PROJECT SUMMARY SHEET

PROJECT TITLE NAME: **Continuation Cottonwood Lake Watershed**

Robert Roeber
1112 Cottonwood Lane
Redfield, SD 57469

Phone: (605)472-0581
(605)460-0505
Cottonwood Lake Association
Co-Sponsor- JRWDD

STATE CONTACT PERSON:

PHONE: FAX: E-MAIL STATE:

WATERSHED: Cottonwood Lake, Turtle Creek, Upper-James River

HYDROLOGIC UNIT CODE: HIGH PRIORITY WATERSHED (**YES**/no):

TMDL Development (**completed**) and/or Implementation (**YES**) (check any that apply)

PROJECT TYPES	WATER BODY TYPES	NPS CATEGORY
[] STAFFING & SUPPORT	[] GROUNDWATER	**YES**-AGRICULTURE
YES-WATERSHED	**YES**-LAKES/RESERVOIRS	[] URBAN RUNOFF
[] GROUNDWATER	**YES**-RIVERS	**YES**-SILVICULTURE
[] I & E	**YES**-STREAMS	**YES**-CONSTRUCTION
YES-WETLANDS	[] RESOURCE EXTRACTION	[] STOWAGE LAND
DISPOSAL		

PROJECT LOCATION:

- Cottonwood Lake Spink County
- Range: 65W,
- Township: 115N
- Sections: 4-5, 7-9, and 17-18
- Longitude: 98 deg. 40 min. 30 sec. W
- Latitude: 44 deg. 47 min. 18sec N
- EPA-Region A

SUMMARIZATION OF MAJOR GOALS:

- Increase domestic water supplies with cost sharing funds for Mid-Dakota hookups
- Enhance water-based recreation at public beach with clean up and installation of self-contained toilet and a handicapped accessible boat dock

- Increase availability and provide convenience to recreation infrastructure by developing a boat ramp and dock on the north side of the lake and Appel's landing
- Increase drainage from spring runoff and provide lake improvements by debris and tree cleanup on the North side shoreline between Appel's landing and the lake outlet
- Provide sanitary and sewer improvements with cost sharing funds for septic system upgrades
- Protect water quality and promote fish habitat with cost sharing funds for shoreline stabilization projects large and small

PROJECT DESCRIPTION: Same as goals

319 Funds: $205,000 Local Funds: $22,000 State Funds: Federal Funds: Total project cost: $493,000

- Any questions see budget

319 Funded Full Time Personnel: $30,000 projected

Cottonwood Lake Association Request for Watershed Improvement Funding

We are writing this application of request for funding on behalf of Cottonwood Lake Association and the variety of people that reside in our community and utilize the lake for hunting, fishing, and water recreation.

Our proposals are a continuation of the goals established in the Cottonwood Lake Watershed Improvement Project. The spring run-off has filled our lake to capacity and resurgence of enthusiasm for development and conservation has reappeared. Cottonwood Lake has been a haven for in-state and out-of-state pheasant hunter. Over 2,000 acres of Game, Fish and Parks (GFP) hunting areas border the 5.6 miles of shoreline and more than 20 cabins house pheasant, duck and goose hunters in the fall. Neighbors, a quality restaurant, is available year round to hunters, fishermen and local residents and two available hunting lodges house up to 15. IN the late fall, it serves as a temporary home for snow, blue and Canadian geese that migrate through in addition to predatory bald eagles that follow them. Several sightings of bald eagles have been confirmed and in one instance 14 were counted in the tall cottonwoods at our south side public beach.

The dry years since 2000 had winter killed the lake in 2006, but increased water levels since 2005 has allowed us to reintroduce walleye and perch into the lake. We are in our second year of stocking walleye fry and 3,000 adult perch were added a week ago prior to their spawning. In the dry years, over 20 shorelines stabilization projects were completed utilizing fabric, farmer rock, riprap, and tree and grass planting that supported walleye habitat. The Cottonwood Lake Association initiated a cost share program to pull hazardous rocks to the shoreline to safeguard future boating enthusiasts. This process stabilized shoreline erosion and reduced contaminants that would enter the water during the erosion process. We actively work with the Spink County Conservation service in acquiring trees for homeowners and thanked the JRWDD for their past and continued support of this cost effective program.

We have submitted funding requests to Central Plains Water District, Spink County Commissioners, Game Fish and Parks, as well as Cottonwood Lake Association, and James River Water District. We are requesting technical assistance from JRWDD and Dave Bartel in applying to other funding sources such as DENR small grants 319 EPA funds, inclusion in the State Water Plan, consolidated Water Facilities Construction Program and sources that would support our watershed improvement project.

Responses to our requests have been encouraging JRWDD awarded $50,000 for shoreline stabilization. Homeowners have matched that amount and have committed $20,000 for sewer and septic system upgrades. Over $17,000 in in-kind services has already been provided and more commitments come in yearly. Lake Association members and civic organization volunteers have logged in over 1,000 hours of in-kind labor in three years. The year 2012 has not been totaled but enthusiastic volunteers have made great strides in cleaning up after (3) 1 hundred year flooding events in 2 years. These three events have ravaged our shorelines and its imperative we repair them while the present water elevation is down.

We ask the evaluators to read pages 1-4, plus 9 and 10 of the Phase 1 Watershed Assessment and TMDL final report to get a general description and review of the lake. It is also imperative that they review the

Final Report areas highlighted in yellow. This knowledge will help understand the shortcomings of the original watershed project and the purposes for our new proposals. The following link will take you to the Cottonwood Lake / Lake Louise Final Report:
http://denr.sd.gov/dfta/wp/wqprojects/tmdl_cottonwoodlouiseimp.pdf

Our goals with these projects are to:

- Increase domestic water supplies with cost sharing funds for Mid- Dakota hookups
- Enhance water-based recreation at public beach with clean up and installation of self- contained toilet and a handicapped accessible boat dock
- Increase availability and provide convenience to recreation infrastructure by developing a boat ramp and dock on the north side of the lake and Appel's landing
- Increase drainage from spring runoff and provide lake improvements by debris and tree cleanup on the north side shoreline between Appel's landing and the lake outlet
- Provide sanitary and sewer improvements with cost sharing funds for septic system upgrades
- Protect water quality and promote fish habitat with cost sharing funds for shoreline stabilization projects large and small.

Thank you for your time and consideration

Robert J. Roeber

Public Beach Cleanup and Tree Cleanup, Installation of Self-Contained Outdoor Toilet and Handicapped Dock

Project started April 2009 – This 2-3 acre area is part of a GFP wildlife habitat for pheasants. This area is part of a 500 acre parcel adjacent to the inlet. The tall cottonwoods are habitat for bald eagles that follow the migrating geese in November and December. Whooping cranes fish on the shoreline and have a GFP reserve near the diversion ditch dam four miles away on Turtle Creek. Many species of ducks, herons and cranes are visible. Mary S. Clausen, Regional Supervisor for Land Management GFP, has reviewed and approved of our proposal.

CLA spent $776.00 to Dakota Direction for backhoe services. In kind equipment donations – Markley – skid loader; Odland's Gravel – grapple attachment for skid loader, Ryan Anderson – truck and Doug Zens – trailer.

Cost of toilet (self-contained) - $9,000.00
Cost of aluminum dock - $5,000.00.
Quote – Russel Rhett, GFP Division out of Watertown, services Spink County Cottonwood Lake and Twin Lakes –1-605-882-5391

Requests for funding – CWLA $2,000.00 for toilet and $1,000.00 for dock approved, Central Plains Water District $2,000.00 for toilet and $1000.00 for dock, Spink County $2,000.00 for toilet and $1000.00 for dock, JRWDD request $6,000.00 for toilet and dock

In kind property donation – Del Haux – picnic table $100.00

Hours of in kind donation – cleanup public beach

Trim trees, cutting up downed trees
- Rob Roeber – 80 hrs.
- Kelly Siebrecht – 5 hrs.

Public beach cleanup, burning wood, raking shoreline, pick up limbs
- Bob Cleberg – 12 hrs.
- Linda Cleberg – 12 hrs.
- Jacob Thomas – 6 hrs.
- Kyle Zens – 12 hrs.
- Talaya Zens – 12 hrs.
- Del Haux – 6 hrs.
- Reynold Christman – 6 hrs.
- Ryan Anderson – 12 hrs.
- Mike Pfister – 12 hrs.
- Kelly Siebrecht – 12 hrs.
- Rob Meisel – 12 hrs.
- Cody – 12 hrs.
- Patrick – 12 hrs.

Continued maintenance will be by members of CWLA, National Guard 147th Artillery Battery B, FFA from Redfield and Tulare/Hitchcock

Mowing grass at public beach – 2 plus acres
- Linda Cleberg – 12 hrs.
- Talaya Zens – 6 hrs.
- Charles Groft – 20 hrs.
- Kevin Siebrecht – 20 hrs.
- Del Haux – 12 hrs.
- Reynold Christman – 12 hrs.

Spraying noxious weeds, leafy spurge, Canadian thistle
Rob Roeber – 2 hrs.
Mike Esser – 2hrs.

Weed-eater – shoreline
Rob Roeber – 20 hrs.

Total in kind hrs. performed in 2009 – 329 hrs.

Committed donation – Haider Construction – backhoe to dig hole for self-contained toilet

Mid-Dakota Hookup – Requesting $20,000.00 from JRWDD, $10,000.00 from Central Plains Water Development and matching funds from homeowners

Goals:

- Provide quality water for human consumption – support South Dakota water boards #1 goal
- Reduce contamination from shallow wells and sand point wells
- Provide for continued maintenance by Mid-Dakota – contact person Loren 1-800-439-3079

Present moratorium on hook-ups will come off in May when Mid-Dakota RWS (DW-02) increases water treatment capability by 4.5 million gallons per day. A waiting list is in effect which requires a $300.00 holding fee. Hook-up $1,800.00 to Mid-Dakota lines, $3.50/ft., $20,000.00 a mile. The average total cost of hook-up is running at $4,000.00. Original cost was as low as $300.00 when project was in the initial stages of development. Our goal is to provide lost cost water installation for human consumption.

This project serves homeowners and guests during the summer recreation season and during the fall pheasant, duck and goose hunters. During the summer holidays, Memorial Day, 4th of July, and Labor Day weekends, there are easily one to two thousand people around the lake.

Several homeowners provide housing for hunters during the fall. Twenty-five plus homes and cabins are rented to in-state and out-of-state hunters. This economic impact adds to the tax base for the county and township and helps alleviate the housing shortage for hunters. Most homeowner's re-invest housing profits back into their properties.

Interested homeowners committing to 50% cost share:

- Leon Kimlicka
- Sheri Binger
- Kevin Siebrecht
- Casey Fey
- Peterson Farms
- Ginny Schwab
- Robert Tiff
- Gary and Chad Moore
- Paul Whitley
- Travis Thomas
- Kyle Roberts
- Mark Purnell

Boat Ramp

Yearly maintenance by GFP, CWA and FFA or National Guard

1' x 17' planks (concrete) 40 and $40.00 = $1,600.00 – donated and installed by GFP using backhoe, truck and three employees $500.00 plus for a total of $2,100.00

In kind equipment for shoreline debris and trees – Haider Construction
Tree clean up – Dakota Directional – Doug Zens (trailer) and Ryan Anderson (truck)

In kind labor – Lake Association members
National Guard 147th Filed Artillery – Chris Harford, Chad Moore, Jerry Eaton

Agreement made with property owner Roger Appel (606-472-0115) for use of land to install boat ramp with the condition of no picnic tables or trash receptacles. Property is adjacent to Highway 26 and fulfills a need for a boat ramp on the north side of the lake where the largest number of residents live. Adequate parking for vehicles and trailers.

Aluminum dock needed so boats can be launched, moored and trailer can be moved off the ramp at a cost of $5,000.00 with a request from Central Plains for $1,500.00 and request from JRWDD for $2,500.00. GFP will pull out dock in fall and put dock in in the spring.

In kind donation – labor more
Chad ~~Semour~~ – 20 hrs. committed – level site and clean up debris
Doug Zens – trailer
Gary Newman – loader truck
Chris Harford – National Guard
Jim Haider and Adam McMahan – City of Redfield
Rob Roeber – CWLA – debris cleanup
Levi Zens – FFA

Carr Construction – donated gravel or oversize load at $200.00

Mark Muellenberg – donated fall 2009 – south side east boat dock – 4 yds. of concrete at $100.00/$400.00

Shoreline Stabilization – Request $20.000.00 from JRWDD; $10,000.00 from Central Plains Water Development; $30,000.00 matching funds from homeowners

Reduce erosion for source of contamination

Create and increase walleye habitat and waterfowl wetland stabilization

Habitat for migrating blue, snow and Canadian geese in the fall

Stabilize the distance between septic system and shoreline maintenance by homeowners

Review by Lake Association serves the homeowners and guests

Homeowner

Projected schedule – start in the spring depending on spring runoff – ideal time September-November

Allows for fall planting of grass and trees

Lake is pheasant production area – 8 quarters of GFP pheasant habitat surrounds the lake

Backhoe - $70.00-80.00/hr.

Track hoe - $140.00/hr.

Fabric - $2.79/ft.

Farmer rock – most of it donated – cost of loading/trucking major expense

Riprap - $9.75 lower class A, upper class B

Several homeowners have in kind donation of rock and manual labor but need assistance with cost of fabric and equipment costs for installation

Interested parties – homeowners
Pat and Julie Jungwirth
Maxine Pfister
Bob and Linda Cleberg
Mark Gross
Rob Roeber
Rob Isaacson
Mark Muellenberg
Casey Fey
Mike Pfister
Marty Pfister

Septic System Upgrades – Requesting $20,000 from JRWDD, $10,000.00 from Central Plains Water with matching funds from homeowners

Maintenance by homeowners

Reduces chances of leaching to lake

Protect shallow wells from contamination

Eliminate outdoor toilets – outlawed in 1976 but several are grand-fathered in

Protects aquatic habitat and shoreline waterfowl and wetlands habitat

Eliminate small percentage of homeowners whose septic systems run into the lake

Increase valued property and tax base thus returning funds to counties, townships and JRWDD

Seeking assistance from Central Plains Water Development Board and matching funds from homeowners – fulfills the water quality authority

Attention to the septic survey in the initial watershed assessment report pages 9 and 10

Quotes on septic systems at Cottonwood Lake:

Beckler Construction - $5,600.00 to $6,300.00 depending if the system has a concrete or plastic holding tank and if it has to utilize a Biodome diffuser

Doug Fink – Excavator – minimum $4,800.00 depending on concrete or plastic septic tank

Brad Manning – minimum of $4,500.00

Interested homeowners:

Travis Thomas
Paul Whitley
Gary and Chad Moore
Charles Groft
Kevin Siebrecht
Casey Fey
Rob Roeber
Eugene Holm
Bob and Linda Cleberg

Shoreline Cleanup

Location: From Appel's Landing to Cottonwood outlet

Problem: Six to 15 ft. high volunteer cottonwoods liter shoreline for one-half to three-fourths miles adjacent to Highway 26

It is the first view of the lake encountered when traveling west on Highway 26 from Redfield to Miller. Increased traffic from the Highway 212 detour increased the visibility of this unsightly appearance. These soon to be dead trees provide minimal erosion protection but create a debris and drainage problem so near to the outlet. Decaying trees and vegetation utilize oxygen in the water, hampering habitat for aquatic wildlife. Due to high water that would hamper equipment operation in removing piles of dead trees, this project will be put on hold until water levels recede. It is imperative they be removed prior to winter so as not to hamper spring runoff flow next spring. Trimming of trees and the cutting up of downed trees will proceed as receding water allows.

Track hoe - $140.00/hr. for 10 to 20 hours

Rubber track skid loader

In kind hours and donations

In kind donations – equipment

Kevin Siebrecht – dump truck
Gary Newman – dump truck loader
Kelly Siebrecht – backhoe
Justin Haider – backhoe and operator
Rob Roeber – dump truck
Doug Zens – two flatbed trailers – dump site to burn debris

Rob Roeber – labor – committed 20 hrs. cutting up downed wood and trimming trees

Requesting $3,000.00 from Central Plains for track hoe use in shoreline cleanup

Labor committed

National Guard – Jerry Eaton, Chris Harford and Chad Moore
City of Redfield – Jim Haider, Adam McMahan, Chad Moore and Pat Jungwirth
FFA ---- Redfield – Levi Zens
Tulare – Joey Mitchell and Austin Bushong
CWLA – Gary Newman
Jeremiah Kimlicka – equipment operator
Sara Haider
Jeff Reinhardt – spraying 4-wheeler
Jerry Oligmueller
Darrell McTighe and Son (Engineer consulting – Brose Engineering, Pierre, South Dakota)
Kyle Roberts
Mark Purnell

Budget Continuation Cottonwood Lake Watershed

Activity	Homeowner	GFP	CLA	Spink County	JRWDD	EPA 319 Grant Request
Shoreline stabilization private property	$50,000 $50,000				$50,000 committed	$75,000
Septic System Upgrades	$20,000					$30,000
Boat Ramps Dock Outdoor Toilet		$2,000 Received	In kind donations $17,000 $3,000 cash	$7,000 request		
GFP Shoreline 400 ft. SE Side		Request for fishing dock	1000 in kind hours		$10,000 request	
Strategic Dredging	$25,000?					$50,000
Water Testing Assessment						$10,000
Education Record Keeping						$10,000
Administration						$30,000
Summary Totals	$145,000	$2,000	$20,000 1,000 in kind hours	$7,000	$60,000	$205,000
Projected Total= $439,000						

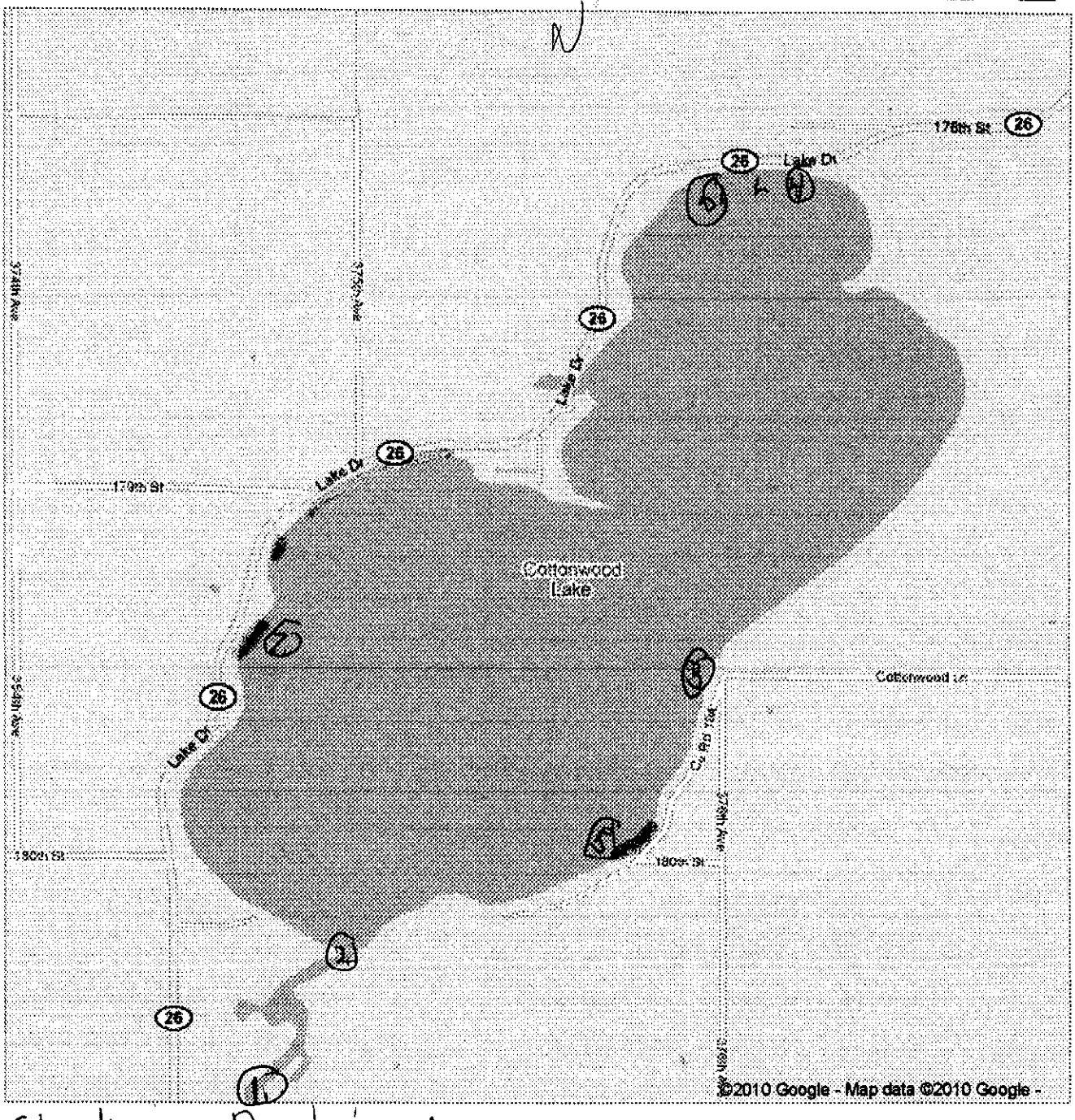
Perenial Flooding Areas

Google maps

To see all the details that are visible on the screen, use the "Print" link next to the map.

Get Directions My Maps

Print Send Link



Strategic Dredging Areas

1. Tubandts Bridge 40ft, 200ft.
2. Inlet to Lake
3. GFP Boat Ramp 400ft.
4. Appels Landing Boat Ramp
5. Rocbocs Point Handicap Fishing Area
6. Outlet to Lake
7. Rob Esseveson Shoreline 440yds

Interested Parties Homeowners for shoreline stabilization (47) and Septic System Upgrades (14)

Name:	Address:
Chad and Kristina Moore	1029 SD Highway 26
Kevin and Maxine Schurch	1035 SD Highway 26
Sharon Stahl	1041 SD Highway 26
Susan Muellenburg	1067 SD Highway 26
James and Kristina Mattson	1017 SD Highway 26
Michael Eaton	1071 SD Highway 26
Tom Lloyd	1101 SD Highway 26
Richard and Dawn Oakley	1109 SD Highway 26
Rod and Robbi Siegling	1157 SD Highway 26
Thomas and Patricia(McCllough) McMorrow	1020 Lake Drive
Jerry Gligmueller	1001 Thompson Beach Road
Craig McTighe	1009 Thompson Beach Road
Darrel McTighe	1011 Thompson Beach Road
Tim and Deborarah Baxter	1021 Thompson Beach Road
Wilber and Judy Masat	1023 Thompson Beach Road
Larry Gordon (septic system)	1225 SD Highway 26
Donna Thomas (septic system)	1261 SD Highway 26
Gary Moore (septic system)	1271 SD Highway 26
Sarah and Jeremiah Kimlicka	1291 SD Highway 26
David McMahan	1293 SD Highway 26
Gale Holler	1305 SD Highway 26
Delbert Fortin	1313 SD Highway 26
Brenda Cleberg	1319 SD Highway 26
William Esser (septic system)	1337 SD Highway 26
Brian Wagner	1357 SD Highway 26
Leon Kimlicka	1393 SD Highway 26
Howard Leibowitz	1419 SD Highway 26
Lyle and Mandelte Brown	1447 SD Highway 26
Mark and Shelia Muellenburg	990 Cottonwood Lane
Tony and Shelly Binger	1000 Cottonwood Lane
Richard and Linda Cleberg (septic system)	1042 Cottonwood Lane
Pat and Julie Jungwirth	1008 Cottonwood Lane
Casey and Malinda Fey	1018 Cottonwood Lane
Delard and Leone Haux	1024 Cottonwood Lane
Robert and Linda Cleberg (septic system)	1042 Cottonwood Lane
Kyle and Sandra Roberts	1052 Cottonwood Lane
Gerald and Linda Christman	1064 Cottonwood Lane
Sherry Binger (septic system)	1090 Cottonwood Lane
Rocky Eaton (septic system)	1096-1098 Cottonwood Lane
Brian Roeber (septic system)	1110 Cottonwood Lane
Robert J. Roeber (septic system)	1112 Cottonwood Lane
Mark Allen and Mary Kay Holm (septic system)	1132-1134 Cottonwood Lane

Interested Parties Homeowners for shoreline stabilization (47) and Septic System Upgrades (14)

Kelley and Amber Siebrecht	1136-1134 Cottonwood Lane
Ginny Schwab (septic system)	1148 Cottonwood Lane
Charles and Amber Groft	1172 Cottonwood Lane
TR and Amy Vermeulen (septic system)	1210 Cottonwood Lane

PHASE I
WATERSHED ASSESSMENT &TMDL
FINAL REPORT

COTTONWOOD LAKE/ MEDICINE CREEK
FAULK, HAND, SPINK COUNTIES, SOUTH DAKOTA

South Dakota Watershed Protection Program
Division of Financial and Technical Assistance
South Dakota Department of Environment and Natural Resources
Steven M. Pirner, Secretary

March, 2001

Introduction

General Lake Description

Cottonwood Lake is a hypereutrophic lake located in a portion of the James River Basin that lies within Spink County. The lake has an area of 1,649.6 acres (667.6 ha). It reaches a maximum depth of 9.0 feet (2.7 m) and holds a total water volume of 10,722 acre-ft. It is a natural basin, however, the lake outlet has been modified to maintain a more stable lake level as well as a greater volume of water. The only major tributary to the lake is Medicine Creek, which enters on the south end of the lake and flows out through the north end. Due to its shallow nature, the lake is not subject to stratification of any type.

Trophic Status Comparison

The trophic state of a lake is a numerical value that ranks its relative productivity. Developed by Carlson (1977), the Trophic State Index, or TSI, allows a lake's productivity to be easily quantified and compared to other lakes. Higher TSI values correlate with higher levels of primary productivity. A comparison of Cottonwood Lake to other lakes in the area (Table 1) shows that a high rate of productivity is common for the region. The values provided in Table 1 were generated from the statewide lake assessment final report (Stueven, 1996). The TSI for Cottonwood Lake will vary slightly in this report due to the use of more recent data.

Table 1. TSI Comparison for Area Lakes

Lake	Nearest Municipality	TSI	Mean Trophic State
Redfield	Redfield	83.38	Hypereutrophic
Mina	Mina	79.76	Hypereutrophic
Rosette	Ipswich	78.45	Hypereutrophic
Cottonwood	**Redfield**	**76.83**	**Hypereutrophic**
Faulkton	Faulkton	76.32	Hypereutrophic
Louise	Ree Heights	71.16	Hypereutrophic
Bierman Gravel Pit	Chelsea	70.28	Hypereutrophic
Jones	St. Lawrence	68.3	Hypereutrophic
Loyalton Dam	Loyalton	65.28	Hypereutrophic
Richmond	Richmond	60.16	Eutrophic

Beneficial Uses

The State of South Dakota has assigned all of the water bodies that lie within its borders a set of beneficial uses. Along with these assigned uses are sets of standards for the chemical, physical, and biological properties of the lake. These standards must be maintained for the lake to satisfy its assigned beneficial uses. All bodies of water in the

state receive the beneficial uses of wildlife propagation and stock watering. Following, is the list of the beneficial uses assigned to Cottonwood Lake, as listed in the state water quality standards:

(6) Warm water marginal fish life propagation
(7) Immersion recreation
(8) Limited contact recreation
(9) Wildlife propagation and stock watering

Recreational Use

The South Dakota Department of Game, Fish, & Parks provides a list of public facilities that are maintained at area lakes (Table 2). Cottonwood Lake has two public boat ramps available for use and each has a boat dock maintained during the summer months. The ramp along the east side of the lake is also equipped with a public toilet. Cottonwood Lake has 141 property owners along its shores and there are approximately 130 cabins that receive use for at least some portion of the year. A growing number of these residents are developing year-round residency at the lake. In addition to those who live or own property around the lake, sportsmen and other recreationists regularly use the lake throughout the year.

Table 2. Comparison of Recreational Uses on Area Lakes

Lake	Parks	Ramps	Boating	Camping	Fishing	Picnicking	Swimming	Nearest Municipality
Redfield	1	1	X	X	X	X	X	Redfield
Mina	1	3	X	X	X	X	X	Mina
Rosette		1	X		X			Ipswich
Cottonwood		**2**	**X**		**X**		**X**	**Redfield**
Faulkton	1	1	X	X	X	X	X	Faulkton
Louise	1	1	X	X	X	X	X	Ree Heights
Bierman Gravel Pit					X			Chelsea
Jones		1	X		X	X		St. Lawrence
Loyalton Dam		1	X		X			Loyalton
Richmond	1	2	X	X	X	X	X	Richmond

Background/History

Geology

Cottonwood Lake and its watershed lie within the James River Basin division of the Central Lowland Physiographic Province. The only major geomorphic feature located in the watershed is the area known as the Orient Hills. They are located at the western end of the watershed and comprise its beginning. Pierre Shale underlies most of the region and has been exposed in areas. Bedrock formations include the Niobrara Formation as well as Carlisle Shale. The area was affected by only one period of glaciation during the late Wisconsin time. Carbon dating estimates that this occurred between 14,000 and 9,000 years ago. Most of the material that overlies the bedrock consists of till and outwash-alluvium mixtures with minor amounts of lacustrine sediments. (Christiansen, 1977)

Population Demographics

There are an estimated 62,644 people living within a 65-mile radius of Cottonwood Lake. The major municipalities included within this region are Aberdeen, Huron, Redfield, Faulkton, and Miller. The primary sources of income are production agriculture and agricultural related businesses. In recent years the area has worked hard to diversify its economy by tapping the available labor market. Today this region is home to companies such as Mutual of Omaha, Trussbilt, and 3M. (Governors Office, Economic Development, 2000). Huron and Aberdeen are to be linked to the nation's interstate highway system over the next few years, encouraging continued growth of these communities.

Water Resources

The groundwater in the Medicine Creek watershed is important for two primary reasons. Approximately 6% of the water entering Cottonwood Lake comes directly from springs. Underlying Cottonwood Lake is the Tulare Aquifer, which has formed in the glacial till. This aquifer has very hard water with calcium as the dominant cation in most samples. It is relatively shallow, typically less than 100 feet, and discharges to the surface in many areas as it flows from western Hand County into eastern Spink County (Koch, 1980).

Due to periods of drought in this region of the state, groundwater is a more reliable source of water for area residents. In addition to the Tulare Aquifer, portions of the Grand, Elm, and other smaller aquifers underlie the area.

Fishery

The most recent fisheries survey was completed July 8-10, 1997. A complete copy of the survey may be found in Appendix A. Species encountered during the survey included yellow perch, walleye, northern pike, black crappie, common carp, and black bullhead. Black bullhead comprised 96% of the total frame net catch. Common carp represented approximately 2.1% of the total catch. Black crappie comprised approximately 0.72% of the total catch. Yellow perch, northern pike, and walleye occurred as 0.41%, 0.31%, and 0.16% of the total catch, respectively.

Black crappie populations have been consistently low since 1990. In 1997, catch per unit effort (CPUE) was the highest at 2.61 with lengths ranging from 19 to 29 cm or 7.5 to 11.5 inches with the majority of the population greater than 22 cm or 8.6 inches. High water levels may have been beneficial to the population. Yellow perch populations ranged from 13 to 31 cm or 5 to 12 inches. Again, high water levels may have contributed to the increased catch of yellow perch. Walleye and northern pike were both found in relatively low abundances. The walleye were 25 to 41 cm or 9 to 16 inches in length. The northern pike were 19 to 77 cm or 7.5 to 30 inches in length.

South Dakota Game, Fish and Parks (SDGF&P) recommend commercial fishing efforts should be encouraged to reduce the black bullhead and common carp populations. The lake should be managed primarily as a walleye and yellow perch fishery with continued walleye stockings and direct habitat development towards these species, if feasible.

Threatened and Endangered Species

There are no threatened or endangered species documented in the Medicine Creek watershed. The US Fish and Wildlife service lists the Whooping crane, Bald eagle, and Western prairie fringed orchid as species that could potentially be found in the area. None of these species was encountered during this study; however, care should be taken when conducting mitigation projects in the Medicine Creek watershed.

Septic Survey

A septic survey was conducted at the lake during late fall and early winter. Questionnaires and letters explaining the reason for the survey were mailed to all of the property owners at the lake. Of the 141 property owners, 112 (80%) responded to the mailing. Information requested included the type of wastewater disposal system their cabin was equipped with, fertilizer and pesticide use, presence of artesian wells, and annual usage of their cabin.

The primary focus of the survey was intended to give a general idea of the types of wastewater management systems that are being used around the lake. Table 5 indicates the recurrence of the different systems used. Almost all of the septic systems are less than 200 feet from the lake with some located within 100 feet. Soils for this area include Houdek Loams and Maddock Sandy Loams. The Houdek Soils on the western side of the lake are classified as severely limited for septic suitability due to slow percolation. This portion of the lakeshore is subject to high water tables that may cause failed septic systems to leach to the lake. The eastern side of the lake consists primarily of Maddock soils. These soils are excessively well drained and allow for some leaching of phosphorus to the lake.

Table 5. Frequency of Septic System Types

Outhouse	28%
Septic system draining away from lake	50%
Septic system draining to the lake	3%
Porta Potty	1%
Holding Tank	2%
Other (usually no facilities)	8%
Combination of 2 systems	8%

These onsite wastewater disposal facilities are an important consideration when assessing the nutrient load to the lake. Phosphorus loads from those facilities can and do reach the lake, adding to its nutrient load. A method was developed by Rodiek on Lobdell Lake in Michigan to assess the impact of septic systems on the nutrient loads. Using part time and full time residency as well as loads from Table 6, he was able to develop an annual loading to the lake.

Table 6. Phosphorus Loading Rates, (Copied from Rodiek, 1978)

		Lake Residences
Assumptions		Loading rates to septic systems
4 people per residence	without detergent	0.50 kg x capita^{-1} x yr^{-1}
50% occupancy of residences	detergent only	1.60 kg x capita^{-1} x yr^{-1}
50% use of phosphorus detergent	detergent only	1.10 kg x capita^{-1} x yr^{-1}

Equation 2. Phosphorus Export for Permanent Residence:

$$\left[\left(0.5\frac{\text{kg - P}}{\text{capita - yr}}\times\frac{\text{4 capita}}{\text{residence}}\right)+\left(1.1\frac{\text{kg - P}}{\text{capita - yr}}\times\frac{\text{4 capita}}{\text{residence}}\times 0.50\ \text{P detergent}\right)\right]=4.2\frac{\text{kg - P}}{\text{residence - yr}}$$

Equation 3. Phosphorus Export for Temporary Residence (assumed 50% of year occupancy):

$$\left[\left(0.5\frac{\text{kg-P}}{\text{capita-yr}}\times\frac{\text{4 capita}}{\text{residence}}\right)+\left(1.1\frac{\text{kg-P}}{\text{capita-yr}}\times\frac{\text{4 capita}}{\text{residence}}\times 0.50\text{P detergent}\right)\right]\times 0.5\,\text{occupancy}=2.1\frac{\text{kg-P}}{\text{residence-yr}}$$

Using these estimates for phosphorus contributions to the septic system from each permanent and temporary residence on Cottonwood Lake, a total contribution can be calculated:

$$4.2\frac{\text{kg - P}}{\text{residence}}\times 17\,\text{permanent residence}=71.4\,\text{kg - P}$$

$$2.1\frac{\text{kg - P}}{\text{residence}}\times 112\,\text{seasonal residence}=235.2\,\text{kg - P}$$

These calculations combine for a total of 306.6 kg of phosphorus that could be delivered to the septic systems around the lake. Rodiek found phosphorus retention in the soil to range from 25% to 75%. This would yield from 76.7 kg to 230 kg of delivered phosphorus to Cottonwood Lake. Taking into consideration the high levels of caffeine that were measured in the lake (discussion on page 71); the large increase in nitrates that occurred during mid-summer; as well as the leaching potential of some of the soil; a conservative estimate of 65% of the phosphorus load could be assumed to be reaching the lake on an annual basis (199.3 kg). Septic leachate accounts for 4% of the total phosphorus load to Cottonwood Lake.

Cabin and lake use were also addressed in the survey. Table 7 indicates the amount of time that the cabins and lake are used each year.

Table 7. Lake Residence Use

Never used	9%
30 days or less	43%
31 to 180 days	31%
181 to 210 days	5%
Permanent	12%

The final issues that the survey addressed were the use of pesticides, fertilizers, and the presence of flowing or artesian wells. Some type of pesticide use during the year was indicated by 20% of the respondents. This varied from weed killers to insect repellents for grass and garden crops. Fertilizer use was reported by 28% of the respondents with the majority applying nitrogen at various rates. Individuals reporting flowing wells were contacted and the amount of water discharging into the lake was calculated. Random samples of the various wells were also collected to determine the impact that they have on the lake.