

MINUTES

North Dakota State Water Commission
Bismarck, North Dakota

November 8, 1982

The North Dakota State Water Commission held a meeting in the offices of the State Water Commission, State Office Building, Bismarck, North Dakota, on November 8, 1982. Governor-Chairman, Allen I. Olson, called the meeting to order at 9:00 a.m., and requested Secretary, Vernon Fahy, to present the agenda.

MEMBERS PRESENT:

Allen I. Olson, Governor-Chairman
Florenz Bjornson, Member from West Fargo
Ray Hutton, Member from Oslo, Minnesota
Garvin Jacobson, Member from Alexander
Alvin Kramer, Member from Minot
Guy Larson, Member from Bismarck
Henry Schank, Member from Dickinson
Bernie Vculek, Member from Crete
Kent Jones, Commissioner, Department of Agriculture, Bismarck
Vernon Fahy, State Engineer and Secretary, North Dakota
State Water Commission, Bismarck

OTHERS PRESENT:

State Water Commission Staff Members
Approximately 25 persons interested in agenda items

The attendance register is on file in the State Water Commission offices (filed with official copy of minutes).

The proceedings of the meeting were recorded to assist in compilation of the minutes.

CONSIDERATION OF MINUTES
OF SEPTEMBER 16, 1982 MEETING -
APPROVED

The minutes of the September 16, 1982 meeting were approved by the following motion:

It was moved by Commissioner Jones, seconded by Commissioner Schank, and unanimously carried, that the minutes of September 16, 1982 be approved as presented.

**BRIEFING ON DRAFT REPORT
OF STATE WATER COMPREHENSIVE PLAN
(SWC Project No. 322)**

Gene Krenz, Director of Planning for the State Water Commission, indicated that the draft 1983 State Water Plan has been completed. Copies of the draft

have been mailed to all of the Citizen Advisory Boards for their review prior to the last round of public meetings. The staff is involved in holding the last round of public meetings for the purpose of determining if the draft accurately reflects the information the Boards wanted. Mr. Krenz reported that in the meetings held thus far the Boards are adding almost nothing to the report other than grammar clarifications, typos, etc. It does appear from comments stated in the last round of meetings, that the report needs additional emphasis on weather modification. The four basic recommendations contained in the report do not deal with the operational aspects of weather modification as much as they do with the need to develop a better data base and information-education type of program so that the people can better understand it.

Mr. Krenz said there is an interest in the western part of the State at some time in the future of taking another look at the concept of diversion from Lake Sakakawea for agricultural purposes.

The study, keyed to a 40-year period between 1980 and 2020, used 1990, 2000 and 2020 as benchmark years for measuring needs and the degree to which plan features will meet those needs. The report contains a section referred to as the Early Action Program, which is the 10-year time frame ending with benchmark year 1990. This section details those projects and programs with the highest priority for implementation.

In comparing this State Water Plan to the 1968 Plan, Mr. Krenz said the most dramatic difference in this Plan is the relationship of federal, state and local costs.

He said the major weakness in this report, he felt, is the absence of definitive information about wetlands preservation, wildlife habitat, outdoor recreation and hunting opportunities. The projects and programs that are called for will generally provide benefits in those areas but are incidental for the most part to the primary project purposes.

LeRoy Klapprodt of the Planning staff discussed various sections of the report. He discussed at length the section relating to the Future Without Plan indicating that an important reason for presenting a description of the Future Without Plan conditions is the need to develop an understanding of where we are now and where we are currently headed with regard to utilizing North Dakota's water resources. He said that in developing the Future Without Plan scenario, the planning process is, in effect, establishing a baseline against which the impact of plan recommendations can be measured. Accurately projecting baseline conditions into the time frame considered in this study is made difficult by the variable nature of a number of determining factors. The planning process recognizes that factors such as government programs and regulations, the economic outlook, and social attitudes and perceptions can vary through time. Because variations in these and other factors are unpredictable,

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it was necessary to prepare the Future Without Plan scenario around a set of assumptions. Mr. Klapprodt went on to discuss the assumptions contained in the report and how the information was derived. With the assistance of charts, he explained the water requirements that are being projected in the Future Without Plan conditions, what has been developed, and what the plan is going to do as far as water requirements.

Mr. Klapprodt discussed the planning process for each of the five major hydrologic river basins and a state-wide summary that began with the identification of water management problems and development opportunities through the review of alternative actions and finally the selection of elements for the recommended plan. With the assistance of charts, he discussed for each of the five hydrologic basins the recommended plan and the estimated investments in 1980 dollars.

Commissioner Larson expressed concern that the report doesn't seem to adequately reflect the real interest in municipal water supply associated with the proposed Garrison Diversion water delivery system. He inquired if there was participation from city government officials relative to that area.

Mr. Klapprodt explained that with respect to Garrison, the final report includes what the Garrison project contains. As far as across the state in developing the municipal water supply needs, all of the public meetings were advertised encouraging people interested in water resources to attend, and there were some city officials in attendance at some of the meetings who did express their opinions and concerns. Mr. Klapprodt did indicate that by and large this area was weak. In making the projections for the Future Without Plan of what the municipal water requirements are going to be, population projections were developed for the various regions which included the municipal area. The projected water requirements were determined by using those numbers and a per capita consumption rate. Mr. Klapprodt noted this is a rough estimate since not all communities participated.

Mr. Krenz said that the water requirements associated with municipal and industrial needs that are in turn associated with the Garrison Diversion project are addressed in the report but are not emphasized a great deal. He suggested, and it was agreed by the Commission members, that this area in the report be elaborated upon further.

Mr. Klapprodt concluded his presentation by briefly discussing the general study conclusions contained in the report and noted that one additional conclusion is being considered and that is an accelerated effort in the research to look at the federal criteria for irrigability of soils.

Mr. Krenz stated that his staff members are in the process of preparing an executive summary of the draft 1983 State Water Plan which is anticipated to be completed early in 1983.

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Secretary Fahy expressed concern that he does not want this Plan to become another "sit-on-the-shelf-plan" as was the case for the 1968 plan. He said it is important that the Plan be accepted by the citizens of this State, i.e. accepted by the State Water Commission and the 1983 Legislature. A brief discussion pursued how this should be accomplished.

Governor Olson indicated this is a state-wide plan and contemplates expenditures and state-wide policies and needs to be submitted to the 1983 Legislature for their information, and presumably, this plan could be the basis for policy decisions for the near and mid-term future of this State; otherwise, we have a plan that sits on the shelf.

It was the consensus of the Commission members that the 1983 State Water Plan be submitted to the 1983 Legislature and recognized in some fashion by the Legislature that a 1983 updated plan has been completed. This item is to be an agenda item for the Commission's next meeting, at which time the Commission will consider approval of the Plan and transmittal to the Legislature.

Mr. Alfred Thompson, representing the North Dakota Rural Water Users Association, inquired that since the report is nearing completion - does the State contemplate any danger of domestic water shortfall within the State of North Dakota?

Secretary Fahy replied that generally speaking, it is felt there are adequate supplies of water in North Dakota to satisfy all our needs; however, it will require a distribution system to satisfy those needs.

STATUS REPORT ON ENGLISH
COULEE PROJECT
(SWC Project No. 1351)

Dave Sprynczynatyk reported on the status of the English Coulee Project. He indicated that the main emphasis to date has been on completing the diversion floodway phase.

On October 6, 1982, bids were opened for this phase of the project, and on November 1, 1982, city and county officials advised that final acquisition of lands required for the project had been completed. The contract was awarded, but due to delays and inclement weather, it appears that the contractor will not be able to do anything more than mobilize his equipment this fall.

Mr. Sprynczynatyk indicated that bids for the second phase of the project, which is the south half of the diversion project, will be let this winter and construction will begin next summer. The third phase of the project, which is the retarding structure, is being programmed for and planned by the Soil Conservation Service. Mr. Sprynczynatyk indicated that the earliest that construction could begin on this phase would be 1985.

Commissioner Hutton expressed his concern and that of citizens living downstream from the Red River, that the diversion is actually not going to help the downstream flood situation and it may, in

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some instances, even increase the flood peak. He noted that there is a lot of opposition in the area to the retarding structure. He said that he felt the delay in land acquisition and a misunderstanding of the entire project was largely due to a lack of communication between the city, county, and with local landowners.

UPDATE ON SOUTHWEST
PIPELINE PROJECT
(SWC Project No. 1736)

Robert Dorothy, Project Manager for the Southwest Pipeline Project, reported that the Financial Consultants and the Consulting Engineers reports are completed and available

for distribution. The reports were submitted to the Legislative Council on October 1, 1982. Mr. Dorothy indicated that a summary report is being prepared and should be available for distribution by December 1, 1982.

Mr. Dorothy indicated that the main emphasis of staff activities was negotiation meetings on the water service contract, of which approximately 19 meetings have been held with cities in the southwest area to explain the repayment contracts. On October 28, 1982, copies of the final contract were mailed out to the cities for their consideration and execution and the cities have until December 15, 1982 to either approve or reject the contract. To date, Mr. Dorothy said that the city of Glen Ullin has been the only refusal, and verbal commitments have been received accepting the contract from Dickinson, Mott, Hettinger, Bowman and Dodge.

Mr. Dorothy said that on November 9, 1982, the Legislative Council will receive an updated presentation on the project, and invited the Commission members to attend this meeting.

Michael Dwyer, Attorney for the Project, distributed and discussed draft legislation that has been developed for the Southwest Pipeline Project. The outline as discussed is attached hereto as APPENDIX "A".

In discussion of the bill drafts, Governor Olson requested that Mr. Dwyer obtain information pertaining to the financing arrangements for the ETSI project in South Dakota so that the Commission would have some direction as to the precedent that has been established on the cost of Missouri River water for a specific industrial purpose. This information is to be forwarded to the Commission members prior to their December 6, 1982 meeting.

Mr. Dwyer indicated that December 15, 1982 is the deadline for introducing agency legislation. If the Commission decides to introduce any legislation as an agency bill, Mr. Dwyer reminded the Commission that it will be necessary to adopt that legislation at its December 6 meeting.

Mr. John Arntson, Financial Consultant for the Southwest Pipeline Project, further explained the bill draft relating to alternatives for financing the project including bonding processes.

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Mr. Dorothy stated that two items for the Commission's consideration at its December 6 meeting will be the approval of the Final Report, and authorization for the State Engineer to execute the water service contracts.

Secretary Fahy suggested that it may assist the Commission members in their decision making if a synopsis is prepared listing all of the preferred alternatives that both the State Water Commission and the Legislature will be considering. It was the consensus of the Commission members that such a listing be made available to them prior to their December 6 meeting.

Mr. Clark Cronquist, representing the North Dakota Rural Water Systems Association, indicated that his group is primarily interested in a supply distribution for rural areas and small communities. At their quarterly meeting held in September, the Southwest Pipeline Project was discussed as was the Resources Trust Fund. In the Resources Trust Fund, it states: "water supply facilities". Mr. Cronquist indicated that his group interprets this to mean distribution also, which is the concept his group supports. He stated that in the bill draft presented by Mr. Dwyer that pertains to the Resources Trust Fund, alternative No. 2 is preferred, but if alternative No. 2 is not approved, the group he represents would like the language to remain "water supply facilities".

Mr. Cronquist indicated that his group has promoted and supported the Community Water Facility Loan Fund that the Bank of North Dakota administers which has assisted many rural water systems from non-feasible through FMHA guidelines to feasible.

Mr. Cronquist concluded by saying that his group goes on record supporting consideration that some of the funds in the Resources Trust Fund be used for distribution once the initial project has been built.

**DEVILS LAKE
STATUS REPORT
(SWC Project No. 1712)**

Secretary Fahy indicated that Governor Olson has requested a review of present information relating to conditions at Devils Lake and an overview of plans and proposals for the protection of property in the Devils Lake area. Dale Frink, Commission staff member, made an overview presentation, which is attached in detail as APPENDIX "B".

Mr. Frink further stated that although work on the Corps of Engineers short-term plan of action will not commence until 1984, if 1983 winter precipitation conditions increases the water level to 1428, the Corps is prepared to begin construction this year on an emergency measure to build a coffer dam for the main dike. It is necessary to construct the main dike across a dry lake bed in order to prevent extremely high future seepage through the permanent dam/dike. The Corps is proposing to build a

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coffer dam west of the permanent dike as part of the total construction. Constructing the coffer dam in 1983 would not result in significantly higher costs and could actually advance final construction.

Mr. Russ Dushinske, representing the Devils Lake Basin Joint Board, expressed appreciation that the State Water Commission is maintaining an interest in this project. Mr. Dushinske made reference to Corps of Engineers and Bureau of Reclamation studies, and indicated that the Joint Board was the original sponsor of both the short and long range studies done by the Corps and now the city of Devils Lake has taken over as sponsor of the short-range study. In addition to having problems with floodwaters, Mr. Dushinske indicated there are problems with the water quality. He noted that there have been a number of studies done over the years on this problem but nothing since the most recent rise in Devils Lake. Since all water quality studies are outdated, the Joint Board would like to have the studies resumed. The North Central Regional Council is looking into what studies have been done, costs of updating the studies, etc. He indicated an interest by the Game and Fish Department, and urged continued participation by the State Water Commission.

FURTHER DISCUSSION OF COST SHARING GUIDELINES

Secretary Fahy indicated that some time ago, at the urging of the Consulting Engineers, a proposal was prepared that would have given the consulting engineers the same standing as the State Water Commission for cost sharing in water-related works and facilities. This proposal was mailed out to local entities for their review and consideration. To date, the Water Users Association, many water resource boards and the joint boards have passed resolutions indicating they would like the cost sharing guidelines for participation in water-related works and facilities to remain unchanged.

Secretary Fahy stated that the Consulting Engineers have not responded to our request for comments. Therefore, we have contacted them and they have agreed to participate in a meeting in the near future to discuss the situation.

Secretary Fahy distributed copies of the present cost sharing guidelines for water-related works and facilities. Included in the guidelines in italics are sections that would change as had been suggested some time ago. These are the changes which had been reviewed before local comments had been received.

Secretary Fahy advised that if the State Water Commission does decide to change its policy and hire consulting engineers, an area of great concern to him is that of allowing the consulting engineers to become involved in designing of dams. The design would have to be approved by the State Engineer, however, he would have no knowledge of the actual construction details and methods employed by the contractor. Because his approval of the plans is required by law and because of the potential for damage due to failure, he is of the opinion that the State has a continuing liability for these kinds of projects and should be responsible for their design and construction.

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In an impoundment where there is a possibility of a major disaster and where the State Engineer has approved the design, he feels the State has a liability. He said that if the State Water Commission decides to allow the hiring of consulting engineers to do the kinds of work that the Commission is now doing, his position would be to either limit those impoundments to the low-hazard types of impoundments; or to include a written requirement that regardless of who designs the plans, if the State Engineer has approved the plans the State Engineer shall require an inspector on the job. He said that the State should keep very careful control over impoundments.

**CONSIDERATION OF AGENCY
FINANCIAL STATEMENT**

Matt Emerson briefed the Commission members on the financial status of the agency, noting that the accounts are in line with the percentage of biennium time that has elapsed.

Secretary Fahy then commented on the budget hearing conducted by the Office of Management and Budget.

**STATUS REPORTS ON
BEULAH FLOOD CONTROL PROJECT
AND APPLE CREEK FLOOD CONTROL
PROJECT
(SWC Project Nos. 1732 & 1728)**

Dave Sprynczynatyk reported on the two major construction projects that the Water Commission was involved in the past season: the Beulah Flood Control Project and the Apple Creek Flood Control Project. He indicated that both projects are approximately 98 percent complete to date.

**STATUS REPORT ON DEAD
COLT CREEK DAM PROJECT
(SWC Project No. 1671)**

there is some surveying left to do yet to be completed in 1983.

Mr. Sprynczynatyk indicated that relative to the Dead Colt Creek Dam project, bids will be let in about March or April, 1983. The final design is being completed and construction is anticipated this fall.

**WATER USERS CONFERENCE AND
NEXT STATE WATER COMMISSION
MEETING**

Mr. Tom Hanson, Executive Director of the North Dakota Water Users Association, distributed the agenda for the 1982 Annual North Dakota Water Users Association Convention scheduled for December 6-8.

Secretary Fahy indicated that December 6, beginning at 1:00 p.m. at the Holiday Inn, has been scheduled for the next meeting of the State Water Commission.

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**PAINTED WOODS PROJECT
(SWC Project Nos. 160 & 237)**

At the request of Commissioner Larson, Dave Sprynczynatyk explained the Painted Woods project to the Commission members.

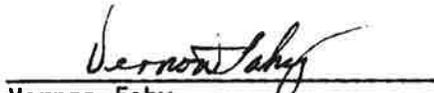
Commissioner Larson expressed concern that from telephone calls he has received, people do not understand the project the Bureau of Reclamation is involved in. He requested more publicity on the project, and Secretary Fahy indicated he would contact the Bureau stating Commissioner Larson's concerns and request them to prepare a news release on the project.

Secretary Fahy and staff members then briefed the members on several projects and litigation that the Water Commission is involved in.

It was moved by Commissioner Larson, seconded by Commissioner Bjornson, and unanimously carried, that the meeting adjourn at 3:30 p.m.


Allen I. Olson
Governor-Chairman

ATTEST:


Vernon Fahy
State Engineer and Secretary

November 8, 1982

NORTH DAKOTA STATE WATER COMMISSION

REGISTER

ATTENDANCE AT State Water Commission

DATE November 8, 1982 PLACE Bismarck, N. Dak.

PROJECT NO. _____

Your Name	Your Address	Who do you Represent? (Or Occupation)
DAVID SPRYNGOZNYK	Bismarck	SWC
W. J. Thompson	S. R. #2 Bismarck N.D.	N.D. Rural Electric Users Assoc.
G. KRENZ	"	SWC
Gretnowski	Bismarck	Tribune
Fletcher A. Poling	Bismarck	Basin Electric Power Cooperative
Mary Helgeson	Bismarck	GOVERNOR'S OFFICE
Matt Emerson	Bismarck	SWC
Joe Cley	Bismarck	S.W.C.
LAURIE McMEETY	BISMARCK	N.D. DEPT. OF AG.
Tom Hanson	Minot	N.D. WATER USERS
Chuck Rupp	Bismarck	N. G. P. L.
tim fough	"	the herald

OUTLINE OF LEGISLATION
SOUTHWEST PIPELINE PROJECT

APPENDIX "A"

NOVEMBER 8, 1982

I. BILL DRAFT ONE: AUTHORIZATION OF SOUTHWEST PIPELINE PROJECT

A. Declaration of Intent, Definitions, and Authorization of Southwest Pipeline Project, which includes specific provisions on:

1. Water Treatment
2. Intake Structure
3. Secondary Transmission Mains
4. Capacity for Industrial Use
5. Capacity for South Dakota Users
6. Pipeline Construction Standards

B. Operation and Maintenance of Southwest Pipeline Project by State Water Commission

C. Operation and Maintenance Fund

D. Reserve Fund for Replacement

E. Deposit of Water Rates for Capital Repayment

F. Validation of Water Service Contracts

G. Appropriation of Final Design, Right of Way, and Other Tasks leading up to Construction

H. Emergency

II. BILL DRAFT TWO: FINANCING OF SOUTHWEST PIPELINE PROJECT

A. Special Bond Issue Authorization

A special bond issue authorization will be necessary if a bond issue is to be utilized for financing the Southwest Pipeline Project. The State Water Commission currently has revenue bond authority. However, the bond issue for financing of the Southwest Pipeline Project would require state revenues to pay off the bonds, whereby they would not be revenue bonds. Thus, a special authorization would be required.

B. Resources Trust Fund -- Bond Payments

Water revenues from the Southwest Pipeline Project will not be adequate to pay off a bond issue for the Southwest Pipeline Project, regardless of how it is structured. Thus, state revenues from some source must be committed to help retire bonds. The resources trust

fund, as it presently exists, does not receive enough revenue to retire a bond issue for construction of the Southwest Pipeline Project. (The revenue projections for the resources trust fund are \$17 million per biennium, or \$8.5 million per year.)

Thus, this portion of bill draft two would increase the percentage of the oil extraction tax that goes into the resources trust fund. (Presently, the oil extraction tax is divided 60% for education, 30% for general fund, and 10% for resources trust fund.) Any increase in the resources trust fund would be taken from the general fund percentage. Several options are given, both in terms of the percentage increase in the resources trust fund and the effective date of such increase.

OUTLINE OF LEGISLATION RELATING TO THE
SOUTHWEST PIPELINE PROJECT AND
OTHER WATER DEVELOPMENT PROJECTS

III. BILL DRAFT THREE: RESOURCES TRUST FUND

A. Definition of Water Supply Facilities

1. Alternative One: Source Development, Treatment, and Transmission of Water to Distribution Systems. Does Not Include Distribution Systems.
2. Alternative Two: Source Development, Treatment, Transmission, and Distribution of Water to the Ultimate Users.

B. Procedure for Obtaining Financial Assistance from Resources Trust Fund - State Water Commission Review and Recommendation to Legislative Assembly

C. Criteria to be developed by State Water Commission

IV. BILL DRAFT FOUR: AMENDMENTS TO STATE WATER COMMISSION STATUTES

These amendments are technical in nature, and are for the purpose of ensuring that the authorities and current statutory provisions of chapter 61-02 are in order for the Southwest Pipeline Project and other projects.

LEGISLATION TO AUTHORIZE WATER USE FEES

A. Legislative Intent and Purpose and Definition

1. Alternative One: Fees would only apply to Industrial Use of Water from the Missouri River for Energy Purposes
2. Alternative Two: Would apply to all Water Permits for Industrial Use of Water exceeding 1,000 acre-feet (or some other amount) of Water Per Year

B. Rate for Conditional Water Permit

C. Rate for Perfected Water Right

D. Procedure for Assessment of Fees and Payment, Metering Devices, and Development of Rules and Regulations

E. Deposit of Fees



GOVERNOR ALLEN I. OLSON
CHAIRMAN

VERNON FAHY
SECRETARY & STATE ENGINEER

MEMO TO: Governor Allen I. Olson and Members of the State Water
Commission
FROM: Vern Fahy, State Engineer
SUBJECT: Devils Lake Flood Control - SWC Project #1712
DATE: November 8, 1982

Introduction

On October 20, 1982, Governor Olson requested a review of present information relating to conditions at Devils Lake and an overview of plans and proposals for the protection of property in the Devils Lake area. This memorandum is in response to this request and is focused on the water level concerns of Devils Lake. Flooding problems in the upper basin and water quality concerns, although significant, are not addressed.

General Description and History of Devils Lake

Devils Lake receives runoff from an area of 3,300 square miles located largely north of the basin. Stump Lake, about ten miles east of Devils Lake, receives runoff from 500 square miles (Figure 1). Neither Devils Lake nor Stump Lake have a natural outlet, and the lake levels fluctuate based on inflows and lake losses due mainly to evaporation. If inflows exceed evaporation the lake level increases, while the lake level declines if evaporation exceeds inflows. For this reason, extreme fluctuations have occurred in the past.

Steven Fox of the Anthropology Department at North Dakota State University has conducted several studies of past shore lines and cultural artifacts found in these areas. He concluded that Devils Lake has exceeded elevation 1450 mean sea level and has been nearly dry several times in the past 2000 years. Edward Callendar, in a 1968 dissertation submitted to the University of North Dakota, found similar conclusions. His study was based on lake sediment core samples. Warren Upham, in an 1896 report for the U.S. Geological Survey, indicated that Devils Lake may have been as high as 1446 feet in 1830. His findings were based on a tree-ring investigation in which no trees older than 57 years were found below 1446. He, therefore, concluded that the lake must have been that high in order to prevent tree growth.

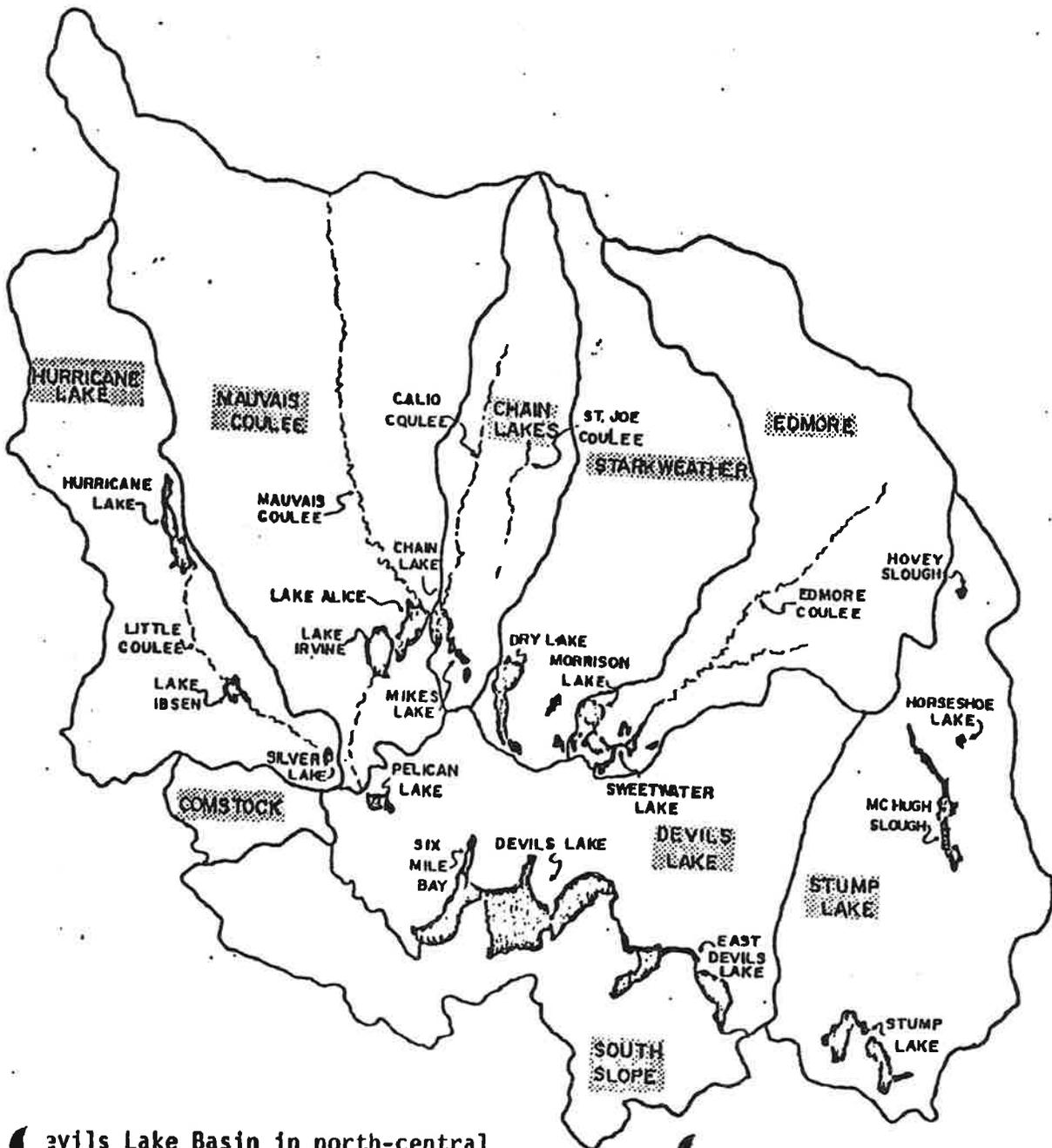


Figure 1. Devils Lake Basin in north-central North Dakota, showing watersheds, major waterways and lakes.

The first recorded water level in Devils Lake was 1438.4 feet in 1867, or nearly 12 feet higher than its present level. The lake continued to decline until 1940, when it reached a low of 1401. Since 1940, the lake has increased over 25 feet. Figure 2 shows the historical lake levels of Devils Lake.

The Problem

At the current level of 1426.6 feet, the area surrounding Devils Lake actually does not experience significant problems. The recreational and water quality aspects of the lake have been greatly enhanced in the past few years due to the large volume of water. There have been problems associated with the road system around and across the lake, but generally, it is thought that the benefits outweigh the negative aspects.

However, significant problems will occur if the lake level continues to rise. Many private and public developments were built in the lake bed areas when the lake was low. The popular belief thirty years ago was that the level decline was the result of agricultural development in the basin, and that the lake would never increase to present levels.

There are four businesses in the City of Devils Lake built below elevation 1430 and over fifty businesses built below elevation 1440. In addition, the city's sewage lagoons are built in an area with a natural ground level of only 1425. At present, a temporary road/dike prevents the lake from encroaching around the lagoon cells.

The highway system around the lake has experienced the largest impacts to date. Highways 57 and 19 were recently raised to an elevation of 1440.0 feet. Highway 20 has an asphalt elevation of 1427.7 feet and experienced water problems in 1982. There are current plans to raise Highway 20. Wood's Road, a heavily used gravelled road located south of the City, has experienced constant erosion problems. Ziebach Pass, located west of Devils Lake, has been inundated for several years.

There are also several other developments located around the lake that would be impacted with higher lake levels. The sewage lagoons at Minnewaukan are constructed in the lake bed area, Camp Grafton has a few buildings and facilities between 1430 and 1440, and the lakeside development along Creel Bay has areas that could be affected. There are also scattered cabins and homes located around other portions of the lake that could be flooded.

In addition to the potential damages to developed areas, there are substantial agricultural areas that could be affected. Table 1 is an elevation-area-capacity table for Devils Lake. At its present elevation (1426.6), Devils Lake has a surface area of approximately 53,000 acres. At elevation 1432, the area flooded would increase to nearly 65,000 acres. Most of the additional 12,000 acres would be located in the Minnewaukan Flats area and is presently used as pasture and hay land.

YEARS

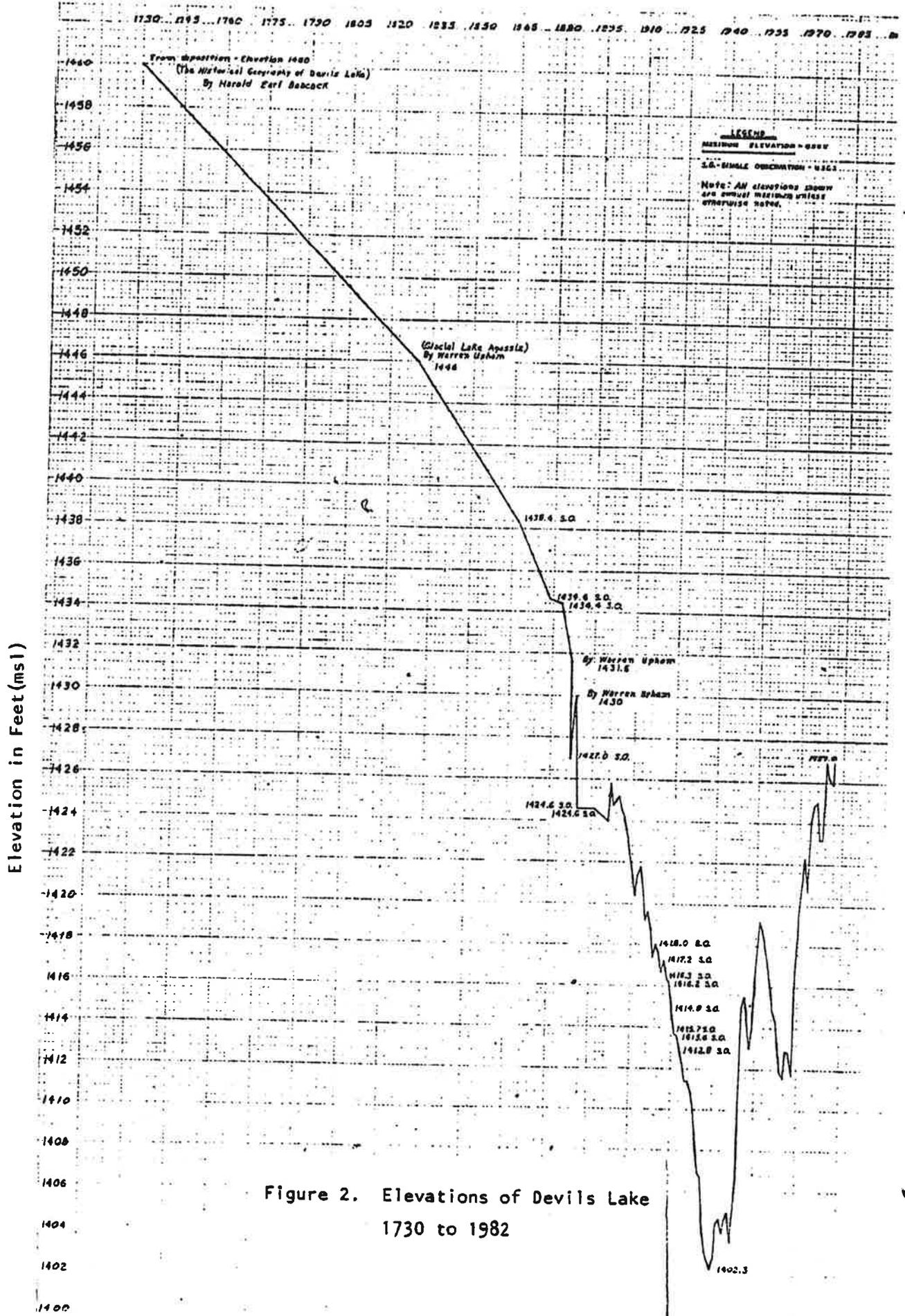


Figure 2. Elevations of Devils Lake 1730 to 1982

Table 1.
DEVILS LAKE AREA - CAPACITY

<u>Elevation</u> <u>msl</u>	<u>Area</u> <u>(acres)</u>	<u>Capacity</u> <u>(acre-feet)</u>
1,415	32,000	269,400
16	33,800	302,300
17	35,400	336,900
18	37,200	373,200
19	39,000	411,300
1,420	40,500	451,100
21	42,500	492,600
22	44,400	536,000
23	46,300	581,400
24	48,200	628,600
1,425	50,200	677,800
26	52,000	729,000
27	54,000	782,000
28	56,000	837,000
29	58,100	894,000
1,430	60,300	953,200
31	62,600	1,014,600
32	64,900	1,078,400
33	67,100	1,144,400
34	69,600	1,212,700
1,435	72,400	1,283,700
36	74,600	1,357,200
37	77,600	1,433,300
38	80,800	1,512,500
39	84,100	1,594,900
1,440	87,600	1,680,800

Past and Future Studies

The majority of recent studies concerning flood impacts and alternatives for Devils Lake have been done by the Corps of Engineers - St. Paul District. The Corps of Engineers has prepared two reports to date that resulted from a request from the Devils Lake Joint Water Management Board and the State Water Commission in October, 1979. The first report, released in February 1980, was a Flood Control Reconnaissance Report. It analyzed various short- and long-term solutions to the problems associated with rising lake levels. The short-term alternatives included dikes, floodplain management, and raising both roads and structures. The report also analyzed seven outlet routes as part of a long-term solution.

The Corps has nearly completed a Draft Detailed Project Report on the dike system in the Creel Bay Area of Devils Lake. This study is being completed under the authority of Section 205 of the 1948 Flood Control Act. Section 205 is the Corps' small project authority and allows construction of projects up to \$4 million. Details of both the Reconnaissance Report and Detailed Project Report will be summarized as part of the "Alternatives" section.

The Corps is also moving ahead with additional studies. As a continuation of the Detailed Project Report, and still under Section 205, the Corps intends to have plans and specifications of the Creel Bay dike and interior water control system by January, 1984. Construction of the dike is currently scheduled for 1984, although funding has not been approved and local agreements have not been signed.

The Corps will also start a one-year study in early 1983 on the "Justification for a Feasibility Study for Devils Lake" report. This justification will take a more comprehensive view of the basin, including an analysis of possible outlets. This study has been funded.

Although the Corps has done the most detailed recent studies on Devils Lake, there have been several other studies related to lake levels. In October, 1976, the Devils Lake Advisory Committee completed a comprehensive study report of the land and water resources in the basin. The report recommended a suitable outlet for the basin, floodplain zoning below the meandered line, and the raising of several roads in the basin.

In 1975, the U.S. Bureau of Reclamation prepared a Water Quality Study Report on Devils Lake as part of Garrison Diversion. This report proposed stabilizing Devils and Stump Lakes with water from Garrison Diversion.

The Bureau is currently funding a joint study between the State of North Dakota and the Department of Interior on the mitigation value of Devils Lake for Garrison Diversion. This concept has not been finalized

although several alternatives have been discussed. As part of the study, the State Water Commission recently completed a model study comparing current lake levels to levels that could be expected if Garrison Diversion had already raised Devils Lake to elevation 1422 in 1968. The study indicated that Devils Lake would currently be at 1431 if the lake had been at 1422 in January of 1969.

Alternatives

Numerous alternatives have been prepared over the years for raising and/or lowering Devils Lake. The alternatives summarized in this section are those proposed in the two recent Corps reports; the Creel Bay alternatives are outlined in the Detailed Project Report dated August 1982, and the various outlet alternatives are outlined in the Flood Control Reconnaissance Study completed in February, 1980.

The Detailed Project Report was limited to alternative measures in the Creel Bay area. The report analyzed several dike systems and recommended that dikes be constructed across Creel Bay to elevation 1445 msl. The cost of the selected plan was estimated at \$2.8 million. The project also includes ponding areas and an interior pumping system for controlling local runoff and seepage flows. Figure 3 is a sketch of these proposals.

The report also estimated damages that would occur within the City if the dikes were not constructed. Damages were estimated to start at elevation 1428 feet and the damages would increase to \$18.7 million if the lake reached 1435. These damages are shown in Figure 4.

The costs of various outlet routes were analyzed in the Corps' reconnaissance report. Cost estimates were prepared for three alternative routes. One route included a channel from West Bay southeast of Minnewaukan through three smaller lakes and terminating at Peterson Coulee, a tributary to the Sheyenne River. Two pump stations would be required and the total cost of this alternative was estimated at \$12 million. The advantages of this plan would be that the highest quality water would be discharged to the Sheyenne River. However, the discharge water would still not meet current allowable standards. High pumping costs are also a disadvantage of this alternative.

The second alternative where costs were estimated included a channel from the south end of East Devils Lake to Tolna Coulee and the Sheyenne River. A pump station with a 40 foot lift would be required near East Devils Lake and a dam would be required to direct the flow through a wetland area. The twelve-mile channel would be designed for a maximum flow of 200 cfs. The total project cost was estimated at \$5.7 million. The main advantage of this plan was its relatively low initial cost. Disadvantages include high pumping costs, adverse impacts to wetland areas, and the high salinity of the water in East Devils Lake.

The last alternative analyzed was a gravity flow system that included a channel from East Devils Lake to Stump Lake and another channel from

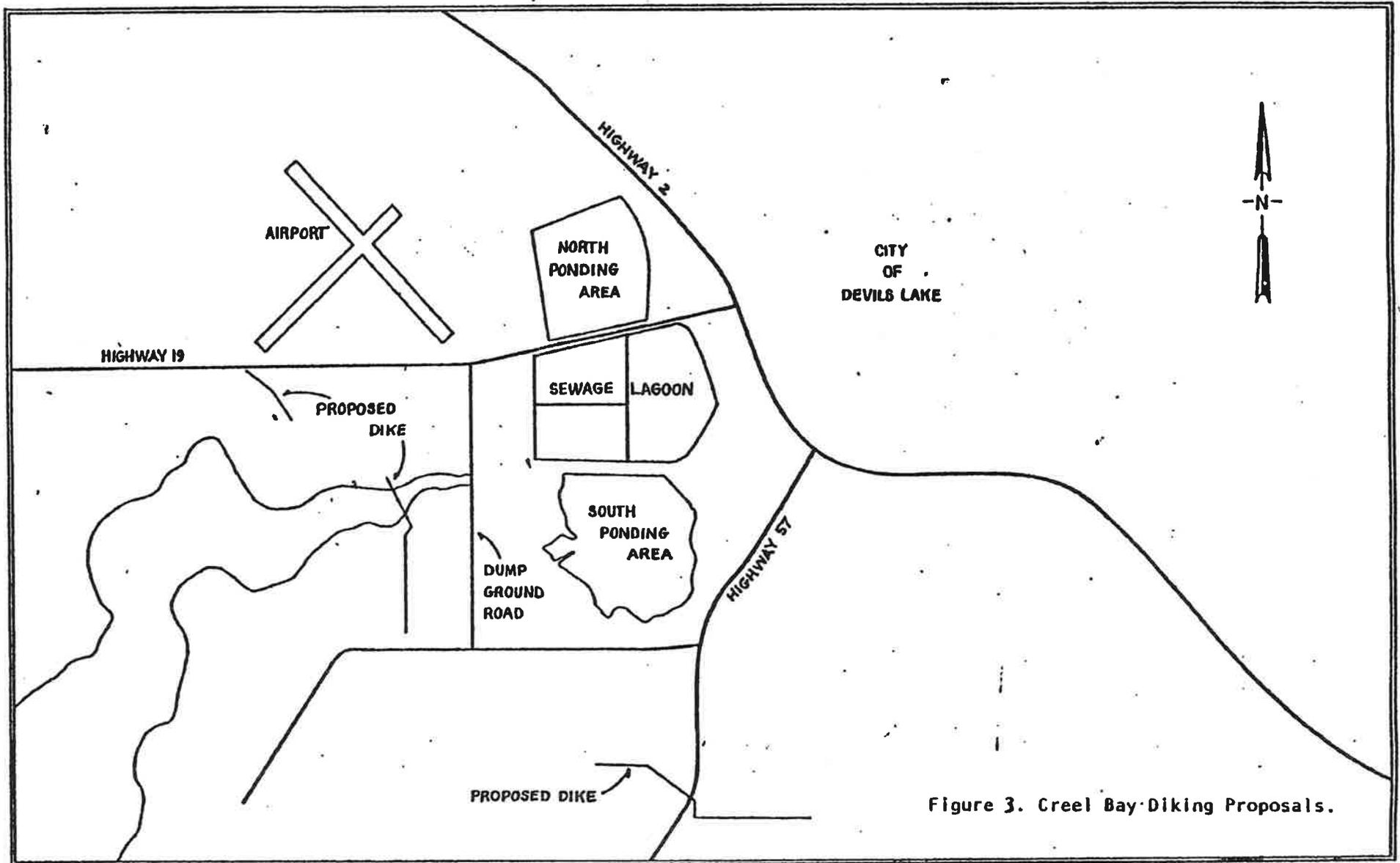


Figure 3. Creel Bay Diking Proposals.

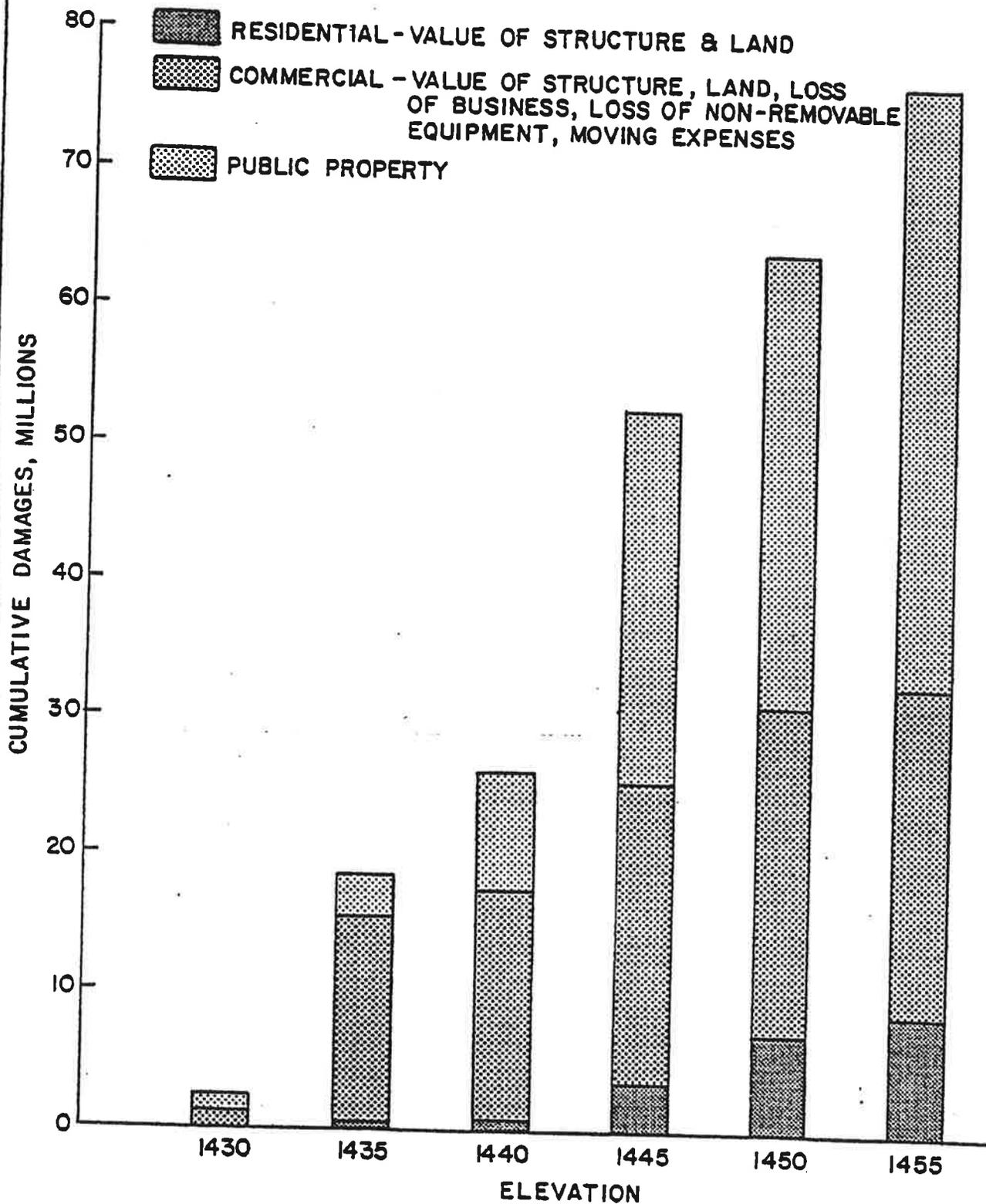


Figure 4. Devils Lake Urban Damages

Stump Lake to Tolna Coulee. The channel from East Devils Lake was 8½ miles long and the Stump Lake to Tolna Coulee channel was 1.7 miles long. The maximum cut from Stump Lake was 75 feet. The estimated cost of this system was estimated at \$13.7 million. The main advantage of the plan is the low operation and maintenance cost. Disadvantages include the very high salinity of the discharge water, high initial costs, and problems with discharging water to Stump Lake. The local people around Stump Lake would prefer receiving Garrison Diversion water rather than water from Devils Lake.

It has also been proposed to simply divert Devils Lake water to Stump Lakes and not to the Sheyenne River. While this alternative avoids downstream water quality issues, it is only considered a short-term solution. East and West Stump Lakes can store about 260,000 acre-feet from their present levels to 1427 msl. This is approximately equivalent to the 1979 runoff. The Corps of Engineers estimated the cost of a gravity channel from East Devils Lake to Stump Lake at \$5 million.

The State Water Commission is working with the City of Devils Lake and plans to work with the City of Minnewaukan and Creel and Grand Harbor Townships, in developing floodplain management ordinances. Although floodplain management will not help existing development, it will prevent or control future developments. It is necessary to control development in Creel Bay to minimize future problems and to keep certain areas free from development. Ground water tables will certainly increase with lake levels. Also, all local runoff will have to be pumped over the proposed dike. If adequate holding pond areas are not maintained, parts of the City could be flooded by local flows. It is also necessary to control development in all areas around the lake. Without an outlet, there can be little control of future lake levels.

Current Hydrologic Situation

Devils Lake is currently at 1426.6 msl. In 1982, the lake reached 1427 msl, its highest level since 1889. The majority of the increased storage in 1982 was the result of summer and fall rains. The basin is nearly saturated and many of the wetlands and lakes in the upper basin are nearly full. There is a high potential for a large runoff in 1983. However, the runoff into Devils Lake is highly variable. Although the basin has been in an apparent "wet" cycle, the lake has actually receded 5 out of the last 15 years. Five wet years account for 80 percent of the total increase in storage and 1979 alone accounts for over one-third of the total increase since 1968. Therefore, higher lake levels in 1983 are not guaranteed and are still dependent on winter and spring precipitation.

In analyzing what could happen in 1983, the following possibilities are shown:

	<u>Estimated 1983 Maximum Lake Level</u>
Case 1 (Little Winter Precipitation):	1427.0 msl
Case 2 (Average Winter Precipitation):	1427.5-1428 msl
Case 3 (1969 equivalent flood):	1428.3 msl
Case 4 (1974 equivalent flood):	1430.0 msl
Case 5 (1979 equivalent flood):	1431.5 msl

The impacts of these possibilities are also variable. Highway 20 currently has an asphalt surface of 1427.7 and, therefore, it is likely that a raise or closure will be required in 1983. The City could continue to upgrade the dump ground road in order to keep the water out of the sewage lagoon and developed areas. However, as the lake level rises, seepage and erosion problems will increase significantly. Therefore, projections above a 1428 water level should trigger Corps emergency measures. The Corps is prepared to build the coffer dam for the main dike as an emergency measure. It is necessary to construct the main dike across a dry lake bed in order to prevent extremely high future seepage through the permanent dam/dike. The Corps is proposing to build a coffer dam west of the permanent dike as part of the total construction. Therefore, constructing the coffer dam in 1983 would not result in significantly higher costs and could actually advance final construction.



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