

1.0 INTRODUCTION

1.1 Introduction

The Mahoning River Environmental Dredging Reconnaissance Study addressed problems related to contaminated sediments and opportunities for ecosystem restoration. The study area was located in northeastern Ohio (Figure 1). It included approximately 34 miles of the lower Mahoning River from Warren, Ohio, to the Ohio-Pennsylvania border. This area had been identified in previous reports as being moderately to severely impaired due to contaminated sediments originating from historical industrial activity along the river.

1.2 Study Authority and Policy Requirements

This reconnaissance-level study was conducted by the United States Army Corps of Engineers (USACE) pursuant to Section 312 of the Water Resources Development Act of 1990, as amended by Section 205 of the Water Resources Development Act of 1996. The amended Section 312 provides for the removal of contaminated sediments (dredging) for the purpose of ecosystem restoration, if such removal is requested by a non-federal sponsor, and if that sponsor has agreed to pay 50 percent of the cost of removal and 100 percent of the cost of disposal. Planning for projects to remove and remediate contaminated sediments is conducted in two phases: a reconnaissance phase and a cost-shared feasibility phase. This report summarizes the activities and findings of the reconnaissance phase study.

1.3 Report Requirements

A reconnaissance-level report must present an evaluation of current and probable future environmental conditions within the study area, and must include formulation and evaluation of conceptual restoration alternatives for the river ecosystem. A comparative conceptual-level cost analysis is also required. The report must include the appropriate text, tables, figures and appendices to support the conclusions of the report.

1.4 Purpose and Scope

The purpose of the Mahoning River Environmental Dredging Reconnaissance Study was to identify problems and opportunities for ecosystem restoration that would be in the Federal interest and meet the USACE's requirements for such opportunities in the civil works program. Work for this study included an evaluation of existing technical and historical data, the generation of new data where data gaps were found to exist, and the analyses of all such data pursuant to the purpose stated above.

Several previous studies have generated data suggesting that sediments of the Mahoning River are severely contaminated, but a comprehensive multi-disciplinary investigation directed specifically towards the restoration of the resource had not been undertaken prior to this study. In addition to a review of all reasonably obtainable regulatory and scientific information, a comprehensive small-scale field reconnaissance and sampling program was completed to provide current observations and additional sediment quality chemical data of known quality. Concurrently, an updated sediment volume estimate study and a biological assessment of the river were executed, and various cultural sources, including the Ohio Historical Society, were contacted to provide additional information about the study area. The U.S. Fish and Wildlife service provided a report concerning the current condition of the river.

Prior to the start of the sampling program, over thirty miles of river were reconnoitered by boat, and over three hundred observations were made of previously unmapped river-related features, such as outfalls and structures. These observations were recorded on existing USACE maps. The purpose of the reconnaissance was to locate potential sampling locations and identify impediments to proposed restoration activities.

Samples were taken in 31 locations. There were three goals for the sampling program: to determine the chemical composition of contaminants known to exist in the sediments; to determine how much contamination is present; and to determine whether the amount of contamination varies with the depth of the sediments. This information was needed so that disposal options and costs could be assessed. The sampling program involved both near-shore hand samples taken while wading, and drilled samples taken from a floating plant mid-channel in proximity to each dam.

The riverbanks were also sampled at three locations. The purpose of this sampling was to determine whether contamination extends into the riverbanks from the riverbed sediments, the lateral and vertical extent of such contamination, and the chemical composition of that contamination. Details of the sampling programs are presented in Section 2.

All of this information was then used to formulate river restoration objectives and conceptual restoration plans designed to meet those objectives. The conceptual restoration plans are presented in Section 4.

Once the conceptual restoration plans were formulated, costs for those plans were estimated. In order to obtain accurate estimates, it was necessary to determine the regulatory status of the sediments if they were removed from the river for disposal. The sampling program described above was used to provide an accurate chemical profile of the sediments for this purpose. It was also necessary to have an accurate estimate of the volume of contaminated sediments in the river. A new sediment volume study provided this information. Current geographical information was necessary to identify physical impediments to restoration activities that might affect the cost of any particular restoration effort or make it unfeasible. Finally, various vendors involved in other river restoration projects were contacted to provide information about the applications and limitations of their methods and technologies, as well as to provide cost

information for their goods and services. The costs associated with the conceptual restoration plans are presented in Section 4.

1.5 Determination of Study Area

The area studied included the Mahoning River from Warren, Ohio (River Mile 46), which is located in Trumbull County, to the Ohio-Pennsylvania border (River Mile 12) near Lowellville, Ohio, which is located in Mahoning County (Figure 2). This portion of the river is referred to as the "lower Mahoning River" in this report. These river miles are according to USACE designations. They differ from designations by the Ohio Environmental Protection Agency (OEPA). Table 1 lists the designations according to both systems to accommodate comparisons if necessary by readers familiar with one system or the other.

The upstream limit of the study area was selected based on ecological and human health factors with consideration given to the limits of regulatory navigability. Above RM 44, the river generally meets Warm Water Habitat (WWH) ecological health and human health goals. Contaminated sediments were noted at RM 42.9. A 1988 State of Ohio, Department of Human Health Advisory (HHA) is posted for the river beginning at RM 41.5. The advisory was posted due to the presence of elevated levels of "polynuclear aromatic hydrocarbons" (PAHs). The HHA consists of two advisories, one cautioning against "contact" with sediments in the river and another restricting fish consumption. The fish consumption advisory was revised in the 1997. A copy of the advisory condition as of 1997 is included in Appendix A. Regulatory navigability extends to RM 41. Biological impairment of the river ecosystem begins in earnest around RM 39. The upstream limit was set at RM 46, in order to include all of the above referenced benchmarks. The downstream limit of the study was legislatively defined.

The study area is limited to the width of the river, as it is defined by the Ordinary High Water Elevation (OHW) mark (Figure 3). The OHW elevation mark is the

lateral extent of USACE jurisdiction. The determination of the OHW mark is discussed in Section 2.2.2.

Intrusive reconnaissance and sampling activities were necessarily limited to those areas over which the USACE has jurisdiction, those areas where permission to enter was secured by the USACE, and those areas considered to be public. Non-intrusive investigation was not thusly limited, and included reviews of property and regulatory records for those properties and entities thought to contribute to the current and former condition of the river.

1.6 Study Management and Coordination

All activities undertaken pursuant to the completion of this study were directed by the USACE. Significant local and regional study input was provided by the Mahoning River, Ohio, Environmental Dredging Study Steering Committee, a diverse consortium of local, state, federal, and private entities and individuals with interests in the restoration of the river. Appendix B includes a listing of steering committee members and the minutes of the four meetings involving Corps staff and the steering committee.

1.7 Planning Objectives

The planning objectives are to restore the aquatic ecosystem and biotic integrity of the Mahoning River within the project area to a level existing on a model reach on the Mahoning River just upstream of the proposed project area, and to eliminate the Ohio Department of Health Human Health Advisory (HHA) currently in effect. The model reach of the Mahoning River selected by this study is just upstream of the project area and supports healthy, desirable aquatic life communities, represents a biological standard well worth replicating in the project area, and is not subject to any HHA conditions. Furthermore, the model reach currently meets or has the potential to meet the goals of the Clean Water Act (CWA). Attainment of CWA objectives in Ohio is determined through the use of biologic indices developed by the Ohio Environmental Protection Agency

(OEPA). Current levels of these indices within the project area are depressed well below values required to satisfy the CWA. Within the project area, there are elevated numbers of pollution-tolerant fish, dominated by carp and catfish species, with external physical anomalies.

The location of the area evaluated for ecological restoration is the Mahoning River channel below the OHW elevation from RM 42.9 in Leavittsburg to the Pennsylvania-Ohio border at RM 12, southeast of Lowellville, Ohio. It is anticipated that real estate values would increase within one mile on either side of the river from RM 12 to RM 42.9. Less specifically, the economies of Mahoning and Trumbull Counties would be improved by the implementation of the project. While very substantial benefits would be immediately achieved, the period of time estimated for realization of maximum attainable benefits is 10 years after project completion.

1.8 Pertinent Past Studies

Sediments of the lower Mahoning River have been the subject of numerous studies. Two of the most extensive include a 1976 report by the USACE and a 1996 OEPA report. These reports are discussed below, as well as other reports pertinent to this study.

1.8.1 1976 USACE Report

The 1976 USACE "Report on Feasibility Study on the Removal of Bank and River Bottom Sediments in the Mahoning River" was prepared by Havens and Emerson, LTD, Consulting Engineers, for use by the USACE. This report examined the characteristics of the bottom sediments and oil-soaked bank materials of the Mahoning River, the impact of these polluted materials, and various alternatives for reducing their adverse impact. Chemical data generated from water and sediment sampling is also included in the report.

As stated in the Syllabus fronting this 1976 report, "A number of alternative plans for sediment removal or control were evaluated in this report, ranging from "No Action" to complete removal of all polluted material". In addition, "the study considered the beneficial impact of the removal of three" of the nine dams in the area targeted for restoration in this reconnaissance study. "The evaluation of alternatives included cost-effectiveness comparisons and environmental consequences". The 1976 report recommends "the dredging of sediments between RM 13 and RM 16.3, partial dewatering of the material removed, deposit of the material in a sanitary landfill under controlled conditions, and demolition of low-head dams at RM 6.9, 13.0, and 21.1".

1.8.2 1996 OEPA Report

The 1996 OEPA report "Biological and Water Quality Study of the Mahoning River Basin" (OEPA Technical Report MAS/1995-12-14) was issued by the Division of Surface Water of the Ohio EPA. It is based on comprehensive chemical, physical, and biological sampling conducted in the Mahoning River Basin study area during the summer and early fall of 1994.

The purpose of the study was to: 1) determine the extent to which use designations assigned in the Ohio Water Quality Standards (WQS) were either attained or not attained; 2) determine if use designations assigned to a given water body were appropriate and attainable; and 3) determine if any changes in key ambient biological, chemical, or physical indicators had taken place over time.

Similar studies had been conducted by the OEPA in 1980, 1983, and 1986. The OEPA 1996 study included a total of 42 sampling sites on the Mahoning River mainstem, 25 sites located on Mahoning River tributaries, 3 Beaver River and 2 Shenango River sites, 10 sites in the Yankee Creek subbasin, and 10 sites in the Pymatuning Subbasin.

The 1996 OEPA report includes water chemistry data, sediment chemistry data, and biological data. The report concludes that Mahoning River sediments were contaminated; and that, unlike most of Ohio's larger streams, there was only slight improvement in the WWH use attainment status of the lower half of the Mahoning River mainstem during the 1980-1994 period. The primary reason identified for the failure of the river ecosystem to respond to decreased loads of pollution was residual contamination of the sediments.

1.8.3 The Mahoning River Corridor Plan

In 1991, the Center for Urban Studies at Youngstown State University submitted a proposal to the Ohio Department of Development for the preparation of a long-range development plan, called The Mahoning River Corridor Plan, for the 50-mile segment of the Mahoning river that runs between Newton Falls and the Ohio-Pennsylvania border. A portion of the plan outline called for a sampling and analysis program and the formulation of alternatives. Public officials were contacted and letters of support for development of the Mahoning River Corridor were received from the following:

- Warren Township Trustees
- Township of Weathersfield
- Office of the Mayor, Youngstown
- City of Girard
- Howland Township Trustees
- Poland Township Trustees
- Mayor, City of Warren
- Mahoning County Planning Commission
- Braceville Township Trustees
- The Mayor, City of Struthers
- CASTLO Community Improvement Corp.
- Mayor, Village of Lowellville
- Congressman Traficant
- Mayor, McDonald Village
- Trumbull County Commissioners

1.8.4 Others

A number of other reports exist regarding the various aspects of the lower Mahoning River. A bibliography listing these reports is included as Appendix C.