

## EXECUTIVE SUMMARY

This report is one of a series of river assessments being prepared by Fisheries Division of the Michigan Department of Natural Resources for Michigan rivers. This document describes the hydrologic characteristics and biological communities of the Rouge River and its watershed in southeast Michigan.

This assessment's purposes are first, to identify opportunities and solve problems concerning aquatic resources and fisheries values within the watershed. Second, to provide a way for public involvement in fishery management decisions. Third, to provide an organized reference for Fisheries Division personnel, other agencies and groups, and citizens who need information about a particular fishery resource.

This document consists of four parts: an introduction, a river assessment, management options, and public comments and responses. The river assessment is the nucleus of the manuscript. In thirteen sections (geography, history, biological communities, geology and hydrology, channel morphology, dams and barriers, soils and land use patterns, bridges and other stream crossings, special jurisdictions, water quality, recreational use, fishery management, and citizen involvement) we describe the characteristics of the Rouge River and its watershed.

In the management options we identify a variety of management problems and opportunities. Three types of options for responding to opportunities or problems are proposed. The first are opportunities to protect and preserve existing resources. The second require additional surveys or data gathering. The third are chances to rehabilitate degraded resources. Opportunities to improve an area or resource, above and beyond the original condition, are listed last. The options listed are not necessarily recommended by Fisheries Division, but are intended to provide a foundation for public discussion and comment and the selection of objectives for managing the Rouge River and its fisheries.

The Rouge River is located in southeastern Michigan and empties into the Detroit River, about midway between Lake St. Clair and Lake Erie. Its watershed is within portions of three counties: Wayne, Oakland, and Washtenaw. It is composed of a mainstem and three major branches, the Upper, Middle, and Lower Rouge rivers.

Discussions of the river begin at the headwaters of the mainstem, and continue through each of the branches. Any notable differences in the mainstem, between the confluences of successive branches, are mentioned as they join the mainstem.

More than 60 fish species are native to the Rouge River drainage, and the original potamodromous species can be inferred from historical records of neighboring river systems. European settlement of the watershed began in the late 1600s. This began a series of many deliberate and inadvertent changes to the river's fish communities. The Rouge River now contains at least 53 fish species. Many native species are still present and abundant; a number have declined severely and are rare; one is considered threatened (redside dace); one has been extirpated (blue pike).

Diversity of fish species is relatively low. The fish and aquatic invertebrate communities are typical of those found in aquatic systems under stress. Game fish species are few, and individuals are small. This is in part due to the small size of the watershed (467 square miles), and to human influences on the river. These influences include degraded water quality from sewage and storm water,

sedimentation and erosion, widely variable flows, fragmentation from dams, paving and channelization of the stream channel near the mouth, and in-stream and riparian habitat destruction.

Rivers exist as patterns of water flow. The geology and hydrology of the watershed define the system. They determine the patterns of water flow over a landscape, reflecting watershed conditions and influenced by climate. The surficial geology of the watershed is defined by a former lake bed (or plain). Although portions of the headwaters are located in glacial outwash, most of the watershed is former lake plain. This affects availability of ground water to the system, topography of the land, and permeability and erosivity of the bed and banks. Flow stability is a determining factor in ecological and evolutionary processes. Flows are looked at annually, seasonally, and daily. The most stable streams in Michigan, the Au Sable, Manistee, and Jordan rivers rarely flood nor have low flows that are less than 80% of average. The Rouge River is very unstable, with annual flow peaks of 20-90 times base flows, summer base flows below 10 cubic feet per second (cfs), and daily fluctuations of over 500 cfs after rain events. These fluctuations destabilize banks, create abnormally large moving sediment bedloads, dislodge and destroy habitat, strand and kill organisms, and interfere with recreational uses of the river.

Gradient (defined as the drop in elevation over a specified length of river) helps determine the energy that water in the stream has to exert on its bed and banks. Stream power is a combination of gradient and discharge of water in a stream. Steeper gradients increase flow velocity, which in turn exert change upon channel depth, width, meandering, and sediment transport. The average gradient of the mainstem is 4.9 feet per mile. Average slopes for the major tributaries are Upper (21.0 ft/mi), Middle (11.2 ft/mi), and Lower Rouge (10.9 ft/mi). The gradient is naturally changing along any given river reach, which creates diverse types of channels and therefore different kinds of habitat for fish and other aquatic life. The best river habitat offers variety that supports different life functions of species. Fish and other aquatic life are typically most diverse and productive in river sections with gradient between 10 and 69.9 ft/mi. Unfortunately, such gradients are rare in Michigan due to the low-relief landscape. Areas of high gradient are also most likely to have been dammed or channelized. The mainstem of the Rouge River contains only 6.1 miles (13%) of the most desirable gradient; the Upper Branch fairs better, with 6.2 miles (44%) in this range; the Middle Branch has over 7 miles (28%), and the Lower Branch has 3.4 miles (14%). In most occurrences, the steepest gradient is located in areas with the least discharge - the headwaters.

The river system is highly fragmented by dams, 62 to date; 26 are on the mainstem and its headwater tributaries, 12 in the Upper Branch watershed, 18 in the Middle Branch watershed, and 6 in the Lower Branch watershed. The majority of the dams are on headwater tributaries, usually in areas of most desirable gradient, water quality, and habitat. Headwater streams are the source of nutrients and aquatic invertebrates (important food for fish), which tend to migrate downstream throughout their life span. Streams and their floodplains are frequently used as storm water detention areas, to the detriment of the system health. Two dams are especially devastating, isolating the watershed from the Detroit River (and Lake Erie ecosystem); these are at Wayne Road in Wayne on the Lower Rouge River and at the Henry Ford Estate in Dearborn on the mainstem.

In combination with climate, soils and land use help decide much of the hydrology and channel form in the river. Changes in land use are often the force that drives change in river habitats. The Rouge River watershed is now dominated by urban and suburban development. This type of land use has a dramatic affect on aquatic environments through increased erosion, drainage of wetlands, channelization of streams, destabilization of water flow, and increases in impervious land area that increase surface water, decrease ground water (never a large component in this watershed), and increase temperature.

As the most densely developed watershed in the state, the Rouge River is crossed by bridges and other stream crossings (i.e., utilities) approximately 1,950 times. Each crossing is a potential source of sedimentation, erosion, contamination, and constriction or relocation of stream channel. Although efforts are being made to minimize degradation to the environment during construction of stream crossings, the potential negative effects remain.

Degraded water quality remains one of the most important impediments to overall river health. Dissolved oxygen levels, temperatures, and nutrient enrichment are water quality parameters considered important to fisheries. Considering these parameters, the mainstem and three major branches have poor to fair water quality, with some headwater tributaries showing fair to good water quality. Conditions generally decline from upstream to downstream. The Lower Rouge River has the worst water quality of the four branches and the mainstem downstream of its confluence with the Lower Rouge River is only slightly better. Unfortunately most sections have identifiable degradation of water quality parameters important to aquatic organisms. Surface water contamination contributing to these degradations comes from both point and nonpoint sources. Contributions from over 150 combined sewer overflows (CSOs) affects the stream due to volume (over 10 billion gallons per year) and composition.

The Rouge River has tremendous recreational potential due to its proximity to the population of Detroit and suburbs. The extensive parkland, primarily managed by Wayne County Parks, makes this one of the most accessible watersheds in the state. Access is more limited in the headwater communities, and particularly in the higher quality reaches. Once water quality and habitat concerns are addressed, the Rouge River could potentially support the highest recreational use of any river in the state.

Fishery management has been limited, due to water quality, habitat, and hydrology limitations. After remediation of the paved section, along with fish passage at the most downstream dam, the lowest reaches of the Rouge River show the most promise for new angling opportunities. The impoundments of the Middle Branch are another area with potential, after remediation of contaminated sediments. Johnson Drain, a tributary of the Middle Branch, is now the location of brown trout stocking. Survival has been limited, mostly due to habitat constraints, but the fishery has been used by area anglers.

The Rouge River watershed does not lack for public interest and support. Large amounts of money and time have been invested in the river to address degradation caused by humans. Many projects have been undertaken to educate the public on the importance of a healthy river, clean up stretches of river affected by CSOs and other forms of pollution, and replace and protect riparian habitat.

The management options offer a variety of ways for communities, interest groups, and individuals to look at opportunities and problems that remain. Participation throughout the watershed in remediation and rehabilitation of the river will be necessary to realize the full potential of this system.