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ABSTRACTS OF PAPERS PRESENTED AT THE MISSISSIPPI RIVER RESEARCH CONSORTIUM
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June 2-3, 1972

IMPLICATIONS OF SNAIL SHELLS IN LOESS-CAPPED STREAM TERRACES OF LA CROSSE COUNTY, WISCONSIN: A PRELIMINARY REPORT. Edward J. Weinzierl, University of Wisconsin, La Crosse, Wisconsin.

Small drainage basins tributary to the Mississippi River in La Crosse County have been examined in the field for the past three years. The purpose of these investigations is to collect data concerning the morphology and structure of late Pleistocene and postglacial stream terraces. It is anticipated that this information will provide the basis for a climatic interpretation of terrace development. In order to achieve this goal the past environments associated with stream deposition and erosion must be reconstructed with precision. While a thorough understanding of former environments can best be obtained by use of multiple indicators, this report deals only with the significance of molluscan remains as preserved in the dominant terrace bench.

Samples of terrace material were collected in continuous vertical sections and then sluiced through a fine mesh sieve. The snail shells retained on the screen were identified and tabulated according to species and depth.

The great majority of species are terrestrial gastropods and still survive in modern North American snail assemblages. Many of the recovered shells, however, are no longer indigenous to southwestern Wisconsin. Gastropod forms now living in northern latitudes or at high elevations were found in the sandy, basal portions of terrace fills. In the overlying zones of loess, these snail species whose living counterparts inhabit climatic regions similar to those of the eastern United States.

These data suggest that local valley filling began during periglacial climates when frost weathering and solifluction were active on the sandstone slopes. Temperate, more humid conditions followed and were accompanied by the deposition of loess deflated from the adjacent Mississippi floodplain. Denser vegetation apparently stabilized the source areas of sediment and promoted stream cutting which resulted in terrace scarps.

ECOLOGICAL SURVEY OF POOL 21, UPPER MISSISSIPPI RIVER. John L. Ostdiek, G.H. Schneider and A.F. Pogge, Quincy College, Quincy, Illinois.

Silt bottoms contained the greatest variety and sand the lowest populations of benthic organisms. Gravel provided the best habitat for caddis fly and other larger larvae. Bottom stability seems to be an apparent survival factor.

A wide variety of phytoplankton was found. Of great concern is the vast amount of sand depositing in the river, and the effect of the many wing dams on shifting and redepositing of this sand.

WATER RESOURCES INFORMATION PROGRAMS: NATIONAL, REGIONAL AND STATE-WIDE EFFORTS. James E. Kerrigan, Water Resources Center, University of Wisconsin, Madison, Wisconsin.

The Wisconsin Water Resources Center has been actively developing an information program for the past six years to provide for the collection, indexing and transfer of water resources information. During the same period, the federal government has been developing programs of national significance. Namely, the Water Resources Scientific Information Center (WRSIC) of the Office of Water Resources Research has supported activities which brings up-to-date information into current notice. Within its program WRSIC has designated the Water Resources Center as a "Center of Competence" to abstract literature in the area of eutrophication and the Environmental Protection Agency has supported the processing of this information into critical literature reviews and the selective distribution of bi-monthly summaries of current literature citations. In addition, WRSIC has designated the Center a "Center of Competence" in the area of water resources economics. Abstracts from both areas are published with others collected by WRSIC into the "Selective Water Resources Abstracts" by the National Technical Information Service (bi-monthly).

To date over 30,000 abstracts are available in the WRSIC computer data base system on a multi-key-word format. Recently the Center has been offered a remote terminal to be located in Madison with on-line computer access to the entire WRSIC collection with the purpose of serving requests for information for 21 states, including Hawaii and Alaska. Remote access terminals at three other locations will cover smaller regions within the experimental program.

Toward further serving the informational needs of the state, the Center has developed a collection of current reports on water resources within the Water Resources Reference Room. Notification of acquisition to the collection are distributed to interested agencies, educators, researchers and interested citizens. Documents are available on loan, and literature reviews and searches are conducted with the assistance of information specialists on a fee-charge basis for the more difficult searches.

A major activity is underway to provide a more complete picture of the agency personnel, faculty, organization, etc., in the state to whom the information could be of most use in carrying out their responsibilities. Because the Mississippi River Research Consortium is deeply involved with encouraging communication between river scientists and the public, the 5th annual meeting provides an opportunity to exchange information thus furthering the objectives of both the Consortium and the Center.

SOME RESULTS OF CHANNELIZATION AND THEIR IMPLICATIONS TO THE MISSISSIPPI RIVER. John W. Robinson, Missouri Department of Conservation, Jefferson City, Missouri.

In 88 years, channelization has resulted in a loss of approximately 19,300 surface acres of water and wetlands in 71 miles of the Missouri River. The methods used to obtain channelization in the Missouri and Mississippi rivers will be discussed. The habitat losses which have occurred in both rivers have been a contributing factor in a 79 per cent decline in the recorded commercial harvest. A comparison of commercial harvest from rivers in which commercial fishing is allowed in Missouri indicated that those in which channelization is the heaviest have the greatest loss. In addition to reducing diversity of habitat, channelization has increased the velocity of flows and reduced the carrying capacity of the channel.

The proposed methods of obtaining a 12-foot navigation channel in the pooled portion of the Mississippi River may well be the same as those used to develop and maintain a 9-foot channel in the Missouri River and the Mississippi River below St. Louis. The amount of material needed to be dredged in the pools for the proposed 12-foot navigation project may well increase the suspended sediment moving into our portion of the river. This plus the dredging and diking proposals in our lower pools look very similar to that laready occurring on the Missouri River and the Mississippi River below St. Louis.

Every attempt should be made to keep the diversity of habitat now present in the pooled portion of the river. Even though channelization is a reality in the open river, much can still be done to preserve and restore fish and wildlife habitat. Notches in dikes, varying heights of dikes and their placement and vane dikes are a few examples of things which could be tried to improve the existing habitat.

OXYGEN CONSUMPTION AND CARBON DIOXIDE PRODUCTION IN THE MISSISSIPPI RIVER NEAR MEMPHIS, TENNESSEE. Jacob Verduin, Southern Illinois University, Carbondale, Illinois.

A mobile limnology laboratory (pontoon type houseboat) is used to investigate oxygen consumption and carbon dioxide production rates in the Mississippi above and below Memphis. The significance of oxygen and carbon dioxide transfer across the air-water boundary is also being investigated. This is a joint study between members of the Southern Illinois University faculty and the Memphis State University faculty.

Some Results of Channelization and their Implications to the Mississippi River[1]

John W. Robinson[2]

The Federal Government has been involved in altering the Missouri River since 1884 - first under the jurisdiction of the Missouri River Commission and since 1902, under the Corps of Engineers. As early as the 1830's, the Federal Government began altering the Mississippi Valley in the interest of navigation. In order to better understand and appreciate the subtleness and effectiveness of channel alteration, let's first examine the Missouri River.

The Corps of Engineers estimated that this river in its wild state occupied some 300,000 acres between Sioux City and the mouth. (Missouri Basin Survey Commission, 1953). Examples of what this river must have looked like prior to channelization occur in the Nebraska - South Dakota reach between Yankton and Ponca. Here the river is very wide and contains many islands. It provides a very diverse habitat which is unusually productive for fish, wildlife and recreation. Let's compare this rich and diverse habitat with the channelized river.

A comparison of river conditions in 1879 with those of 1967 were made in 5 areas consisting of 71 miles of the river. The results of this are presented in Table 1.

Location	River Mile	Acreage 1879	Acreage 1967	Percent Loss	Miles Measured
Lower 17 miles	0-17	10,500	2,100	80	17
Jefferson City	142-152	2,972	1,313	56	10
Rocheport	173-188	6,377	2,193	66	15
Glasgow	220-231	3,730	1,541	59	11
Miami	242-260	5,222	2,291	56	18
Total		28,801	9,438	67	71

Table 1. The acreage of water and wetlands in 1879 and 1967 and the percent lost from 5 locations.

1. Paper presented at the 5th Annual Mississippi River Research Consortium, Loras College, Dubuque, Iowa, June 3, 1972
2. Fishery Biologist, Missouri Department of Conservation

In the 71 miles of river which was planimetered, 19,363 acres of water and wetlands have been lost in the 88 year period between 1879 and 1967. This amounts to a loss of 273 acres of habitat per mile of river (3.1 acres of habitat per mile per year). In this period of time, there has been an average loss of 67 per cent of the water and wetlands. In 1953, the Corps estimated that of the 300,000 acres of river between Sioux City and the mouth, 188,000 acres of accreted land would result because of the channel stabilization program. This is a loss of 63 per cent of the original river acreage.

Between 1945 and 1966, the reported harvest of commercial fish from our rivers has declined some 79 per cent from 1,104,000 pounds to 235,000 pounds (Figure 1). Simultaneously, the number of commercial fishermen has declined 41 per cent from 1,403 to 824. In Missouri commercial fishing is permitted in the Missouri River, the Mississippi River, and that portion of the St. Francis River which forms the boundary between Missouri and Arkansas. Channelization has been accomplished on the St. Francis River for flood control and drainage while on the Missouri River and the Mississippi River, channelization is accomplished primarily for navigation. The per cent reduction in commercial fish harvest is greatest in the river receiving the most channelization (Figure 2). The St. Francis River has declined 88 per cent, the Missouri River 85 per cent, and the Mississippi River 72 per cent. In the pooled portion of the Mississippi River we see a decline in commercial fish harvest of 59 per cent while in the more channelized open river the decline was 90 per cent during the 1945 to 1966 period.

In addition to reducing the diversity of habitat for fish and wildlife, channelization has increased the velocity and reduced the flood carrying capacity of the channel. The Missouri River at Waverly in 1929 had a discharge of 263,000 cubic feet per second with a gage reading of 19.9 feet (Sandhaus and Skelton, 1968). The reduced channel capacity is reflected by higher gage heights with lower discharges in 12 different years (1935, 1941, 1942, 1945, 1948, 1949, 1950, 1957, 1958, 1961, 1962, and 1964). In each of the 12 years the discharge was always less than in 1929, but the gage heights were higher.

Let's examine briefly how channelization has been accomplished on the Missouri River and the Mississippi River below St. Louis. The

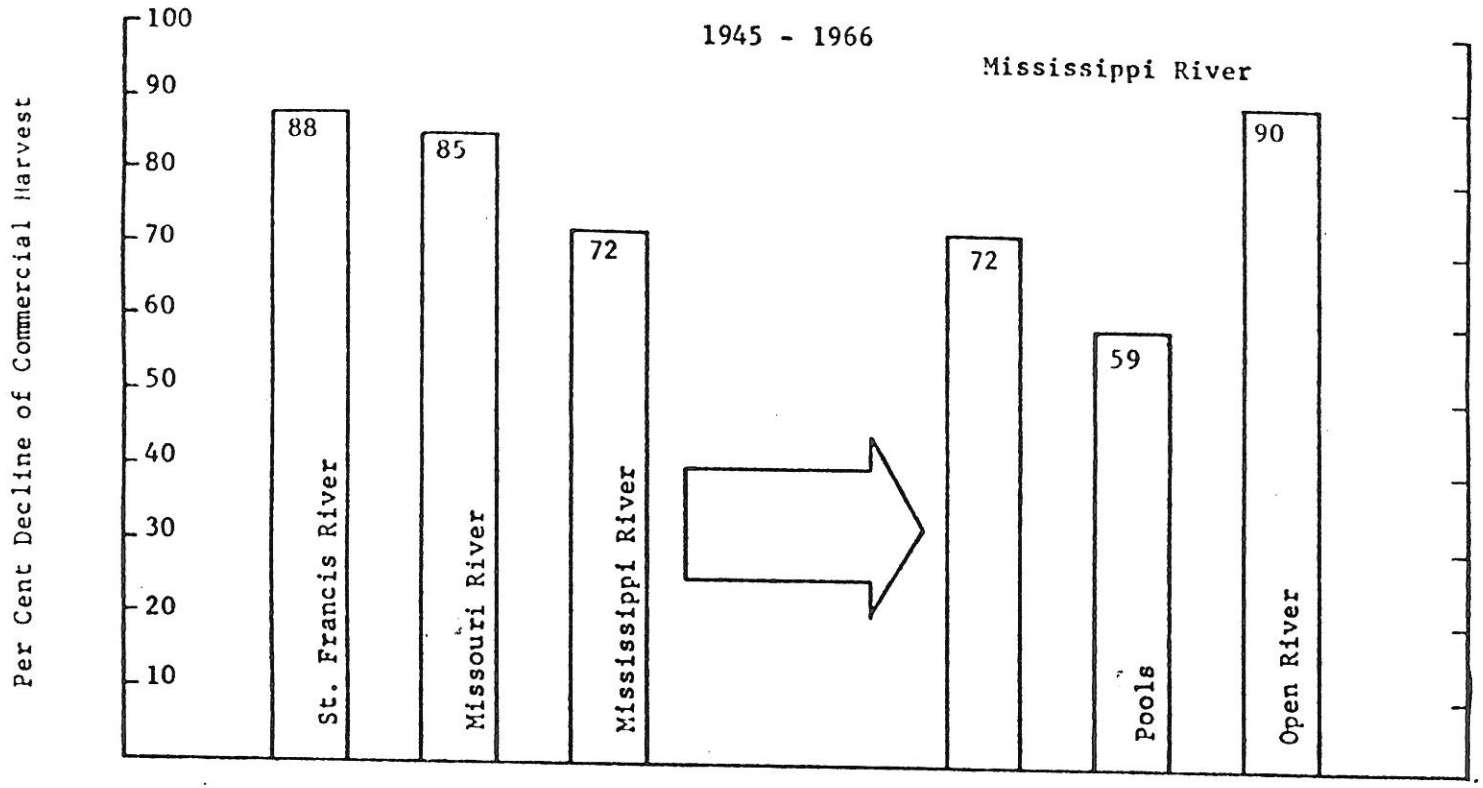

Figure 2. The per cent decline of commercial fish harvest from Missouri's commercial waters, 1945 to 1966.

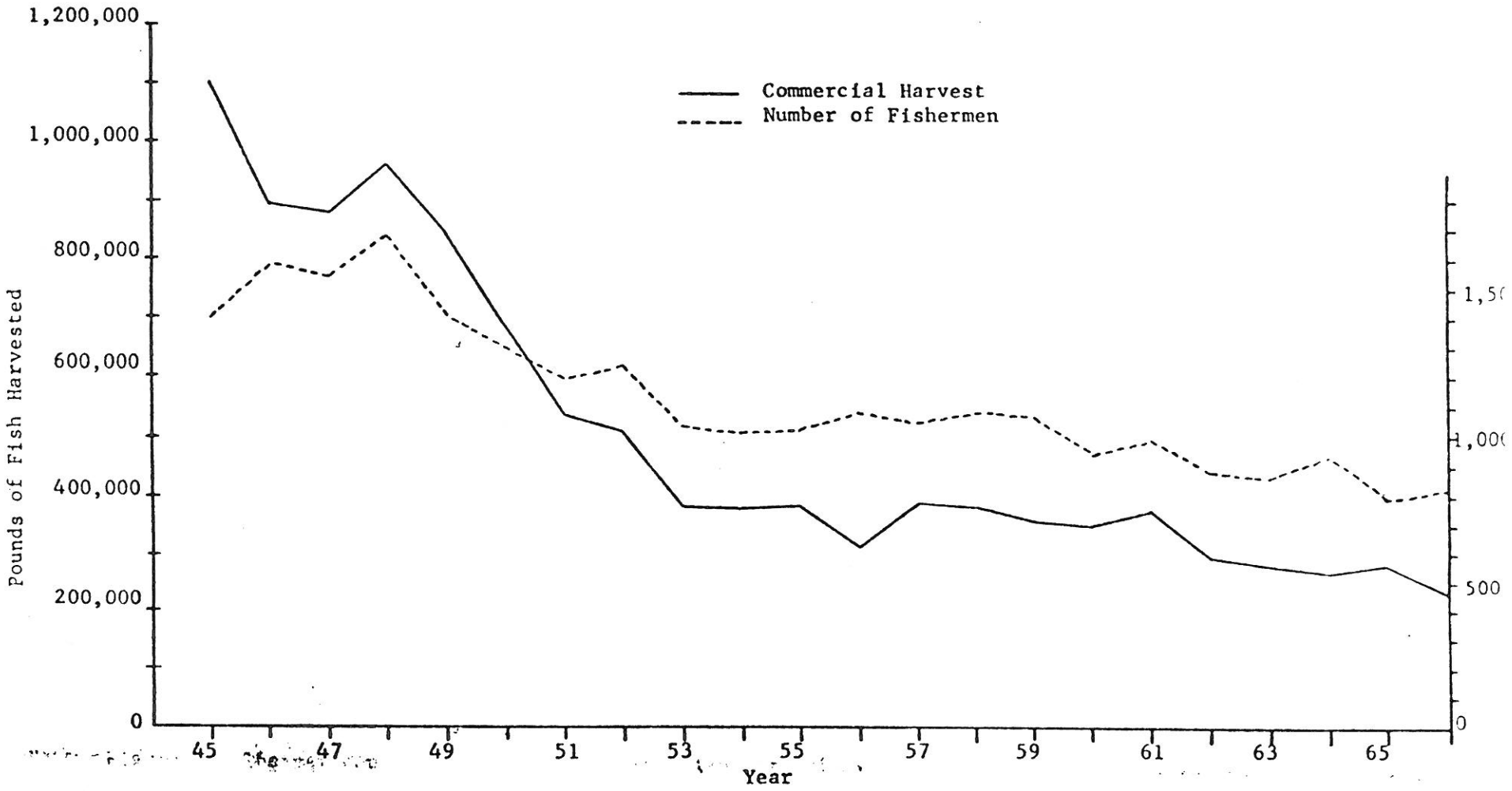

Figure 1. The pounds of commercial fish harvested and the number of commercial fishermen in Missouri's commercial waters, 1945 to 1966.

culprit is the dike initially constructed of pilings but now of impermeable rock. First, dikes are placed in the river to shape it into the desired alignment (a series of easy, gentle bends causing the water to flow smoothly along the outer or concave bank of the river). The second step is to use the rock revetments or concrete mats to hold the river in place. The third step which closely resembles the first, is to place dikes in such a manner as to divert water from behind islands and to cause them to fill with sediment. Once land becomes exposed and terrestrial vegetation becomes established, the land accretion process continues to the detriment of wildlife which needs water and wetlands for continued survival. The final step is to connect all dikes together forming a rock-lined canal with no diversity, a canal which is most efficient, self-cleaning; one in which maintenance for navigational use is at a minimum.

During a 24 year period (1943 - 1966) there has been an average suspended sediment load of slightly more than 4,000,000 tons a year moving down the Mississippi River past East Dubuque, Illinois (Figure 3). Downstream some 270 river miles at Hannibal, Missouri, the average annual suspended sediment load is 28,000,000 tons. This is an increase of 89,632 tons of suspended sediment a year per mile of river or 246 tons per day per mile. This tremendous difference in suspended sediment load exists now in the face of the 9-foot channel maintenance program; a 694 per cent increase in 270 miles of river. What will happen to the suspended sediment load as a result of initial dredging and continued maintenance dredging for a 12-foot navigation channel? If dredging becomes a problem, then dikes to shape and control the river and eliminate flows from behind islands will be necessary. In attempting to maintain a 12-foot navigation channel, there is no guarantee what will take place after its initiation. Closing structures and dikes have been used to eliminate dredging problems on the Missouri and lower Mississippi Rivers. The possible use of dikes in the future must be considered when one looks at the 12-foot navigation channel. Dikes, revetments and closing structures are the presently accepted methods for reducing dredging and trapping sediment, accreting land, and making river channels narrower and deeper. In fact, dikes make large alluvial rivers more efficient and self-cleaning from an engineering standpoint and less

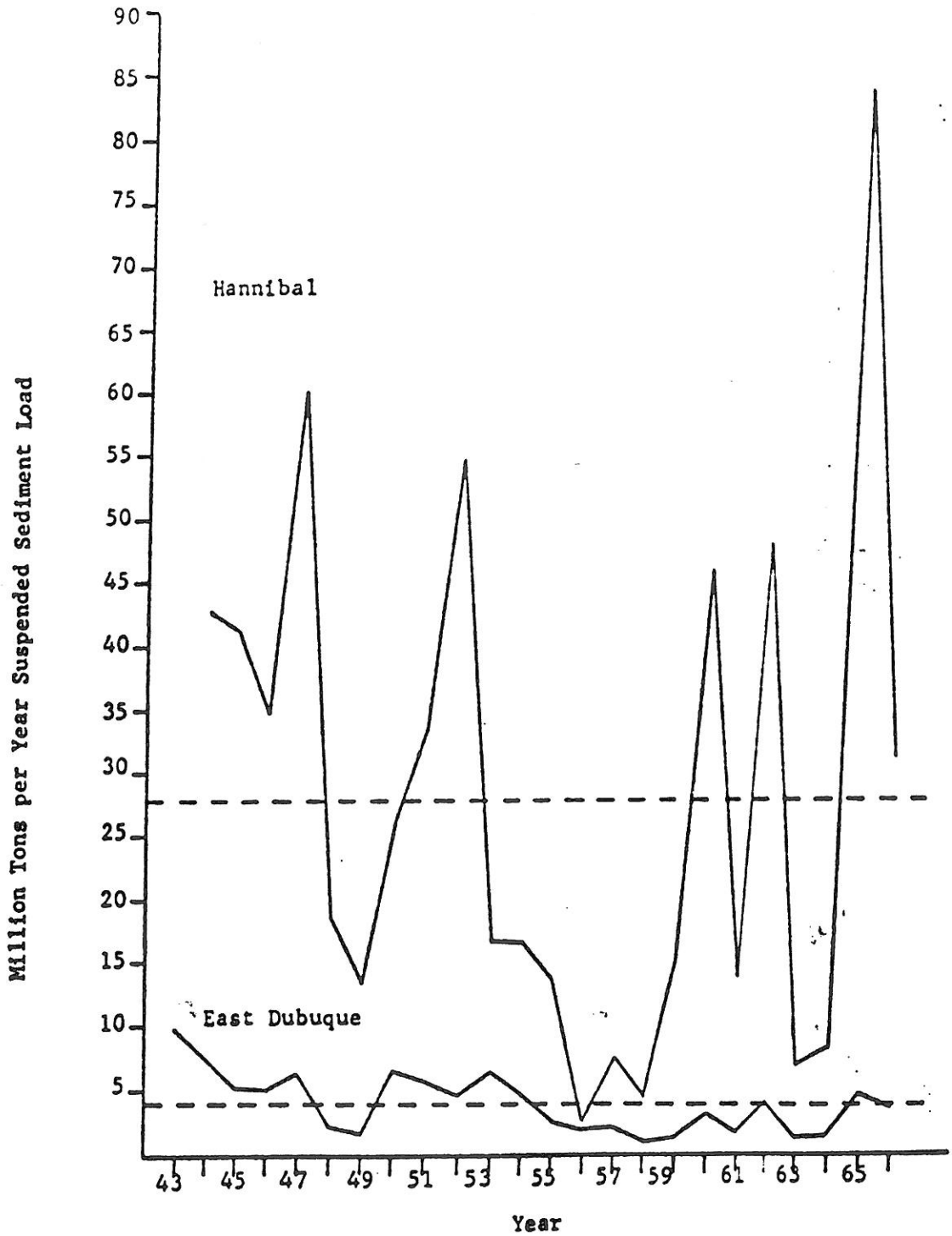

Figure 3. Suspended sediment loads in the Mississippi River at East Dubuque, Illinois and Hannibal, Missouri, 1943 - 1966. Data provided by R.H. Hurlbutt, Engineering Division, Rock Island District, U. S. Army Corps of Engineers.

diverse from a biological standpoint.

We need to look at past actions, see what has been done and be both realistic and wary. While the rivers in Missouri have undergone much channelization, we feel that they are still a long way from being biological deserts and there is much that can be done to make them better. Of the 5 Corps of Engineer Districts which have jurisdiction over the Missouri and Mississippi Rivers in our state, St. Louis District is attempting to consider fish and wildlife values in their present day operations. They have developed some guidelines for working on the Mississippi River. Attempts are made to leave trees standing in areas where dikes are to be built or repaired, thus keeping the area in a natural state. If trees have to be removed, they will be cabled together and placed on the downstream side of the dike creating habitat and shelter for fish. No new work or repairs have been made on closing structures for the past few years. Perhaps most important, St. Louis District has greatly improved their communications with our Department. Because of this, the Missouri Department of Conservation is able in the early planning stages, to comment on and discuss stone work contracts and dredge spoil placement. Past meetings have resulted in evaluating dike features for habitat preservation in a model study at the Waterways Experiment Station in Vicksburg, Mississippi. Through our meetings we have related our feelings regarding the importance of backwater areas and have found a receptive audience. St. Louis seems to feel that there is room for both fish and wildlife and navigation on the Mississippi River and we are working together in an attempt to preserve the remaining diversity and possibly engineer diversity into new dike work.

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WATER RESOURCES REFERENCE ROOM

Room 104
Hydraulics and Sanitary Laboratory

2-3069 - Campus
262-3577 - Off-Campus

Along Lake Mendota, west of the Memorial Union, and just beyond the rising new College Library, is a long, red, brick building known as the Hydraulics and Sanitary Laboratory. In this building, along with the Water Resources Center and the Water Chemistry Department, is the Water Resources Reference Room.

The Reference Room collection contains over 6,000 publications, most of which are soft-bound reports. These are arranged into 29 categories, dealing with water and water-related activities. Included in these categories are such topics as groundwater, water chemistry, water management, water pollution, the water cycle, and many others. A great number of these research reports are received from the 51 Water Resources Centers throughout the United States. The Reference Room also contains annual reports from approximately three-quarters of all the Water Resources Centers. Numerous bibliographies pertaining to the field of water resources, as well as a complete set of Eutrophication Abstracts, published monthly by the University of Wisconsin Eutrophication Program, can be found in the Reference Room. Also, the Selected Water Resources Abstracts, published bi-weekly by the U. S. Department of Commerce-Clearinghouse, adds to the currentness of the collection.

New to the Reference Room is a set of volumes which comprises the Environment Reporter. This is a weekly notification and reference service providing comprehensive coverage of current legislative, administrative, and industrial developments in pollution

control and environmental protection. This consists of five loose-leaf binders covering "Current Developments," "Federal Laws," "State Air Laws," "State Water Laws," and "Decisions." These, however, must be used in the Reference Room.

A reserve section of classroom materials for various professors is maintained upon their individual requests and needs. The Urban and Regional Planning, Water Chemistry, and Civil Engineering Departments maintain selections for student use on the east end of the campus.

In order to keep abreast of the rapid expansion of knowledge and research going on in the area of water resources, the Reference Room uses one of the most-advanced indexing and retrieval systems available.

Computer-produced "Author" and "Keyword" indexes replace the card catalog system used elsewhere. Each publication is cross-listed under keywords describing its contents. Users simply look through the index to find the word or words which best describes what they are looking for. In addition to its own index, the Reference Room also has copies of the Wisconsin Water Index. This index provides access to publications which deal with Wisconsin waters, and which are scattered through fifteen libraries and reference rooms on the University campus and within Dane County.

The collection is small enough that even the uninitiated can easily locate what he is looking for. There is also a reference assistant available to help patrons locate materials elsewhere on campus, should these materials not be available in the Reference Room.

The Water Resources Reference Room is open 7:45 a.m. to 4:30 p.m., Monday through Friday, and at other times by request.