2000 ANNUAL REPORT
WATER QUALITY MANAGEMENT PROGRAM
OMAHA DISTRICT LAKE PROJECTS

1. INTRODUCTION

a. Authorization

This report summarizes the Water Quality Management Program for Omaha District lake projects within the boundaries of the Northwestern Division. It outlines the program objectives, describes ongoing water quality management activities, organizational and laboratory capabilities, major water quality problems, special studies and significant activities of 2000. This report is prepared in accordance with reporting requirements outlined in ER 1110-2-8154.

b. Objectives

The Omaha District (NWO) has established the following objectives for management of the Division Water Quality Program:

(1) Insure the impounded waters and releases from each lake project are of suitable quality for the established project uses.

(2) Establish base line conditions by defining pre-project (pre-impoundment) and post-project water quality conditions at each lake project.

(3) Determine if project waters are in compliance with applicable state and Federal water quality standards.

(4) Quantitatively identify and assess the magnitude of existing and potential water quality problems associated with project waters. Detect changes over time which may be either beneficial or degrading.

(5) Study special problems or develop criteria for such solutions as structural modification or modification of reservoir regulation procedures aimed at controlling or enhancing environmental conditions and meeting water quality objectives.

(6) Provide an understanding of project conditions to facilitate coordination with state agencies in regard to implementing watershed pollution control.

(7) Maintain an adequate water quality monitoring program for the purpose of achieving the above stated objectives.

c. Summary of Significant Problems

Water quality problems identified in Omaha District projects during 2000 include pesticide and fertilizer contamination from agricultural practices, storm water run-off from urbanization especially during construction, sediment and nutrient inputs to the lakes, contaminants in fish tissue and shoreline erosion. Details of these problems are discussed in section 4. a. Water Quality Issues and Problems in NWO. Following is a summary of significant problems identified in the Omaha District.

Shoreline erosion is prevalent at all Omaha District projects. The erosion destroys littoral zone habitat, decreases light penetration, decreases lake depth all of which in turn impact the ecology, chemistry and recreational longevity of the lake.

Pesticides and mercury continue to be detected in Omaha District projects and both have been detected in fish tissue in the Zorinsky, Wehrspann, Garrison, Bowman-Haley, Pipestem, and Audubon Projects. Polychlorinated biphenyls (PCBs) and dieldrin have also been detected in tissue taken from fish collected in both the Salt Creek and Papillion Creek. Although these creeks are not Corps of Engineer (COE) managed, the contaminants in these streams may have passed through COE projects.

Extensive urbanization in the basins of tributary reservoirs has caused problems with excessive sediment, nutrients and other pollutant inputs. Cherry Creek, Chatfield, Bear Creek, Holmes, Zorinsky, Wehrspann, Glenn Cunningham and Standing Bear lakes are experiencing urbanization associated problems.

The Old Williston Landfill Area, located on the Garrison Project, has undergone extensive ground water and sediment monitoring for the past ten years. The City of Williston, North Dakota, conducted the monitoring and the Omaha District conducted water sampling in the Little Muddy River adjacent to the site. The City of Williston has hired a contractor to compile data collected as 2000 was the final year of the study. This report will be reviewed by the North Dakota Department of Health and other entities to determine if additional sampling is necessary. This determination is expected in 2001 to 2002.

The EPA water quality data storage system, STORET, has undergone complete reorganization at the EPA level. Difficulties in entering and retrieving data from STORET forced the NWO to search other data entry programs. A COE owned Microsoft ACCESS based program called DASLER was chosen to store and manage data collected from 1998 through the present. Eventually, DASLER will act as a "front-end" program to submit data to the STORET system.

2. ORGANIZATION AND COORDINATION

a. Organization and Assigned Responsibilities

The Omaha District is responsible for the implementation of the Water Quality Management Program at the Corps lake projects located within the district boundaries. The Northwestern Division, Omaha office provides policy guidance and monitors the overall Water Quality Management Program. The Waterways Experiment Station Chemistry and Materials Quality Assurance Laboratories (CMQAL) performs water quality analyses for the NWO and is responsible for technical supervision of water analyses performed at district, project and commercial laboratories. The CMQAL has established and maintains a laboratory quality control program. Engineering organizational elements in the district offices are responsible for the water quality program, although the activities are coordinated with Operations and Planning elements. A biologist and a hydrologic technician coordinate the water quality sampling program in the Omaha District. As of July, 2000, the limnologist postition has been vacant due to a retirement. Initiatives are underway to fill the position. The following table provides further staffing information:

TITLE	GRADE	YEARS OF EXPERIENCE	AREAS OF EXPERTISE
Biological Aide (co-op)	7	2	General biological study
Hydrologic Technician	9	5	Data entry
Biologist	11	16	Sample collection
Environmental Intern	Not Graded	0	General Office and Field Work
Limnologist	12	0	Limnology, Chemistry, Aquatic Ecology, Ichthyology, Environmental Remediation, Wetlands

Additionally, approximately 30 area personnel are involved in sample collection and mainstem release water monitoring in the water quality monitoring program.

Those Operation Division elements assigned with this responsibility are as follows:

PROJECT OFFICE	STATE
Fort Peck	Montana
Garrison	North Dakota
Oahe	South Dakota
Big Bend	South Dakota
Fort Randall	South Dakota
Gavins Point	South Dakota
Tri-Lakes	Colorado

b. Coordination with Others

Water quality activities conducted jointly or under contract with other groups or agencies are as follows:

AGENCY/CONTRACTOR	PROJECT	TYPE OF INVESTIGATION	TYPE OF WORK
USGS	Fort Peck	Surveillance	Sample Collection
USGS	Garrison	Surveillance	Sample Collection
Wayne Kromarek, Contractor	Bowman-Haley	Surveillance	Sample Collection

Routine coordination of sample collection and analyses is conducted with other state organizations within the Omaha District to avoid duplication of sampling effort.

3. WATER QUALITY ACTIVITIES IN NWO

a. Investigations

Three types of investigations are performed on reservoir projects: pre-impoundment, surveillance and comprehensive investigations. A pre-impoundment investigation is made before completion of a project to establish base line conditions. A surveillance investigation is an annual post-project investigation consisting of fixed station sample collection and analysis of basic water quality parameters to establish water quality trends. A comprehensive investigation is an extensive post-project investigation conducted at several locations in the lake to obtain a more thorough understanding of reservoir water quality. Additional water quality parameters are analyzed if a specific problem is being investigated and to obtain a comprehensive evaluation of the present project conditions.

Field investigations conducted during 2000 are as follows:

(1) Pre-impoundment Investigations - none.

(2) Surveillance Investigations

MAINSTEM PROJECTS	TRIBUTARY PROJECTS		
Fort Peck	Pipestem	Standing Bear	Branched Oak
Garrison	Bowman-Haley	Zorinsky	Pawnee
Oahe	Cherry Creek	Glenn Cunningham	Stagecoach
Fort Randall	Bear Creek	Lake Audubon	Olive Creek
Gavins Point	Cold Brook	Lake Pocasse	Wagon Train Lake
Big Bend	Yankton	East Twin	West Twin
	Chatfield	Wehrspann	Yankee Hill
	Conestoga	Bluestem	Holmes

3. COMPREHENSIVE INVESTIGATIONS

b. Special Studies – In summer of 2000 the EPA began a long-term study on Lake Oahe. This study involves collecting water quality data to be used in a program called eMAPS (Environmental Monitoring and Assessment Program). eMAPS is a geographic information system that contains data on small streams and lakes in North America. The purpose of using Lake Oahe as a study site is that the lake covers a large geographical area and the data contributes to general information about lake environments. Also of interest is the Missouri River watershed which is being looked at in a water quality interest instead of just a water quantity view. Data from the Omaha District water quality program will be shared with the study coordinators and the water quality unit will review data collected on this study.

4. WATER QUALITY ISSUES AND PROBLEMS IN NWO

a. Issues and Problems of 2000

(1) Pesticides and Heavy Metal Contamination. Pesticide application throughout the Missouri River basin has affected most Omaha District projects. Pesticides detected in the past five years include cyanazine, atrazine, alachlor, diazinon, dachthal, metolachlor, dieldrin, simazine, metribuzin, propachlor, dicamba and trifluralin. Not all the listed pesticides are covered by Federal criteria or state water quality standards.

Due to the widespread occurrence of pesticides, bioaccumulation of some pesticides in tissue of aquatic organisms is a potential threat to all consumers of these organisms. A 1986 fish tissue analyses program evaluated the extent of bioaccumulation of pesticides and metals in fish of the Salt Creek and Papillion Creeks Lake projects. Results of those tests show that chlordane, dieldrin, DDT and several metals were detectable, but below the level set by the Food and Drug Administration (FDA) to limit or restrict human consumption. Similar studies have not been undertaken to update this information.

Fish tissue collected from Zorinsky and Wehrspann Lakes by the Nebraska Department

of Environmental Quality in the past four years has exceeded FDA recommended human consumption limits based on mercury levels in the tissue. The Nebraska Department of Health (NEDH) has issued an advisory against consumption of fish caught in these impoundments. The advisory at these impoundments is only directed at pregnant women, nursing women or infants; there is no cancer risk level involved.

Although not a COE project, the NEDH has issued advisories on eating fish caught in the Salt Creek from Lincoln to the Platte River.

Tissue collected in the Salt Creek has contained both poly-chlorinated biphenyls (PCB) and dieldrin. The levels of these toxins were high enough to issue a consumption advisory.

The following sites, tested by the NEDH, have shown no fish contamination that would warrant a consumption advisory under Nebraska protocol: Branched Oak, Bluestem, Conestoga, Holmes, Olive Creek, Pawnee, Wagon Train, Yankee Hill, Glen Cunningham, and Lewis and Clark Lake.

The USFWS has also conducted studies concerning fish collected in irrigation return water. The studies will measure heavy metals and organochlorine pesticides in the fish tissue. Data were collected in 1996 in Lake Pocasse and in 1997 in the Cheyenne arm of Lake Oahe. Results of the 1996 testing are being combined with similar studies conducted in Colorado, Utah, Montana, North and South Dakota, Kansas and Nebraska. A report of the findings was to be published in 2000 but is now expected in 2001.

The Cheyenne River Sioux Tribe and the South Dakota Game, Fish and Parks collected fish tissue in the Cheyenne River, Moreau River, Grand River and these arms of Lake Oahe in 2000. The tissue contained sufficient mercury to warrant a consumption advisory on fish caught in waters adjacent to tribal lands.

As a result of this study the South Dakota Game, Fish and Parks Department is going to extend the area of study in other portions of Lake Oahe in 2001. To determine background levels of mercury they are also going to study fish in land locked stock ponds. The source of the mercury may be mining concerns upstream from the reservoir.

The North Dakota Department of Health and Consolidated Laboratories (NDDHCL) in Bismarck, North Dakota, has issued an advisory on consumption of fish caught in some streams and lakes in North Dakota. Bowman-Haley Lake, Pipestem Lake, Lake Sakakawea and the Missouri River South of Garrison Dam are included in the advisory. The detection of mercury in the fish fillets precipitated the advisory. The advisory was not intended to discourage anglers from eating fish, but offered advice on how fish caught in these impoundments could be eaten safely. Anglers are advised to consume small younger fish and release older fish. Additional analyses will be conducted by the NDDHCL and the advisory updated annually.

The NDDHCL had undertaken a study on mercury in fish tissue from Lake Sakakawea. The study involved the release of mercury from vegetation inundated by the 1993 flood. The study concluded that walleye, sauger and Chinook salmon populations all demonstrated a significant increase in mercury content.

The Montana Department of Public Health and Human Services has published a "Meal Advisory" for consuming certain species and size of fish caught in Fort Peck Lake. The advisory is based on mercury in tissues of Walleye, northern pike, Lake Trout and Chinook salmon. The source of the mercury is considered to be mostly from natural sources however some may be from industrial or mining in the watershed.

(2) Urbanization. Urbanization is on-going around many Omaha District reservoirs. Reservoirs with urbanizing watersheds include Cherry Creek, Chatfield, Bear Creek, Holmes, Zorinsky, Glen Cunningham, Standing Bear, and Wehrspann Lakes. Urbanization to a lesser degree is occurring at additional projects.

Construction methods normally involve laying the land bare allowing sediment laden run-off to impact nearby streams and lakes. Best Management Practices (BMP) to minimize construction associated sedimentation damages are rarely used effectively. Methods of minimizing construction impact include; temporary sediment ponds, staging construction so that large areas are not denuded, using hay bales, silt curtains, etc. Efforts should be made to prevent off-project construction sedimentation from causing on-project impacts. This could be accomplished by working with developers and appropriate state, city, or county agencies.

Post construction problems are commonly associated with storm drainage and urban pollution. The conversion of grasslands or forests to roads, rooftops, sidewalks, and other water impervious surfaces make stream flows more variable and increases the frequency of high flow events. In addition, pollutants associated with urban drainage can cause severe impacts to downstream water bodies. Urban storm flows detrimental to receiving water can be permitted under the National Pollutant Discharge Elimination System thus requiring treatment. Storm sewer exits can be allowed on project lands provided detention in the form of ponds, swales, or wetlands exist on private property. A developer may be asked to construct a series of wetlands to slow downhill flows and provide time for bacterial die-off, chemical degradation, reduced flow rates, and sediment fall out.

(3) Sedimentation Sedimentation is a process which reduces the usefulness of reservoirs. In the design and construction of reservoirs, the COE will commonly allow for additional volume to accommodate sedimentation. The inflowing sediment can seriously affect the reservoir ecology, fisheries and benthos. The reservoir can suffer ecological damage before a volume function such as flood control is impacted. The influx of sediment eliminates fish habitat, adds nutrients, destroys aesthetics, and decreases biodiversity. Working closely with the project sponsors in an effort to manage sediment input would ultimately prolong reservoir life. Wetlands or sediment traps could be

constructed at the upper end of a reservoir either upstream of the reservoir, or by taking a portion of the reservoir's upper end, making a wetland.

In an effort to slow the sediment load emptying into Wehrspann Lake a sediment impoundment structure was built upstream of the reservoir in 1999. Turbidity, suspended and dissolved solids data were gathered upstream and downstream of the project to determine sediment inflow to the lake during construction. Post construction data should be collected to determine the sediment impoundment's effectiveness.

(4) Shoreline Erosion. Shoreline erosion is a major problem occurring on nearly all reservoirs located in areas of erodible soils such as the Midwest. The Omaha District alone has over 6000 miles of reservoir shoreline of which between 70 and 90 percent is eroding. Some facilities have been protected, such as recreational and archaeological sites, but most of the shoreline continues to erode. Continued loss of the shoreline habitat (littoral zone) results in the loss of fishery habitat as well as loss of habitat for other biota such as aquatic vegetation and benthos. Past shoreline erosion efforts should be evaluated for effectiveness so that successes can be repeated.

b. Water Quality Classification

The water quality conditions in each project have been classified in accordance with the following criteria:

CLASS	CRITERIA
I	High Water Quality No Known Problems
II	Generally Good Water Quality: Minor or Suspected Problems
III	Continuing Water Quality Problems Requires Close Monitoring of Trends and Careful Examination of Problems

The following is a list of projects evaluated according to the above classifications. This classification was conducted in 1989.

(1) Class I: None

(2) Class II

Fort Peck	Chatfield	Garrison	Oahe
Big Bend	Fort Randall	Gavins Point	Audubon

Pipestem	Lake Pocasse	Lake Yankton	Cold Brook
Cottonwood Springs			

(3) Class III

Zorinsky	Standing Bear	Pawnee	Wehrspann
Yankee Hill	Glenn Cunningham	Stagecoach	Conestoga
Cherry Creek	Bowman-Haley	Holmes	Bluestem
Bear Creek	Branched Oak	East Twin	West Twin
Olive Creek	Wagon Train		

5. TECHNICAL ASSISTANCE TO OTHERS

A large part of the technical assistance to others consisted of aiding district elements. An increasing portion of the workload has been assisting outside agencies such as states, Natural Resource Districts or project sponsors with specific water quality problems. The following identifies assistance provided to various Corps elements and outside agencies.

a. Technical Assistance - Engineering Division.
   1. Reviewed Section 1135 projects
   2. Provided data on the Chatfield/Bear Creek Re-allocation study
   3. Worked with other COE elements on evaluating dredging test results
   4. Worked with UNL on contracts for evaluating Salt Creek Lakes and researching problems for quantifying long term changes in reservoir chemistry, physics and biology

b. Technical Assistance - Operations Division.
   1. Review and comment on Standing Bear Lake construction
   2. Assisted numerous area offices on shoreline problems and evaluations of the effectiveness of their efforts
   3. Provided information on agitation dredging
   4. Attended Salt Creek coordination meetings
   5. Worked on willow seed for shoreline erosion

c. Technical Assistance - Real Estate Division.
   1. Assisted Real Estate Division and developers to resolve sedimentation problems associated with construction at Chatfield Reservoir

d. Technical Assistance - Other Corps Elements.

   1. Water quality personnel are members of several groups and committees

including two COE Field Review Groups.

2. Assisted OCE on a variety of COE efforts such as reviewing Section 1135 projects, handbooks and other reports and in updating the Water Quality Engineering Manual
3. Assisted OCE and WES on a variety of new environmental programs and efforts such as Ecosystem Management and Restoration Resources Programs and the Roadmap Conference to provide environmental direction to COE efforts
4. Worked on assessing and guiding the COE Research and Development program
5. Worked with WES in developing environmentally friendly methods and guiding research efforts for submittal to district and division offices
6. Provided input at OCE meetings pertinent to new environmental missions
7. Provided information and expertise at OCE meeting involving new COE environmental initiatives

e. Assistance to Outside Agencies.

1. Assisted the City of Omaha on a Zorinsky Lake Watershed Development Plan
2. Assisted the State of Nebraska in their Non-Point Pollution Source Program
3. Assisted the Nebraska Department of Environmental Quality to protect water sources for numerous cities SWAP program
4. Worked with the State of Nebraska on resolving fish tissue pollutant problems in Nebraska waters
5. Provided the City of Omaha with methods of dealing with sedimentation and shoreline erosion within the Zorinsky Lake watershed
6. Assisted the State of Nebraska in implementing the Source Water Assessment Program for Nebraska
7. Worked with the City of Omaha on Papio sampling
8. Worked with the State of Nebraska in evaluation Non-Point Source projects.
9. Worked with the State of Nebraska in resolving fish tissue contaminant problems
10. Worked with the State of Nebraska and area offices in attempting to resolve odor problems associated with the development of hog lots
11. Worked on shoreline erosion problems on Salt and Papio Creek Lakes. Provided information to project office and Nebraska Game and Parks

f. Water Quality Sample Collection Training. The Omaha District Water Quality Unit utilizes approximately 30 area personnel for water quality sample collection and support of the continuous recording water quality monitors. Periodic training of new personnel and refresher training is necessary to maintain the present quality of field sampling. The following Projects were provided with training:

1. Fort Randall
2. Oahe, Pierre
3. Oahe, Mobridge

4. Big Bend

6. POSITIVE ACTIONS

As a result of the water quality unit's involvement, a variety of efforts to improve lake quality are being accomplished. These efforts improve water quality and recreation and have the potential to extend the recreational life of the lake. Examples of positive actions include:

a. Major programs are on going at Zorinsky Lake. These programs are aimed at maintaining and improving water quality and reservoir ecosystems.

b. Water quality personnel are involved in shoreline erosion prevention projects and wetland creation projects, which will benefit water quality, aesthetics, fisheries, and recreation.

c. The following ideas have been provided by water quality personnel and have been initiated or are being considered for action:

(1) Utilizing riprap in new ways to increase habitat diversity and decreasing the cost of riprap per linear foot.

(2) Resolving shoreline erosion problems using sound ecological methods.

(3) Working with state agencies on warning fishermen about reservoirs with contaminants in fish flesh.

7. GOALS AND RECOMMENDATIONS

The following actions are recommended to improve and maintain the overall water quality program.

a. Maintain a balanced Water Quality Management Program that is responsive to project and agency needs.

b. Assist Operations elements with the development of action plans for dealing with emergency situations such as fish kills or algal problems and assist Real Estate with easement problems pertinent to water quality applications.

c. Expand on the use and training of project personnel to collect water quality data.

d. Maintain a viable Water Quality Data Collection Program to determine if project waters are in compliance with applicable State water quality standards.

e. Cooperate with state and Federal agencies in evaluation of stream flow needs and resolving problems beyond Corps management boundaries to insure beneficial usage of impounded waters.

f. Assist other district elements in the assessment of potential of actual water quality issues.

g. Identify and resolve point source pollution problems such as inadequate sewage treatment.

h. Maintain a viable monitoring program at all the projects in accordance with ranked priorities, concentrating more effort on Class III projects, as identified in 4.b.

i. Facilitate coordination with state agencies in regard to implementing water shed pollution control by providing an understanding of project conditions.

WATER QUALITY PROBLEMS AND ISSUES
MRR LAKES 2000
OMAHA DISTRICT

PROJECT	ALGAL BLOOMS	FISH KILLS	POTENTIAL PROBLEM AREAS *	STATE STANDARD EXCEEDANCE
Fort Peck, Montana Missouri River Mainstem	No	No	coal and oil development, algal blooms	**INFLOWS:** none identified **RESERVOIR:** arsenic, mercury, dissolved oxygen **RELEASES:** arsenic
Lake Sakakawea, North Dakota Missouri River Mainstem	No	No	oil drilling, strip mining, algal blooms metribuzin	**INFLOWS**: none identified **RESERVOIR**: arsenic, mercury, dissolved oxygen **RELEASES:** none identified
Lake Audubon, North Dakota Subimpoundment Lake Sakakawea	No	No	winter kills metribuzin	**IMPOUNDMENT**: arsenic, mercury, total phosphorus, dissolved oxygen, sulfate
Lake Oahe, South Dakota Missouri River Mainstem	No	No	ag runoff , mercury bioaccumulation metribuzin	**INFLOWS**: none identified **RESERVOIR**: mercury, total phosphorus, iron, sulfate **RELEASES:** arsenic, mercury, sulfate, total phosphorus
Lake Pocasse, South Dakota Subimpoundment Lake Oahe	No	No	ag runoff, winter kills metribuzin, atrazine	**IMPOUNDMENT**: arsenic, iron, total phosphorus, sulfate
Lake Sharpe, South Dakota Missouri River Mainstem	No	No	ag runoff atrazine	**INFLOWS**: none identified **RESERVOIR**: mercury, sulfate, dissolved oxygen **RELEASES:** sulfate
Lake Francis Case, South Dakota Missouri River Mainstem	No	No	intrusion of the white river delta metribuzin, atrazine	**INFLOWS**: none identified **RESERVOIR**: mercury, sulfate, dissolved oxygen, total phosphorus, arsenic **RELEASES:** sulfate, mercury
Lewis and Clark, South Dakota Missouri River Mainstem	No	No	emergent aquatic vegetation atrazine, cyanazine	**INFLOWS**: sulfate, mercury **RESERVOIR**: mercury, sulfate, dissolved oxygen, arsenic **RELEASES:** sulfate, total phosphorus, arsenic
Lake Yankton, South Dakota Forebay of Gavins Point	No	No	schistosome dermatitis alachlor	**IMPOUNDMENT**: sulfate, mercury, dissolved oxygen, arsenic
Bowman-Haley, North Dakota Tributary	Yes	No	algal blooms no pesticides detected	**INFLOWS**: sulfate, arsenic, iron, total phosphorus **RESERVOIR**: mercury, sulfate, total phosphorus, arsenic, pH **RELEASES:** arsenic, iron, sulfate, total phosphorus
Pipestem, North Dakota Tributary	Yes	No	winter kills no pesticides detected	**INFLOWS**: iron, total phosphorus, arsenic **RESERVOIR**: mercury, total phosphorus, arsenic, dissolved oxygen **RELEASES:** arsenic, total phosphorus
Cottonwood Springs, South Dakota Tributary	No	No	winter kills no pesticides detected	**IMPOUNDMENT:** arsenic, dissolved oxygen
Cold Brook, South Dakota Tributary	No	No	winter kills no pesticides detected	**INFLOWS**: not measured **RESERVOIR**: mercury, arsenic, dissolved oxygen **RELEASES:** arsenic
Cherry Creek, Colorado Tributary	No	No	rapid urbanization winter kills metribuzin	**INFLOWS**: arsenic, mercury, dissolved oxygen **RESERVOIR**: arsenic, dissolved oxygen **RELEASES:** arsenic, iron
Bear Creek, Colorado Tributary	No	No	urbanization winter kills metribuzin	**INFLOWS**: arsenic, iron, sulfate **RESERVOIR**: mercury, arsenic, pH **RELEASES:** arsenic

* Potential Project Areas contain pesticides for which no standard exists

WATER QUALITY PROBLEMS AND ISSUES
MRR LAKES 2000
OMAHA DISTRICT

PROJECT	ALGAL BLOOMS	FISH KILLS	POTENTIAL PROBLEM AREAS *	STATE STANDARD EXCEEDANCE
Chatfield, Colorado Tributary	No	No	urbanization winter kills no pesticides detected	**INFLOWS**: arsenic, iron, mercury **RESERVOIR**: arsenic, iron, dissolved oxygen **RELEASES:** arsenic, iron
Pawnee Lake, Salt Valley Reservoir Nebraska Tributary	Yes	No	bioaccumulation of metals & pesticides sedimentation shoreline erosion atrazine, metolachor, alachlor, metribuzin	**INFLOWS**: arsenic **RESERVOIR**: arsenic, iron, dissolved oxygen **RELEASES:** arsenic
Branched Oak Lake, Salt Valley Reservoir Nebraska Tributary	Yes	No	bioaccumulation of metals & pesticides sedimentation shoreline erosion atrazine, simazine, alachlor, cyanazine, metolachlor	**INFLOWS**: arsenic **RESERVOIR**: arsenic, iron, dissolved oxygen **RELEASES:** arsenic
Holmes Lake, Salt Valley Reservoir Nebraska Tributary	Yes	No	bioaccumulation of metals & pesticides sedimentation shoreline erosion atrazine, alachlor, metolachlor	**INFLOWS**: arsenic **RESERVOIR**: arsenic **RELEASES:** arsenic, iron
Stagecoach Lake, Salt Valley Reservoir Nebraska Tributary	Yes	No	bioaccumulation of metals & pesticides sedimentation shoreline erosion atrazine, metolachlor, alachlor	**INFLOWS**: none identified **RESERVOIR**: iron, mercury, arsenic, dissolved oxygen **RELEASES:** none identified
Zorinsky Lake, Papillion Creek Reservoir Nebraska Tributary	Yes	No	bioaccumulation of metals & pesticides sedimentation shoreline erosion atrazine, cyanazine, metribuzin	**INFLOWS**: iron, dissolved oxygen, arsenic **RESERVOIR**: mercury, dissolved oxygen, arsenic **RELEASES:** arsenic
Glen Cunningham Lake, Papillion Creek Reservoir Nebraska Tributary	Yes	No	bioaccumulation of metals & pesticides sedimentation shoreline erosion metribuzin, atrazine, c*yanazine, simazine	**INFLOWS**: iron, dissolved oxygen, arsenic **RESERVOIR**: iron, mercury, dissolved oxygen, arsenic **RELEASES:** iron, arsenic

* Potential Project Areas contain pesticides for which no standard exists