

EXECUTIVE SUMMARY

This assessment for the Muskegon River watershed is one of a series being prepared by Michigan Department of Natural Resources, Fisheries Division, for river basins in Michigan. This assessment describes fisheries and related resources, identifies issues that are of concern to fishery managers, and outlines management options to address those issues. The assessment provides an organized approach to identifying opportunities and solving problems. It provides a mechanism for public involvement in management decisions; allowing citizens to learn, participate, and help determine decisions. It also provides an organized reference for Fisheries Division personnel, other agencies, and citizens who need information about a particular aspect of the river system.

The document consists of four principal sections: introduction, watershed assessment, management options, and public comment and response. The watershed assessment is the nucleus of the document. Physical, biological, and cultural characteristics of the watershed are described under twelve sections: geography, history, biological communities, geology and hydrology, channel morphology, soils and land use patterns, special jurisdictions, recreational use, dams and barriers, water quality, fisheries management, and citizen involvement.

Seventy-seven management options are provided. The options are consistent with the mission statement of the Michigan Department of Natural Resources, Fisheries Division and convey four approaches to correcting problems in the watershed. These include options to protect and preserve existing resources, options requiring additional surveys, opportunities for rehabilitation of degraded resources, and opportunities to improve areas or resources beyond existing conditions. Options are related primarily to aquatic communities; but wildlife, botanical, and social factors are noted where they are important and directly affect aquatic communities. Some options are simple but most are complex, sometimes involving management of the entire watershed which may take many years to accomplish. Management options listed are not necessarily recommended by Fisheries Division, but are intended to provide a foundation for public discussion and comment, eventually resulting in the selection of acceptable management objectives for the Muskegon River and tributaries.

The first draft of the assessment was available for public comment from March through August 1995. Comment from two public meetings and written comments were incorporated into the final assessment. A fisheries management plan will be completed based on the assessment and public comment received. The assessment process is continuous and updates can be completed when needed and new information becomes available.

The Muskegon River is located in north-central Michigan and incorporates over 2,350 square miles of land. The river is 212 miles long, with a 575 ft drop in elevation between the source and the mouth at Lake Michigan. Most of the watershed is contained within eight counties: Roscommon, Missaukee, Clare, Osceola, Mecosta, Montcalm, Newaygo, and Muskegon. Approximately 94 tributaries flow directly into the mainstem and primary tributaries include West Branch of the Muskegon River, Clam River, Middle Branch River, Hersey River, Little Muskegon River, Bigelow Creek, Brooks Creek, and Cedar Creek.

Numerous agencies have regulatory responsibilities that affect the river system. These range from small local governments to large federal bureaucracies. The Federal Energy Regulatory Commission has authority over hydroelectric dams. The US Fish and Wildlife Service, US Forest Service, US Department of Agriculture Natural Resources Conservation Service, and US Environmental Protection Agency have responsibilities for land and natural resources management. The Michigan

Departments of Natural Resources and Environmental Quality manage many natural resources and regulatory activities. Local agencies conduct zoning and other land management activities. County drain commissioners have responsibility for legally designated drains and some lake-level control structures.

There are numerous local government interests including counties, villages, towns, and cities within this watershed. Interest from organized recreational groups is widespread and includes many local hunting and fishing groups in the basin. The river also draws interest from Lake Michigan fishing groups because of migratory fish species using the river. A few environmental groups are locally active in the Muskegon area, focusing on local contamination problems.

Human settlement in this watershed occurred throughout the early to late 1800s and was influenced by exploitation for copper and white pine throughout the state. Lumbering had significant affects on river habitat through log transport down the river and deforestation of the uplands. The development of large hydroelectric dams began in the late 1800s and many smaller dams have been established on the tributaries. Agricultural and urban development has been moderate. Nutrient and chemical pollution peaked in the mid 1900s and had significant effects, especially in Muskegon Lake. The introduction or invasion of pest animals also had notable effects on aquatic communities in the river.

Today, agricultural and urban developments are moderate. Erosion of sediment into streams from uplands is significant. Drainage systems are established on many tributary streams. Irrigation is not widespread in the mainstem but is sometimes a significant withdrawal from tributaries. Use of floodplains for development and agriculture is substantial in many areas. Virgin timber was logged from the entire watershed but secondary timber growth is extensive.

The channel of the Muskegon River has been adversely altered. Most of the moderate and high gradient reaches have been impounded. High gradients produce high diversity stream channels favorable to aquatic communities. Removal of riparian vegetation, especially old growth forest, has reduced important wood habitat in the channel. Many tributaries have been dredged and straightened.

Numerous dams and impoundments exist in the watershed. Five major impoundments are on the mainstem. Three of these are created by operating hydroelectric dams located midway in the river. One is a retired and partially-removed hydroelectric dam at Big Rapids. The last mainstem dam is a wildlife flooding located at the headwaters. Most of the tributary dams are non-hydropower used for aesthetics, swimming, or wildfowl habitat. These dams are detrimental to the river because they impound most high gradient habitat, reduce river habitat, create water flow fluctuations, trap wood habitat and sediments, kill fish, fragment habitat that reduces the genetic integrity fish populations, and block potamodromous fishes from much of the river. As part of federal hydroelectric dam relicensing procedures, a settlement agreement was negotiated in 1994 between the resource agencies and Consumers Power Company. This settlement agreement provides mitigation for some effects the hydroelectric dams have on the river.

Water quality is good in most parts of the watershed. The mainstem is affected by moderate nutrient enrichment and excessive sediment bedload. Localized water quality problems exist near metropolitan sites and below dams. Chemical contaminants causing public health advisories on eating fish in the watershed include mercury, PCBs, chlordane, and PAHs. DDT, DDE, and dioxins are other chlorinated organic chemical contaminants in fish that can affect the health of wildlife species. Organic contaminants in fish have been reduced significantly since the 1970s and are primarily found in species using Lake Michigan for part of their life history. Mercury is a concern for inland species and levels do not appear to be decreasing. Atmospheric emissions appear to be the

largest source of mercury in and near the watershed. Sources for most contaminants are still present in the watershed but discharges appear to be low.

Stable flows generally produce good conditions for fish reproduction and survival. Stable discharge is supported by permeable geology's that provide groundwater to streams. Geologic landforms in the watershed are moderate to high in permeability, which is reflected by intermediate stability in mainstem discharge. The upper river (upstream of Big Rapids) appears to have the most unstable high flows. Hardy Dam is moderating high flows below Croton. Before 1994, hydroelectric dams destabilized low flows and significantly reduced habitat below Croton. The settlement agreement establishes provisions for near normal flows and habitat conditions should improve in the future. Flows in some tributary streams are less stable because of improper operation of lake-level control structures and many are affected by increased surface runoff from agricultural and urban development.

The native fish community in the Muskegon River watershed was composed of 97 species. An additional 12 species colonized through constructed channels or were directly introduced. Current survey records verify the presence of 77 (79%) native species. Of the twenty native species not currently verified, five are most likely extirpated. These include Arctic grayling, lake herring, muskellunge, sauger, and white bass. Three unverified native species may still be present but are not recorded because of limited sampling. These include bloater, lake whitefish, and round whitefish that are currently present in Lake Michigan and seasonally use Muskegon Lake and the lower river for spawning or feeding. The status of the remaining 12 native species not verified in current surveys is uncertain. Additional sampling will be needed to verify their presence or absence. These include spotted gar, mooneye, striped shiner, weed shiner, mimic shiner, pugnose shiner, pearl dace, black buffalo, ninespine stickleback, fantail darter, least darter, and slimy sculpin.

Limited information is readily available on the original aquatic communities in the Muskegon River watershed. However, changes in the fish community of the river are indicated by the disappearance of two species. Arctic grayling had a known riverine stock and the muskellunge most likely had a riverine stock. Grayling have been extirpated from the river system since 1905. Factors contributing to extirpation included overfishing, use of the river for logging, dam (barrier) construction, and habitat changes resulting from settlement. Grayling were very abundant in the Hersey River but the distribution of this species throughout the watershed is not known. The form of muskellunge originally present in the Muskegon River system was the Great Lakes muskellunge. The original distribution of this species in the watershed is not known.

Distributions of other extirpated fish species were not limited to the river. Factors outside the watershed contributed to their demise. Lake herring and sauger were predominantly Lake Michigan species that used the river for part of their life history, and their demise was associated with catastrophic changes that occurred in Lake Michigan fisheries. White bass were an extremely abundant species that primarily used Muskegon Lake and the lower Muskegon River, but the demise of this species may also have been related to changes in Lake Michigan fish species (predators and competitors), along with changes in Muskegon Lake and the Muskegon River. Severe declines in potamodromous stocks have also occurred for walleye, lake sturgeon, and probably lake trout, round whitefish, and lake whitefish. Declines of these stocks were influenced by changes in Lake Michigan and Muskegon Lake, as well as the Muskegon River watershed.

Recent fish community information is not sufficient to accurately document the distribution of most species within the watershed. Fish diversity and biomass are similar to many other large Michigan rivers. The fish community of the mainstem is intermediate in composition between Michigan

warmwater and coldwater streams. Warmwater-coolwater species dominate the fish community but coldwater-coolwater fish are present throughout the mainstem. Populations of some species exhibit low recruitment. Hydroelectric dams are negatively affecting aquatic communities below Croton. A number of important pest species are present.

Five species of fish found in this watershed are listed as threatened species in Michigan: sauger, lake herring, lake sturgeon, river redhorse, and mooneye. Sauger and lake herring have been extirpated from the Muskegon River watershed. Lake sturgeon and river redhorse are found below Croton Dam, the distribution limited to the lower river by hydroelectric dam barriers. The presence of mooneye in the watershed is unlikely. There have been no recent reports from anglers nor have they been collected in fisheries surveys.

Two species of fish in the watershed are listed as Michigan species of concern. These are pugnose shiner and spotted gar. Pugnose shiner have been identified in lakes from within the watershed and spotted gar are found in Muskegon Lake. The weed shiner is an endangered species in Michigan and its presence in the watershed is uncertain.

Comprehensive studies of invertebrates, amphibians and reptiles in the watershed are not available. There are 15 invertebrate species listed on the Michigan Natural Features Inventory, including eleven terrestrial insects, two mussels, one aquatic snail, and one terrestrial snail. Five reptiles are listed on the Natural Features Inventory including three snakes and two turtles. Two mammals and five birds are listed on the Natural Features Inventory.

Outdoor recreation is extensive in the watershed. Fishing is limited over most of the mainstem because of fish blockage by hydroelectric dams. The impoundments cover most of the high gradient river sections and limit river boating recreation and fishing. Access is limited in several areas of the mainstem and tributaries, along with handicap accessible fishing locations.

The type of game fish present at specific locations vary with the character of the river. Fishing from the headwaters to Croton Dam is moderate to poor. From the headwaters to the confluence with the Middle Branch River, there are 85 miles of low gradient mainstem and the primary game fish is northern pike. There are approximately 40 river miles between the confluence with the Middle Branch River and Big Rapids, with 24 miles of moderate gradient and the rest low gradient. Smallmouth bass and walleye are the primary game species, along with stocked trout. Rogers, Hardy, and Croton dams impound approximately 40 miles of moderate and high gradient stream. Fishing in the impoundments is moderate to poor for yellow perch, walleye, smallmouth bass and crappie. Fishing from Croton Dam to Muskegon Lake is good to excellent. There are approximately 45 river miles in this section with 14 miles of moderate gradient and the rest low gradient. Fishing for walleye, smallmouth bass, and northern pike is good. Fishing for stocked resident trout, steelhead, and chinook salmon is excellent. Muskegon Lake is 4,150 acres and supports a variety of fisheries. Fishing is good to excellent for northern pike, walleye, smallmouth bass, largemouth bass, yellow perch, bluegill, pumpkinseed, black crappie, channel catfish, flathead catfish, steelhead, and chinook salmon.

There is considerable potential for protection and enhancement of fisheries in the river. All biological communities would benefit from stabilization of stream discharge, maintaining natural water temperatures, protection and rehabilitation of wetlands, reducing upland and streambank sediment erosion, protection and rehabilitation of instream and lake vegetation habitat, and dam removal or mitigation of various dam issues. Reintroduction of white bass would benefit Muskegon Lake and the lower river. Reintroduction of Great Lakes muskellunge may be possible. Improvement

of native lake sturgeon numbers may be possible. Stocking rainbow trout in Croton and Hardy impoundments may be possible. Stocking resident trout and walleye may be possible in the Big Rapids to Osceola County river section. Fish passage at the hydroelectric dams would benefit the entire river. Species that could benefit include steelhead, chinook salmon, brown trout, walleye, lake sturgeon, river herring, and lake trout. Fish passage could significantly increase natural reproduction and angler catch.