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US Army Corps
of Engineers
Buffalo District



Cuyahoga River, Ohio Restoration Study

Draft Executive Summary

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December 1985

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Cuyahoga River, Ohio Restoration Study: Draft Executive Summary		5. TYPE OF REPORT & PERIOD COVERED Draft
7. AUTHOR(s)		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, Buffalo 1776 Niagara Street Buffalo, NY 14207		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE December 1985
		13. NUMBER OF PAGES 46
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release, distribution unlimited		15. SECURITY CLASS. (of this report)
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Flooding Flood damage reduction Cuyahoga River		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) a. Subject: Preliminary Feasibility Report (PFR) on Flood Control in the Valley View/Independence Area - Cuyahoga River, Ohio, Restoration Study. b. The primary water resources needed for which a solution was sought under the Cuyahoga River Reports was to reduce flood damages at four specific sites in the Valley View/Independence Area.		

DRAFT EXECUTIVE SUMMARY
CUYAHOGA RIVER RESTORATION STUDY

GEOGRAPHICAL SETTING

The Cuyahoga River is about 100 miles long and drains some 810 square miles of northeastern Ohio as shown on Figure 1. The river begins at an elevation of about 1,300 feet, several miles northeast of Burton in Geauga County, and flows in a southerly direction towards Hiram Rapids, where the direction changes southwesterly through Mantua, Kent, and Cuyahoga Falls, to the confluence with the Little Cuyahoga River at Akron. From Akron, the river flows north to Cleveland, to an elevation of about 570 feet. The lower 5.8 miles are part of an existing Federal navigation project for Cleveland Harbor, one of Lake Erie's major ports.

The main tributaries of the Cuyahoga River are: Big, Mill, Brandywine, Tinkers, Yellow, and Chippawa Creeks; Mud Brook, Furnace Run, Little Cuyahoga River, Congress Lake Outlet (Breakneck Creek), and West Branch Cuyahoga River. The overall basin consists of rolling hills and many natural small lakes and ponds. A relatively distinct escarpment near Cleveland divides the basin between an upland plateau and the narrow lake plain.

STUDY AUTHORITY

The Cuyahoga River Restoration Study was initiated by the Flood Control Act of 1968 (Section 219) which authorized a survey of the "Cuyahoga River from Upper Kent to Portage Trail in Cuyahoga Falls, OH, in the interest of flood control, pollution abatement, low-flow regulation, and other allied water purposes." No studies were completed under the 1968 authorization because of adverse public reaction to the limited study scope as presented at the initial public meeting on 16 September 1970. At this meeting, local interests stated their desire for environmental and aesthetic improvement programs to complement existing and proposed flood control studies. This led to expansion of the scope of the study under the authority of Section 108 of the 1970 River and Harbor Act, that instructed the Secretary of the Army, acting through the Chief of Engineers to "investigate, study, and undertake measures in the interest of water quality, environmental quality, recreation, fish and wildlife, and flood control, for the Cuyahoga River Basin, OH. Such measures shall include, but not be limited to, clearing, snagging, and removal of debris from the river's bed and banks; dredging and structural works to improve streamflow and water quality; and bank stabilization by vegetation and other means."

The authorization was sponsored by the Cuyahoga River Reclamation Commission, an agency of the city of Cuyahoga Falls. Congressional support came from former Senator Stephen M. Young and former Congressmen J. William Stanton (11th District) and William H. Ayres (14th District). The 1970 authorization was sponsored by Congressman Louis B. Stokes (21st District) and former Congressman Charles A. Mosher (13th District).

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FIGURE 1

The following is the text of the Authorization:

a. Flood Control Act of 1968

"Section 219. The Secretary of the Army is hereby authorized and directed to cause surveys for flood control and allied purposes including channel and major drainage improvements . . . to be made under the direction of the Chief of Engineers, in drainage areas of the United States and its territorial possessions, which include the localities specifically named in this section. After the regular or formal reports made on any survey authorized by this section are submitted to Congress, no supplemental or additional report or estimate shall be made unless authorized by law except that the Secretary of the Army may cause a review of any examination or survey to be made and a report thereon submitted to Congress, if such review is required by national defense or by changed physical or economic conditions . . . Cuyahoga River from Upper Kent to Portage Trail in Cuyahoga Falls, Ohio, in the interest of flood control, pollution abatement, low flow regulation, and other allied water purposes. . ." (underline added)

b. River and Harbor Act of 1970

"Section 108. (a) The Secretary of the Army, acting through the Chief of Engineers, is authorized to investigate, study, and undertake measures in the interests of water quality, environmental quality, recreation, fish and wildlife, and flood control, for the Cuyahoga River Basin, Ohio. Such measures shall include, but not be limited to, clearing, snagging, and removal of debris from the river's bed and banks; dredging and structural works to improve stream flow and water quality; and bank stabilization by vegetation and other means. In carrying out such studies and investigations the Secretary of the Army, acting through the Chief of Engineers, shall cooperate with interested Federal and State agencies." (underline added)
(b) Prior to initiation of measures authorized by this section, such non-Federal public interests as the Secretary of the Army, acting through the Chief of Engineers, may require, shall agree to such conditions of cooperation as the Secretary of the Army, acting through the Chief of Engineers, determines appropriate, except that such conditions shall be similar to those required for similar project purposes in other Federal water resources projects." (underline added)

PURPOSE OF EXECUTIVE SUMMARY

In accordance with the authorizing legislation, the Cuyahoga River Restoration Study (CRRS) was initiated in 1970 with the objective of developing a program to restore the river environment and upgrade the quality of the Cuyahoga River Basin. The study has continued through the present with four major reports having been completed: The First Interim Report (September 1971); the Second Interim Report on Flood Control in the Cuyahoga River Basin (March 1976); the Third Interim Report on Erosion and Sedimentation (November 1979); and the Draft Final Feasibility Report on Flood Control in the Valley View/Independence area (December 1985). The purpose of this Executive Summary is to provide the reader with a brief overview of the contents of these reports and their findings and conclusions. For further details, the reader is referred to the individual reports available for inspection at the Buffalo District Office.

SCOPE OF THE CUYAHOGA RIVER RESTORATION STUDY

The study categories of water quality, environmental quality, recreation, fish and wildlife, and flood control listed in the 1970 study authorization are very broad and interrelated. For this reason, it was necessary to subdivide these categories into eight specific water-related resource problems. These eight specific problems are as follows: water quality, recreation, water supply, flood control, erosion and sedimentation, debris removal, fish and wildlife, and aesthetics. These problems were either addressed in an Interim Report of the CRRS, or, by other local, State, or Federal interests, as follows:

(1) Water Quality - The Northeast Ohio Areawide Coordinating Agency is currently involved in a Section 208 Study (Public Law 92-500) in the Cuyahoga River Watershed. The goal of this study is to identify development and management water quality programs that would control point and nonpoint sources of pollution, thereby reestablishing and maintaining the highest practical water quality in the Cuyahoga River Basin. To avoid duplication of effort, no further consideration was given to this aspect under the CRRS.

(2) Recreation - Various Federal, State, and local agencies are currently involved in recreational planning and implementation in the Cuyahoga River Watershed. Of particular importance are the activities of the State of Ohio - Cleveland Metropolitan Parks Department, Akron Metropolitan Park District and Ohio Department of Natural Resources - and the National Park Service under their management of the Cuyahoga Valley National Recreation Area. Thus, since other Federal, State, and local agencies have taken the lead in meeting both the immediate and long term recreation needs of the area, further study under the CRRS was not warranted.

(3) Water Supply - The problems associated with providing a sufficient supply of water for present and future needs of the Cuyahoga River Basin have been addressed by the Ohio Department of Natural Resources in their 1972 Northeast Ohio Water Development Plan. Therefore, there was no need to study this problem under the CRRS.

(4) Flood Control - Flooding along Big Creek was addressed in the First Interim Report of the CRRS and the remaining flood problems in the basin were addressed in the Second Interim Report. Flooding in the Valley View/Independence area was reassessed in the Final Report.

(5) Erosion and Sedimentation - Addressed in the Third Interim Report for this study.

(6) Debris Removal - Addressed in the Third Interim Report as a means to reduce streambank erosion and in the Final Report as an alternative measure to reduce flood damages in the Valley View/Independence area.

(7) Fish and Wildlife - Since there was no interest on the part of other Federal, State, or local agencies to address this need under the CRRS, no further consideration was given to this aspect. However, although this need was not considered separately, all alternatives formulated for the various

reports conducted under the CRRS were discussed and coordinated with the U.S. Fish and Wildlife Service to assure that any required mitigation was incorporated into the considered alternatives.

(8) Aesthetics - Since there was no interest on the part of other Federal, State, or local agencies to address this need under the CRRS, no further consideration was given to this aspect. However, all alternatives formulated for the various reports conducted under the CRRS gave full consideration to enhancing the physical environment, where possible.

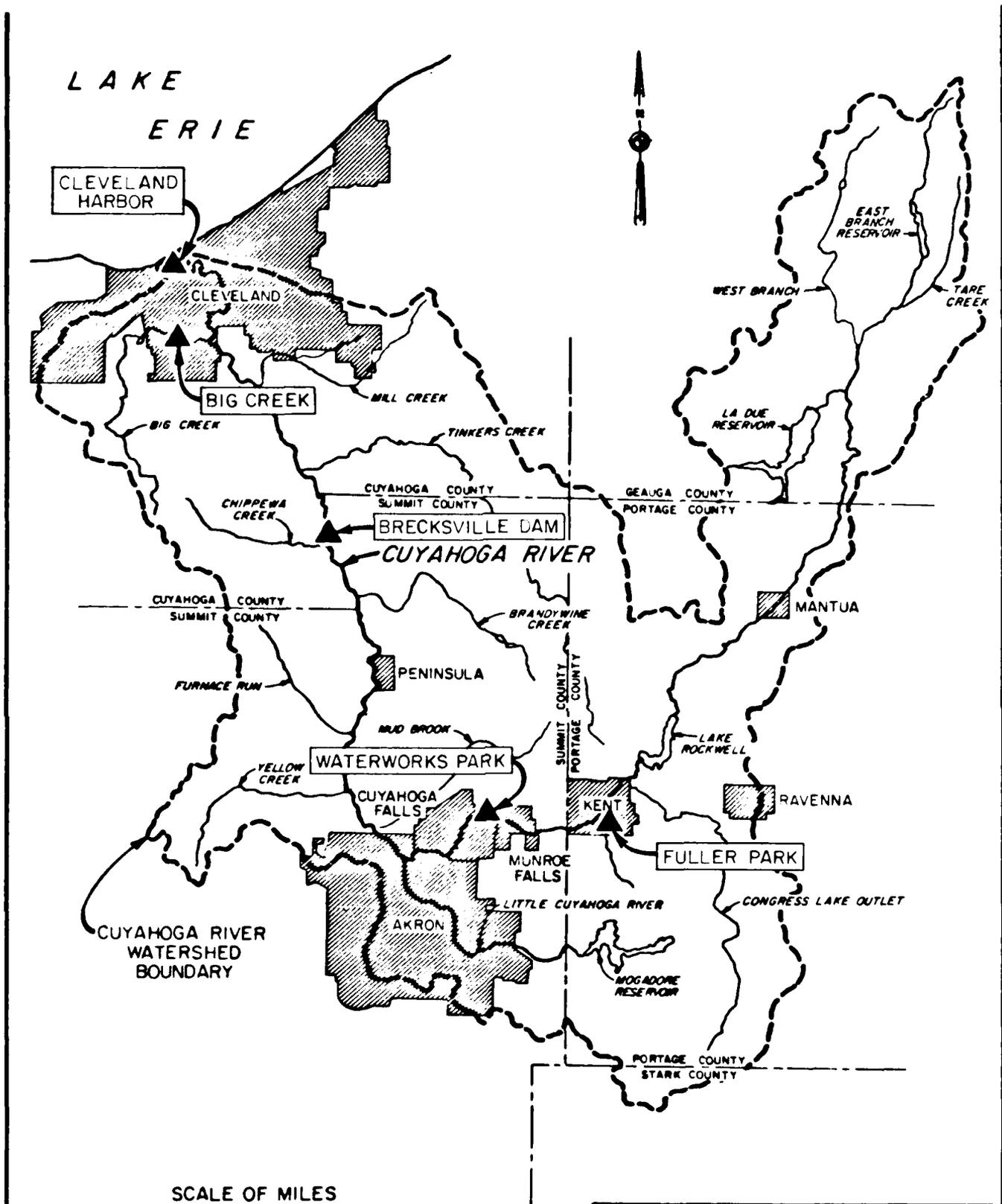
FIRST INTERIM REPORT

The First Interim Report (September 1971) presented the scope of the longer-term Framework Plan plus an Early-Action Program for the Cuyahoga River Restoration Study. The Framework Plan presented a description of the basin's resource problems and needs, and possible alternative means of dealing with these problems and needs. Sources of pollution and other degradable conditions were sought out and identified. Current pollution abatement programs were inventoried to determine their effects on pollution. The Early-Action Program consisted of four action programs that were considered compatible with the overall framework plan and which could be constructed or accomplished without additional study. The four early-action programs were (see Figure 2):

(a) Recreational improvements such as canoe docks and landscaping at Waterworks Park-Cuyahoga Falls (river mile 49.0) and Fuller Park-Kent (river mile 54.0). In a letter to Congress dated 25 September 1975, the Secretary of the Army deferred these proposed recreational facilities. The Secretary also indicated that these facilities would be reviewed in subsequent studies of the basin. As stated in the "Revised Plan of Study, Cuyahoga River Restoration Study" (January 1978), it was the consensus of the local officials that present and future recreational needs have been identified and programs for expansion to meet these needs have been outlined. Therefore, the need for improving the recreational facilities in the basin under the Cuyahoga River Restoration Study was not investigated further.

(b) Debris removal from Cleveland Harbor. The Secretary of the Army deferred implementation of this program because he concluded that ". . . removal of debris outside the Federal channel should be prosecuted by non-Federal interests."

(c) Flood control and aesthetic improvements on Big Creek at the Cleveland Zoological Park. Funds to begin Advanced Engineering and Design for this \$25 million project were released in October 1975. The Phase II General Design Memorandum was completed in FY 79. Plans and Specifications were essentially completed in FY 80. However, construction has not been initiated due to lack of Federal funding which has been withheld because the project is not economically viable at the ever increasing Federal discount rate. Historically, a project would have proceeded based upon the discount rate that prevailed at the time construction funds were first appropriated. This reasoning has not held up for this project.



**CUYAHOGA RIVER, OHIO
 RESTORATION STUDY**

**EARLY ACTION PROGRAMS
 (1st INTERIM REPORT)**

 U.S. ARMY ENGINEER DISTRICT BUFFALO
 DECEMBER 1985

FIGURE 2

(d) Pilot sediment removal project was considered on the upstream side of the dam at Brecksville, Ohio. On 16 July 1976, the Buffalo District Engineer recommended that the Pilot Sediment Removal Project be terminated. The project showed that sediment removal was not a feasible means of improving water quality on the upstream side of the Brecksville, OH, dam because the sediment in this area was relatively unpolluted, with no oxygen depletion. This recommendation was concurred with by the Division Engineer and approved by the Office of the Chief of Engineers by letter dated 9 December 1976.

SECOND INTERIM REPORT

Flooding in the Cuyahoga River Basin is a frequent and costly problem for local residents. For example, the most recent major flood, which occurred in September 1979 had a frequency of occurrence of about once in 40 years, and caused damages in excess of \$3 million. Local interests have repeatedly requested assistance in alleviating these flood damages.

In response to these requests and in accordance with the authorizing resolutions, the Buffalo District investigated the feasibility of providing flood protection for the Cuyahoga River Basin in the Second Interim Feasibility Report for the Cuyahoga River Restoration Study (CRRS). Five floodprone areas were identified in the study and corrective plans for these areas were developed. The five areas investigated were (see Figure 3): Lower Cuyahoga (from river mile 5.8 to river mile 18.8), village of Mantua, Hudson Village and cities of Streetsboro and Twinsburg. Types of improvements considered were: channelization; reservoirs; and floodproofing. Further, clearing and snagging was considered at the village of Mantua and cities of Streetsboro and Twinsburg, and shoal removal was investigated at the city of Streetsboro. However, with the exception of a clearing and snagging and shoal removal project at the city of Streetsboro, no plan was economically justified. Further, although a clearing and snagging and shoal removal project at the city of Streetsboro was economically justified, the primary responsibility for the plan rested with local interests. Therefore, since the Federal interest in the proposed flood control plan at the city of Streetsboro was insignificant and plans to reduce flood damages at the other four locations were not economically justified, the Second Interim Flood Control Study was terminated in 1976.

THIRD INTERIM REPORT

The commercial navigation harbor at Cleveland, Ohio, consists of a breakwater-protected Lakefront Harbor in Lake Erie and improved navigation channels on the Cuyahoga River and Old River. When sediment carried by the Cuyahoga River reaches the relatively quiet waters of the navigation channel and Lakefront Harbor, it deposits sediments and forms shoals. These shoals must then be removed by maintenance dredging costing approximately \$4,000,000 per year. (NOTE: Does not include additional cost of providing diked disposal facilities required because the dredged sediment is heavily polluted based on present U.S. Environmental Protection Agency standards). Also, in addition to the annual cost for dredging the navigation channels and

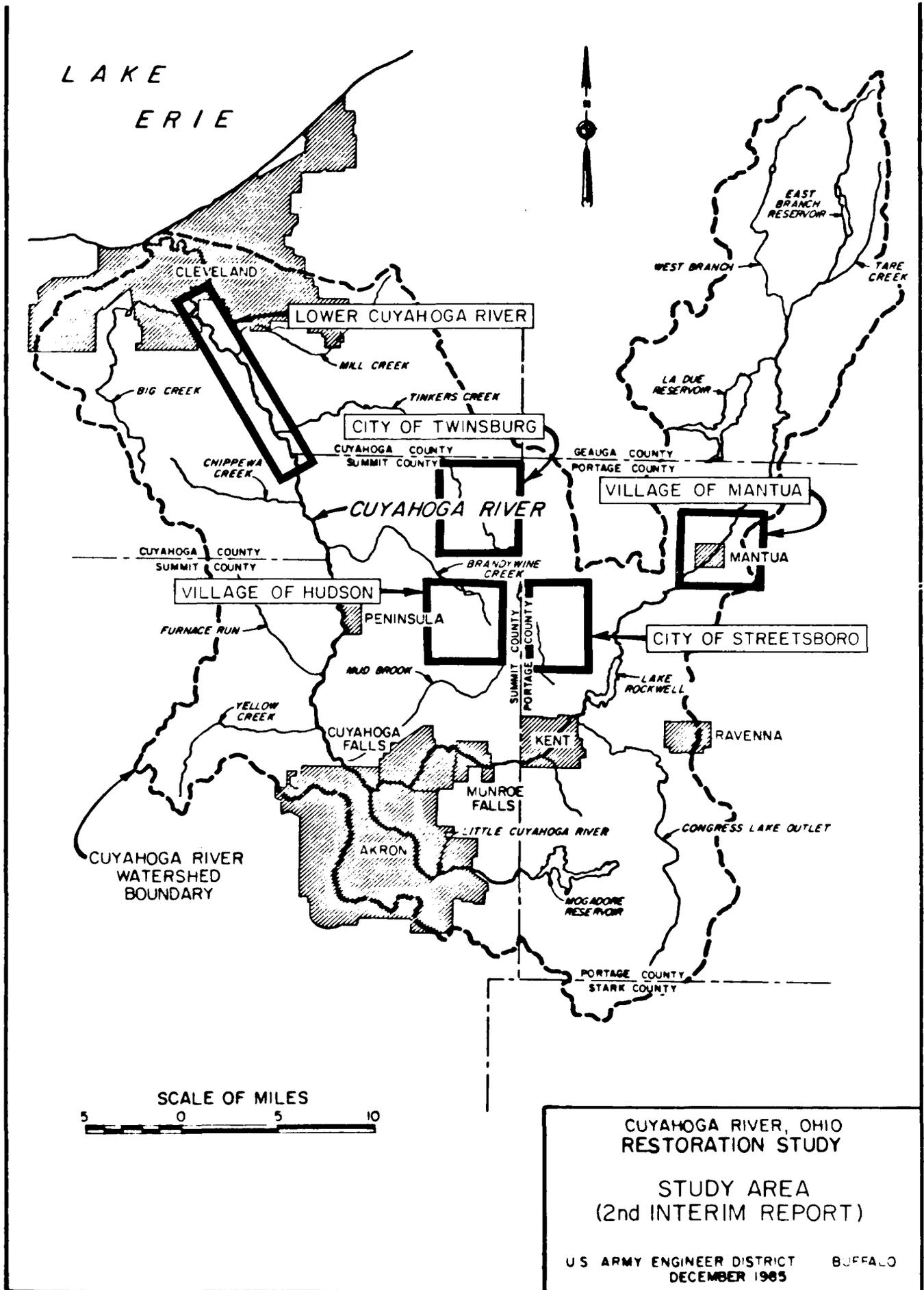


FIGURE 3

Lakefront Harbor, sediment accumulation presents severe problems to commercial interests utilizing the harbor facilities. Since dredging is normally not concluded until July, vessels must reduce their load in the Lakefront Harbor before proceeding upriver; also, sediment enters the ship's ballast system and accumulates until the ship is laid up.

At the request of local interests and because of the costly problems listed above, the Third Interim Report on Erosion and Sedimentation was initiated in 1977 and the Preliminary Feasibility Report was essentially completed in 1980. This was followed by a Supplemental Information Report completed in 1982. These reports presented a summary of the results of the planning effort conducted since initiation of the erosion and sedimentation study. This planning effort included detailed studies to identify and quantify the major sources of sediment in the Cuyahoga River Watershed, and formulation and assessment of a wide range of alternative measures for addressing the erosion and sedimentation problems of the area.

Although the Cuyahoga River drains an area of approximately 810 square miles, the scope of the erosion and sedimentation study was directed towards identifying the sources of erosion and determining the feasibility of providing erosion control measures in the 303 square miles of the Cuyahoga River Basin between Independence, Ohio, (river mile 13.8) and Old Portage, Ohio, (river mile 40.25) (see Figure 4). This reach of the river was identified by Dr. Robert Apmann in his report on "Erosion and Sedimentation of the Cuyahoga River Basin" (1973) as the most prolific source of sediment in the river system. Dr. Apmann's findings were subsequently confirmed by a 1-year suspended sediment data collecting program conducted by the U.S. Geological Survey.

A summary of the results of the erosion and sedimentation studies follows.

a. Summary Results of Streambank Erosion Control Studies.

The purposes of the streambank erosion control studies conducted for the Third Interim Report were to identify and quantify sources of streambank erosion and to determine the feasibility of implementing streambank erosion control measures in the channel component study area. The channel component study area consisted of the main stem (main channel) of the Cuyahoga River between Independence, Ohio (river mile 13.8), and Old Portage (river mile 40.25) and the channels of the six major tributaries in this reach. These tributaries are Mud Brook, Brandywine Creek, and Tinkers Creek on the east side of the basin and Yellow Creek, Furnace Run and Chippewa Creek on the west side of the basin.

Results of the studies conducted indicated that of the 143 miles of streambanks studied (71.5 river/stream miles) only 22.7 miles, or 16 percent of the streambanks were actively eroding. The studies also indicated that annual streambank erosion produces about 52,000 cubic yards of sediment per year. Of this 52,000 cubic yards of sediment, it is estimated that 47,000 cubic yards of sediment is transported to Cleveland Harbor and requires annual maintenance dredging. This volume of sediment represents about 5 percent of the total volume of sediment annually dredged. The studies also indicated

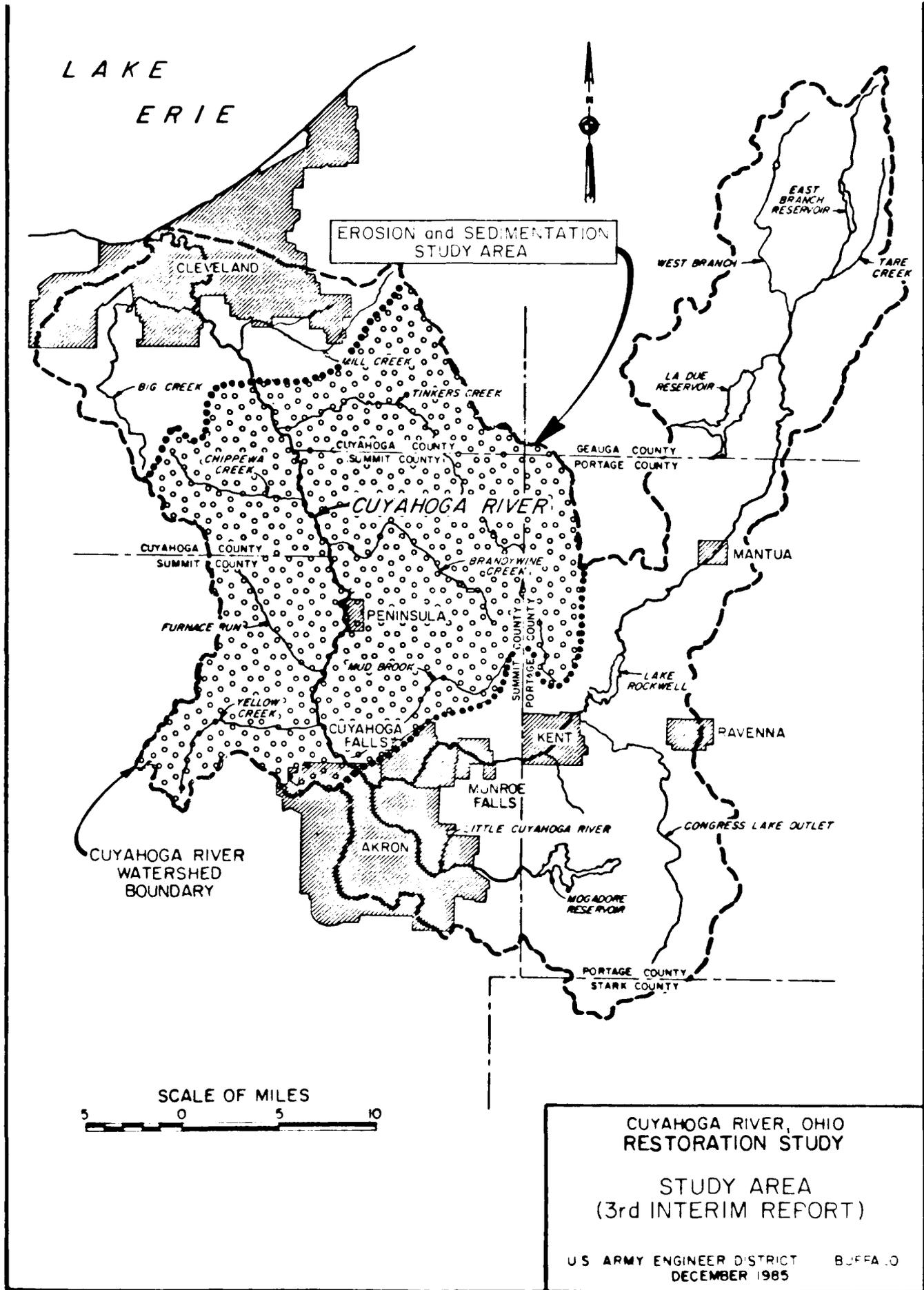


FIGURE 4

that there were seven locations on the Cuyahoga River where the existing rate of annual streambank erosion was likely to produce a change in the course of the river (potential meander change). If these potential meander changes were to occur, they would introduce an additional 125,000 cubic yards of sediment into the river system. In addition, the studies indicated that damage to local roads and railroad facilities of the Baltimore and Ohio Railroad (Chessie System) will occur in the future due to streambank erosion at these sites.

Initially, a total of nine structural and/or nonstructural conceptual alternatives (including no action) were formulated to control streambank erosion within the study area. Preliminary evaluation and assessment of these conceptual alternatives indicated that only three alternatives warranted further consideration. In addition, the basis of comparison for these three alternatives was the no action (do nothing) plan. Based on additional evaluation and assessment, it was determined that the three alternatives warranting further study were not economically feasible and no overriding environmental or social benefits would be derived from implementation of these plans. Therefore, it was concluded that the "no action" plan was the appropriate course of action as regards streambank erosion control for the Cuyahoga River and its tributaries. Further, as no streambank erosion control plan was economically feasible, this aspect of the study was terminated.

b. Summary Results of Upland Erosion Controls Studies.

The purposes of the upland erosion control studies were to identify and quantify sources of upland erosion and to develop a series of management programs to control erosion in the upland study area (the 303-square mile drainage basin of the Cuyahoga River between Independence (river mile 13.8) and Old Portage (river mile 40.25)). Implementation of these management programs, must, however, be pursued by other (local) interests.

Results of the investigations conducted for the study indicated that erosion and sedimentation is a very serious problem in the upland area. For example, sheet and rill erosion (diffuse nonpoint sources) from critically eroding areas produce about 884,000 tons of soil loss annually. These critically eroding areas occur on only 27,000 acres, or 14 percent of the total area. All other areas within the study area produce an insignificant volume of soil loss and can be deleted from further consideration.

Of the 884,000 tons of soil loss produced from critically eroding areas, it is estimated that 551,000 tons is delivered to the Cuyahoga River system annually and requires maintenance dredging at Cleveland Harbor. This volume of sediment represents about 43 percent of the total volume of sediment dredged. Therefore, in order to significantly reduce dredging costs at Cleveland Harbor, an effective erosion control program must be implemented on these critically eroding areas.

Management programs were developed to control sheet and rill erosion on critically eroding areas. These management programs consisted of Best Management Practices (BMP's) which, based on Soil Conservation Service experience with similar type projects, are both effective in erosion control

and economically justified (that is, local interests implementing the management programs will realize benefits equal to or greater than the cost of implementing these programs). The average cost to implement these management programs on critically eroding areas was estimated at \$300 per acre. Sediment produced from identifiable nonpoint sources of erosion (gully erosion and flood plain scour on disturbed areas) is also a significant problem in the upland area. For example, this study identified a total of 32 sites, comprising 587 acres, where gully erosion or flood plain scour is occurring within the study area. In addition, it is estimated that these sites produce about 138,000 tons of sediment per year that requires annual maintenance dredging at Cleveland Harbor (11 percent of the total volume dredged). These sites also produce an additional 48,000 tons of soil loss per year from gully erosion that does not enter the river system. However, this still represents a significant loss of a natural resource.

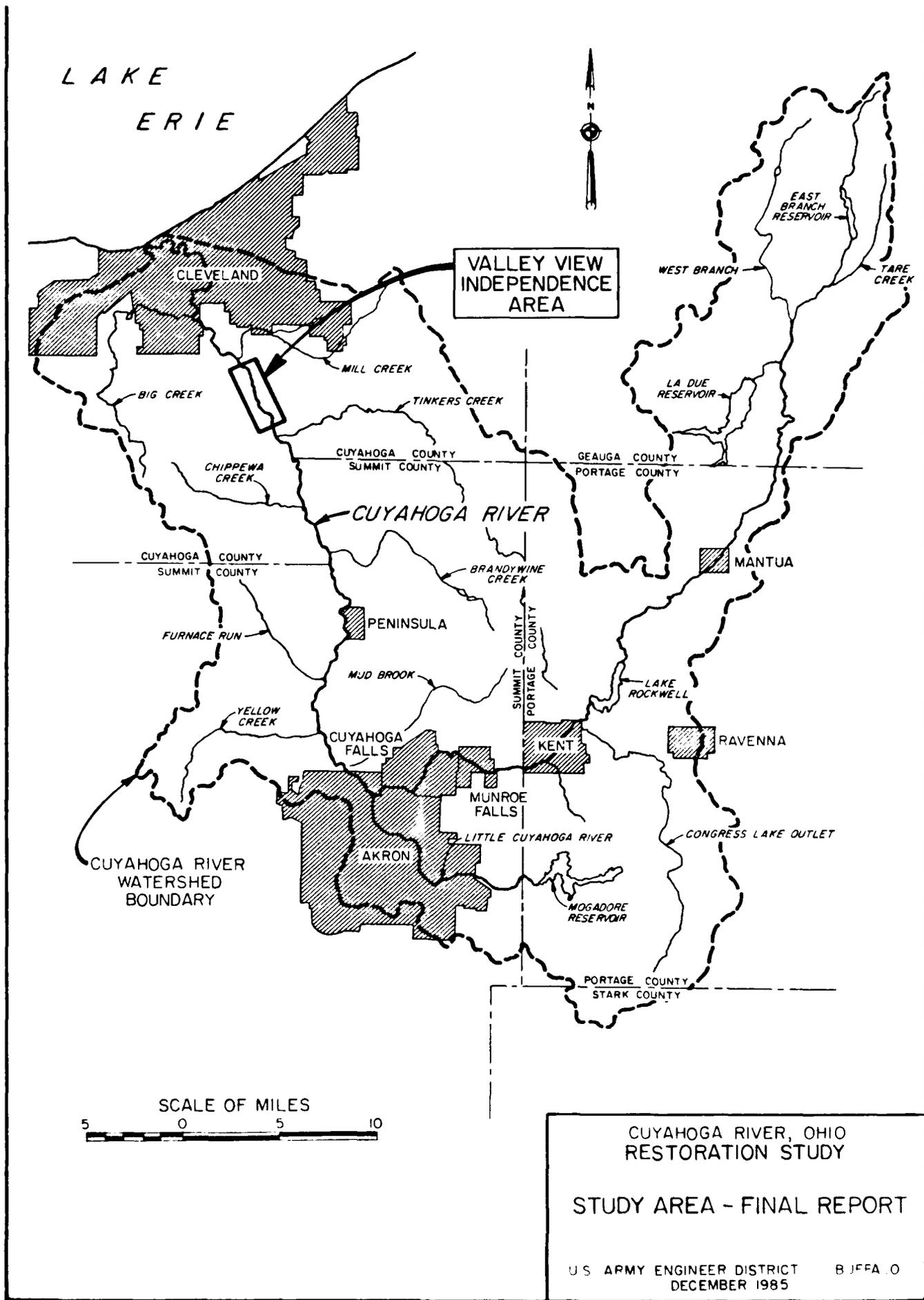
Management programs were developed to control the erosion on these 32 identifiable nonpoint sources of erosion. These management programs consisted of BMP's similar to those required to treat sheet and rill erosion. The average cost to implement these management programs was estimated at \$2,800 per acre. However, since implementation of the management programs developed for both diffuse and identifiable nonpoint sources of erosion is the responsibility of local interests, this aspect of the study was also terminated once the information was provided to local interests.

DRAFT FINAL REPORT

As previously discussed, the Second Interim Study investigated the feasibility of providing flood protection measures in the lower reach of the Cuyahoga River from river mile 5.8 to river mile 18.8 which includes the Valley View/Independence area. Types of protection measures considered included channelization, reservoirs, and floodproofing, all providing protection for the entire reach of the river. However, no plan was economically feasible and the study was terminated in 1976.

Subsequent to completion of the Second Interim Report, local interests in the Valley View/Independence area (between river mile 11 and river mile 16 - see Figure 5) requested that smaller-scale flood control measures, such as minor channelization, clearing and snagging, debris removal, and/or ring levees be investigated for areas within their communities where high flood damages occur. In addition, several flood events occurred subsequent to completion of the Second Interim Report which indicated that the damage-frequency curves for the Valley View/Independence area used in the previous study may have been too low, thus underestimating potential flood control benefits. Based on the above, it was deemed appropriate to reevaluate the flooding problem in the Valley View/Independence area with a view towards providing some limited degree of protection for concentrated damage areas in the Final Report for the CRRS.

As a first step in the study, four areas in the Valley View/Independence area were identified where flooding was particularly severe: two areas were commercial-industrial areas, and the other two areas were residential. All other reaches within the Valley View/Independence area either did not contain



**CUYAHOGA RIVER, OHIO
 RESTORATION STUDY**

STUDY AREA - FINAL REPORT

 U.S. ARMY ENGINEER DISTRICT BJFFA.0
 DECEMBER 1985

FIGURE 5

any structures (and thus flood damages would be minor), or, if there were structures present, they were isolated and potential flood damage reduction benefits in these areas would not be of sufficient magnitude to support a flood control project. Therefore, the remainder of the study concentrated on these four high damage areas.

Alternatives were developed to reduce flood damages in these four areas. These alternatives fell into four broad categories: levee protection plans; floodproofing; minor channelization; and flood plain relocation. However, no plan was economically justified and the study was terminated. Further, as this was the last report to be prepared under the Cuyahoga River Restoration Study, the study authority was also terminated.

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