SECTION 319 NONPOINT POLLUTION CONTROL PROJECT REPORT

WATERSHED PROJECT FINAL REPORT

LAKE HANSON/PIERRE CREEK RESTORATION PROJECT

By

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July 2008

Grant # 9998185-03

EXECUTIVE SUMMARY

PROJECT TITLE: Lake Hanson/Pierre Creek Restoration Project

GRANT# 9998185-03

PROJECT START DATE: 11 June 2003

PROJECT COMPLETION DATE: 31 October 2008

FUNDING:

Funding Sources	Original Budget	Actual Expenditures
U.S. EPA Section 319 Grant	$598,125	$513,420.44
SD Consolidated Water Grant	$200,000	$200,000.00
Other Federal (EQIP, CRP, WHIP)	$73,500	$12,400.00
Hanson County Conservation Dist.	$5,000	$11,949.00
Other local and in-kind	$228,600	$168,262.37
Total	$1,125,225	$906,031.81

Summary of Accomplishments

Project goal was to implement Best Management Practices (BMPs) in the watershed along with in-lake restoration activates that will restore water quality in Lake Hanson and Pierre Creek to meet designated beneficial uses, protect against bacterial contamination, and improve the lake TSI through in-lake sediment removal.

The Ann Agricultural Non-point Source (AGNPS) model indicates the project Total Maximum Daily Load (TMDL) goal of a five percent reduction in phosphorus load to Lake Hanson was attained.

A Septic System dye test was done with 100% compliance to determine if cabin septic systems are contributing pollutants to Lake Hanson. The results from the test show that there is a small amount leaking from the septic tanks into the lake.

Though out the dredging of Lake Hanson, an estimated 121,755 yd3 of sediment was removed to reduce in-lake phosphorous levels, restore water depth, and to restore lake beneficial uses (wildlife, recreation, fisheries, etc.).

Shoreline damaged by livestock and wave action was also stabilized and fenced off to reduce further sedimentation to the lake from the banks.

Five grazing systems were installed throughout the watershed and the project's priority feedlot has completed an Ag Waste Management System (AWMS) feasibility and started design. The AWMS is scheduled for construction in 2009.

The load reductions realized through the installation of BMPs in the watershed and the in-lake dredging are summarized in the Table 2 on page 14 of this report.

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INTRODUCTION

Project Area

Lake Hanson is a 60-acre reservoir located in central Hanson County, South Dakota (see Figure 1). The lake receives runoff from the Pierre Creek watershed (48,000-acre, primarily agricultural). Lake Hanson is located on Pierre Creek three miles south of the City of Alexandria and two miles upstream from where Pierre Creek enters the James River. Included in this 48,000 acre watershed are many acres of pasture. The quarry and numerous springs along Pierre creek provide a continuous flow of water into Lake Hanson.

Lake Hanson was placed on the South Dakota 303(d) list in 1998 for high Tropic State Index (TSI). Due to local support for improving the lake a watershed assessment was initiated in the spring of 2001 by the Hanson Conservation District. The Lake Hanson/Pierre Creek watershed assessment was completed in August of 2002 and the "Watershed Assessment and TMDL Final Report" completed in December 2002. The TMDL for Lake Hanson remains undeveloped at this time. Over the years silt and other nutrients carried along in the water in Pierre Creek have settled into the lake reducing its depth and affecting the water quality in the lake.

There are 33 homes on the north shore of the lake with 9 of them occupied as permanent residences. Facilities at the lake included a campground, picnic area, boat ramp, and a beach.

Lake Hanson was built in 1935 as part of a WPA project by constructing an earthen dam across Pierre Creek about two miles upstream from where Pierre Creek enters the James River.

Lake Hanson is a 60 acre reservoir in central Hanson County, South Dakota. The reservoir receives runoff from agriculture operations and the lake has experienced declining water quality according to the state 303(d) report. The land use in the watershed is predominately agricultural.

During the time of the assessment, Lake Hanson had a maximum depth of 14 feet, and a average depth of 7 feet. Originally the maximum depth was about 17 feet, and an average depth of 10 feet.

Lake Hanson was also identified in Ecoregion targeting for impaired lakes in South Dakota (Stueven, et.al. 2000) as not supporting its beneficial use.

Assigned beneficial uses for Lake Hanson include:

- warm water permanent fish life propagation
- immersion recreation
- limited contact recreation
- wildlife propagation and stock watering

The beneficial uses assigned to all segments of Pierre Creek are:

- Fish and wildlife propagation, recreation, and stock watering as well as irrigation

The section of Pierre Creek located downstream from Section 11, T102N, R58W, (Hwy. 262 to the James River) is a perennial section of the stream and has additional assigned beneficial uses of:

- Warm water semi-permanent fish life propagation
- Limited contact recreation.

Impairments and potential impairments to the beneficial uses of Lake Hanson and Pierre Creek based on state standards for beneficial uses that were identified in the Assessment Report are:

1. Sedimentation: The greatest impairment to the beneficial uses of Lake Hanson is sedimentation. Sedimentation rates in Lake Hanson have declined through the years (1970 to present) as a result of conservation practices in the watershed.

2. Productivity: (measured by Trophic State Index = TSI). Lake Hanson has a typical to lower TSI than other lakes in the Northern Glaciated Plains Ecoregion and its tropic state is eutrophic. Lake Hanson's TSI is considered low enough to support beneficial uses; however, implementation of BMPs in the perennial portion of Pierre Creek and dredging are identified as ways to improve the TSI and/or maintain the current TSI.

3. Bacterial Contamination: Data tends to support the potential for bacterial contamination related to cabin septic systems, livestock use of the lake, stream riparian areas, and two livestock feeding areas in the lower portion of the watershed. No in-lake samples exceeded the bacterial state standard; however, swimming beach monitoring from 1993 to 2002 indicated one beach closure and 15% impairment during the summer beach season. Sampling on Pierre Creek indicated bacterial impairment during the first major storm events in the spring.

Beneficial uses threatened in the Lake Hanson/Pierre Creek watershed as discussed above, impact the use of the lake and watershed for swimming, boating, recreation, wildlife, and residential living. Lake Hanson and Pierre Creek are key components of the economic health and sustainability of the community of Alexandria and surrounding rural residents and agricultural producers.

Hanson County, in cooperation with the Lake Hanson Association, has a recreation area on the north shore of Lake Hanson. The recreation area consists of a public beach, bathrooms, campsites, boat ramp, and public dock. The public beach also provides swimming lessons. The City of Alexandria has no swimming pool. The campsites, beach, and boat dock are heavily used during the summer, especially on weekends. Shore and boat fishing is popular for local residents and campers. Lake Hanson is the largest attraction for visitation for the Alexandria community.

The north shore of Lake Hanson also includes a residential area of permanent and summer homes. The City of Alexandria located three miles north of the lake has a population of 563 people and permanent residents at Lake Hanson add another 50 people to the community. Lake Hanson and Pierre Creek are used by lake residents, visitors, and the residents of Alexandria for family gatherings and picnics, walks and jogging, wildlife watching and photography, and other activities related to its aesthetic qualities.

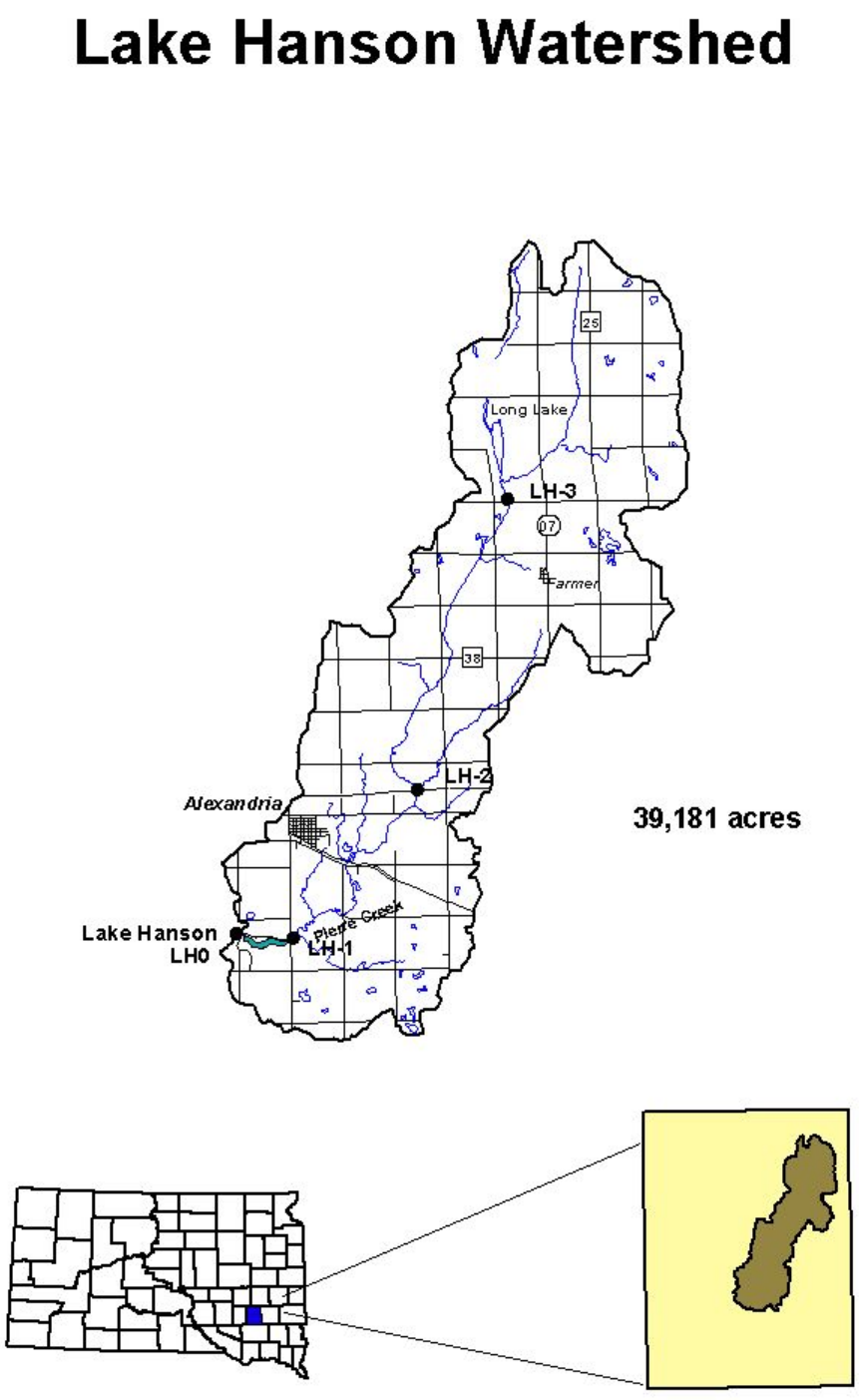

Figure 1: Lake Hanson/Pierre Creek Location and Watershed Map.

Nonpoint Source Pollutants

The Lake Hanson/Pierre Creek watershed assessment project was initiated at the request of local organizations, and citizens concerned about the sedimentation and water quality problems in

Lake Hanson. The main concerns included the extensive shallow water areas in the lake caused by sedimentation and water quality concerns related to algae blooms and water safety for swimming and boating.

The sediment delivery to Lake Hanson at its inlet was estimated to cause 0.04 inch's of sediment accumulation in Lake Hanson per year. This low rate was attributed to the implementation of conservation practices such as conservation tillage and grazing management over the past 20-30 years. The sediment survey (see Figure 2) measured lake sediment to average 1 meter in depth. The assessment recommends targeting the lower portion of the watershed to obtain the greatest reduction in sediment delivery from current rates, along with treatment of shoreline erosion. Dredging of existing lake sediment is a preferred activity supported by local citizens, and the watershed assessment states "*Dredging the excess sediment from the lake will increase boatable acres in the lake, reduce the potential for excessive plant growth, and remove nutrient-rich sediments that could potentially increase nutrient concentrations in the lake during periods of stratification.*"

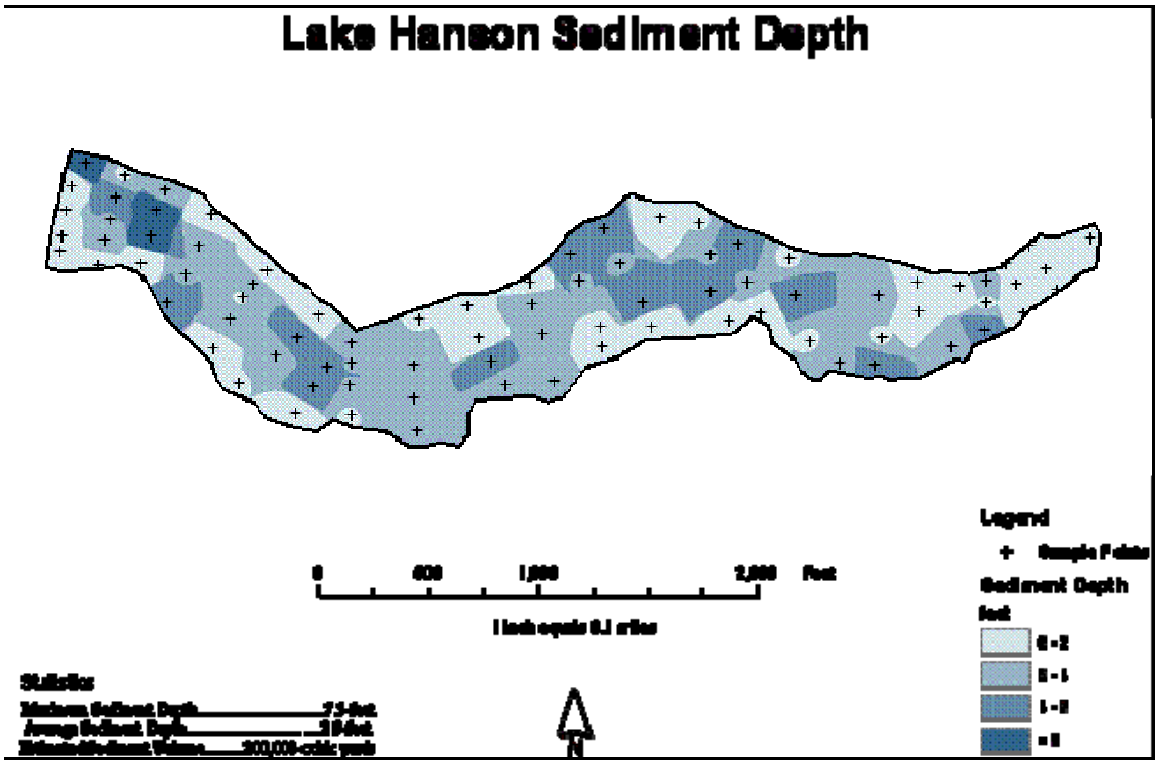

Figure 2: Map of sediment and depth of sediment in Lake Hanson from 2002.

Lake Hanson is classified as eutrophic with a TSI more of less typical (63.92) for the Northern Glaciated Plains Ecoregion but considered low enough to support the lake's beneficial uses. As with sedimentation, the nutrient loading to Lake Hanson has decreased in the past 10 years. Prior to 1990, lake productivity was considered to be limited by phosphorus but now, based on current sampling data, is rated as nitrogen-limited. The implementation of conservation practices in the watershed has reduced nitrogen loading to a greater extent than phosphorus loading. The source of nitrogen and phosphorus in the lake is unclear from the assessment; however, likely sources are livestock waste and/or cabin septic systems. Due to occasional bacterial problems and algae blooms, the assessment recommended improving Lake Hanson's TSI or, at a minimum, maintaining the current TSI.

The Pierre Creek Watershed has the following land uses:

Cropland:	33,500 acres	70%
Pastureland:	2,500 acres	5%
Rangeland:	10,000 acres	21%
Urban/Other	2,000 acres	4%

The major crops grown are corn and soybeans with some use of wheat in the rotations. Conservation tillage is now used extensively in the watershed. Its use has reduced sediment delivery an estimated 57% compared to 20-30 years ago when conventional tillage was the common practice. Of the 5,500 acres of critical cells identified by the AnnAGNPS model for nutrient and sediment delivery, 3,200 of these acres were under conventional tillage.

Pasture and rangeland are used primarily to graze cattle, with cow-calf and yearling operations the most common enterprises. Dairy cattle feeding, and hogs are the types of livestock operations in the watershed in a typical year. Fifteen livestock operations were assessed as part of the watershed assessment to evaluate nutrient and bacterial loadings.

Urban and other land uses consist of the City of Alexandria, the unincorporated town of Farmer (population 15), roads, railroads, water areas (lakes and wetlands), and private recreation areas. Storm water runoff from Alexandria enters Pierre Creek at a point about 3 miles upstream from Lake Hanson. Wastewater from Alexandria is treated in wastewater lagoons located in the watershed three miles north of Lake Hanson.

PROJECT GOALS, OBJECTIVES AND ACTIVITIES

The goals of the project were to:

Implement Best Management Practices in the watershed along with in lake restoration activities, restore water quality in Lake Hanson and Pierre Creek, and to meet designated beneficial uses.

Objective 1: Implement Best Management Practices (BMPs) in the Pierre Creek watershed through technical assistance for planning and funding. Priority will be given to landowners within the "critical cells" defined by the AnnAGNPS model.

Task 1: GRAZING SYSTEMS & LAND MANAGMENT: Implement Best Management Practices in the Pierre Creek watershed.

> **Accomplishments:** The project has participated with five producers throughout the watershed totaling about 662 acres. This includes pasture on the south and north east sides of the lake. This is less than what was set as a goal for this project, but was a very important component for this project to reach the TMDL.
>
> The shoreline on the west half of the south shore of Lake Hanson has been enrolled in the CRP (conservation Reserve Program) CP-30 section for 15 years. Livestock will be fenced out of Lake Hanson in this area for at least the 15 years the land is enrolled in the CRP program. The shoreline on the east half of the south shore and pond off the east half of the north shore are also being enrolled in the CRP Program CP-30 for 15 years. Livestock will be fenced out of the area except for a small area for water access on the far east end.
>
> There were no incentives given by this project for implementing no-tilling practices, however many acres have changed from conventional till to no-till over the time the project was operating. Producers found the beneficial effects of no-till practices on soil structure resulted in the increase in the ability of soils to absorb water, resulting in less water run-off during heavy rain events.

Objective 2: Reduce nutrient loading and coliform bacteria in Pierre Creek and Lake Hanson through the implementation of livestock and residential nutrient management practices.

Task 2: LIVESTOCK WASTE MANAGEMENT. Assist l**i**vestock producers to install two livestock waste management systems and implement nutrient management plans.

> **Accomplishments:** The feedlot considered the number one priority from the assessment for the watershed is setup for constructing an Ag Waste Management System in 2009. The construction of this system will be in cooperation with the Lower James Implementation Project. Another producer is considered upgrading his facility, in which the project would be able to help with the staking pad. The producer has not moved forward at this time but may in the future.

Task 3: CABIN SEPTIC SYSTEMS: Inventory current management of lakeside cabin septic systems, conduct a feasibility study on implementation options for a sanitary sewer, and complete a plan for future wastewater management.

A procedure was developed for sampling the septic systems. This procedure can be found in Appendix A of this report. The cabin septic systems were sampled on July 3, 2006 with 100% participation. The results show that there is a small amount leaking from the septic tanks around the lake, but no individual cabins were determined to be failing. The samples that were taken during this test can be seen in Figure 3.

A feasibility study has not been done at this time due to the lack of interest for a community system.

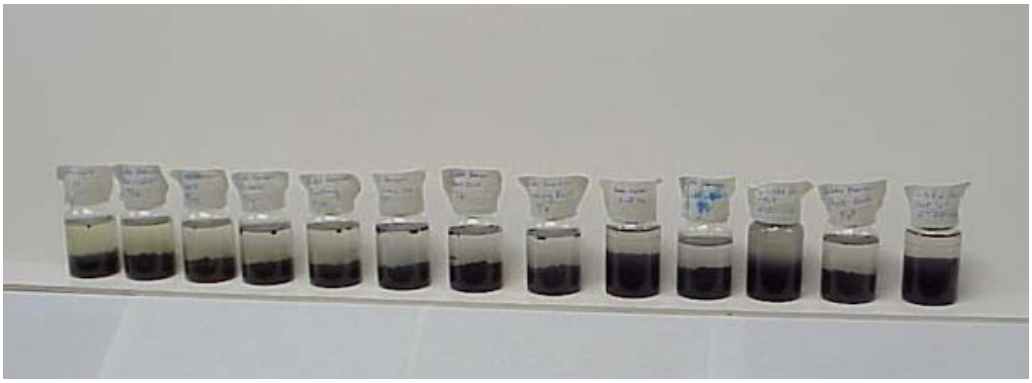

Figure 3: Results from the cabin septic system test.

Objective 3: DREDGING. Remove 175,000 yd3 of sediment from Lake Hanson to reduce in-lake phosphorus levels, restore water depth, restore lake beneficial uses (wildlife, recreation, fisheries, etc.), and to reduce sedimentation by stabilizing shoreline damaged by livestock and wind action.

Task 4: Dredging. Remove 175,000 yd3 of sediment from Lake Hanson and include the sediment trap area just upstream of the lake.

The task of dredging was delayed at the beginning of this project due to the financial issues, but went forward in 2006 with Lakes and Streams receiving the bid. The total amount intended to be dredged could not be done because of available funds and the increase in dredging costs. After further investigation of the sediment trap to the east of the lake, it was determined that cleaning out of this area may do more harm than good, therefore, this was not done.

Dredging was started in the fall of 2005 (see Figure 4). Dredging continued through 2006, but was not completed on time because of several minor break downs and one major break down involving the cutter head. Dredging was put on hold during May 2007 when the emergency spillway breached due to excessive rainfall (see Figure 5 & 6). Articles on the breaching of the spillway can be found in Exhibit B of this report.

Figure 4: Start of the dredging project.

Figure 5: The emergency spill way after breach, spring 2007.

Figure 6: Area of dredging after spillway breach, and lake drained.

It was estimated that a total of 121,755 yd3 were removed from the lake through a combination of dredging and the breaching of the spillway in the spring of 2007. The lake was measured with survey grade GPS after the dam breached and before the lake filled with water again (see Figure 7).

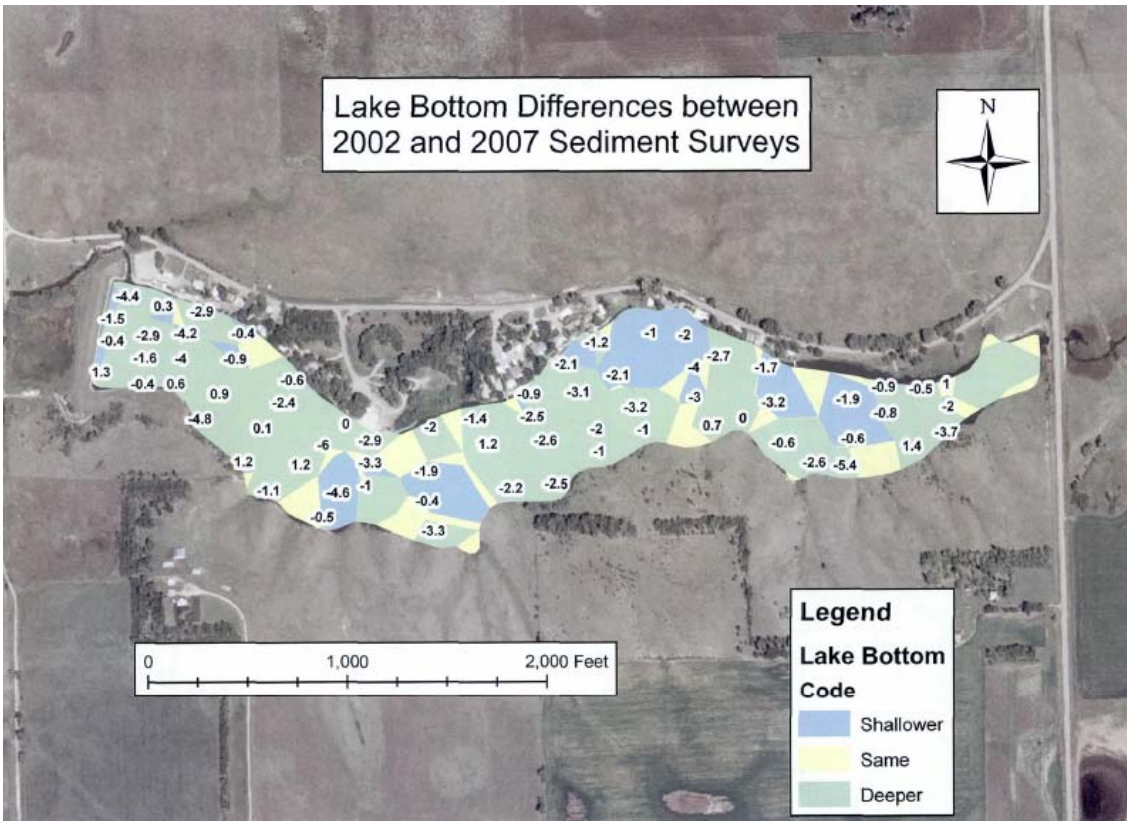

Figure 7: Change in Sediment and lake depth in Lake Hanson.

The reclamation of the ponds has started, but wasn't completed by the time this project came to a close. The reclamation of the ponds is the responsibility of the county and will be completed in the spring of 2009. An agreement with the land owner of the property the ponds are located on has been developed with the Lower James Implementation Project to cover any issues with rental of the property.

Task 5: STABILIZATION. Stabilize 500 LF of shoreline through vegetative/bio restoration and 300 LF of shoreline through (riprap, etc.) to reduce sedimentation from shoreline erosion and improve wildlife habitat (see figure 8 & 9 for a before and after picture of a stabilized area).

Engineering designs were completed by NRCS for 6 areas along the south side of the lake that were in poor condition. These areas total about 1,050 linear feet along the lake, and were completed in the fall of 2008.

Figure 8: Area along the south shore of Lake Hanson before stabilization.

Figure 9: Area along the south shore of Lake Hanson after Stabilization.

Objective 4: WATER QUALITY & INFOMATION. Maintain water quality and beneficial uses by providing information and education to the public on water quality in the Pierre Creek watershed and Lake Hanson and this projects progress to address water quality goals.

Task 6: REPORTS & NEWS RELEASES. Complete semi-annual reports on project progress and distribute this information and water quality information through a newsletter twice a year to all watershed interests and project partners

Newsletters have been sent out discussing various topics to increase public awareness and concern for water quality. These newsletters can be found in Appendix C of this report. They have promoted grazing systems as a way to improve profitability, improved livestock health, and positive impact on water quality in the project area. Other topics

included the history of the lake, goals of the original local organizers, the power of water, the funding for the lake project, progress to date on the dredging phase, and the clean water goals of the lake project.

Task 7: INFORMATION. Provide information on project progress and activities through public meetings and tours.

The project held informational meetings throughout the years. The people attending were lake homeowners and a few producers near the lake. Newspaper articles were written and published in the local papers

Grazing workshops were held, these seminars informed producers of the economical and environmental benefits of managed grazing systems.

On August 22, 2006 a public tour consisting of two grazing systems, Lake Hanson, and the sediment holding ponds was held. Participants learned from grazing system operators how they used the systems, and the benefits of the systems for their livestock operations. Information was given on the dredging process, function of the holding ponds, and all questions concerning the dredging of the lake and return flows from the ponds to the lake were addressed during the tour.

An information meeting was held each year and the need for the project discussed. The discussion pointed out the fact that there has been a water quality related beach closing and also the possibility that the cabin septic systems could be contributing to water quality problems. The informational meeting also addressed erosion and the resulting sedimentation and potential for nutrients to be attached to the eroding particles leading to Phosphorus and Nitrogen being added to the lake. Several presentations to students at the local school have been done throughout the project. The goal of the presentations was to help them understand how different substances can end up in the lake and ways to help lower or even eliminate them. Newsletters and newspaper articles informing the public of potential water pollution and erosion concerns are on going.

Several newspaper articles have been published in the local papers in reference to the May 2007 storm that destroyed the Emergency Spillway. The articles included information on repairing the damage, future plans for dredging, and shoreline restoration. Some of these articles can be found in Appendix C.

Task 8: WORKSHOPS. Provide technical information on BMPs in the watershed by completing workshops with emphasis on grassland and cropland BMPs.

No till workshops were held in Mitchell by the Cooperative Extension Service. A Holistic Management Workshop was held featured grazing systems and their benefits to the environment and producers.

Task 9: MONITOR WATER. Monitor and evaluate project progress to meet water quality goals through in-lake water quality monitoring, tracking of milestone progress, and evaluation of BMP effectiveness.

Water samples were taken during the dredging operation to ensure water quality was not adversely affected.

Mr. Posicak from Hanson High School brings his students out to the lake for projects such as monitoring the water quality. The Phosphate levels for the lake during school sampling periods is shown in Figure 10 bellow. Samples taken shortly after the breaching of the spillway are significantly higher, but are back to normal when sampling in the fall started again. The other parameters sampled by the Hanson High Scholl can be seen in Appendix B attached to this report. They will continue to monitor the water as they have in the past.

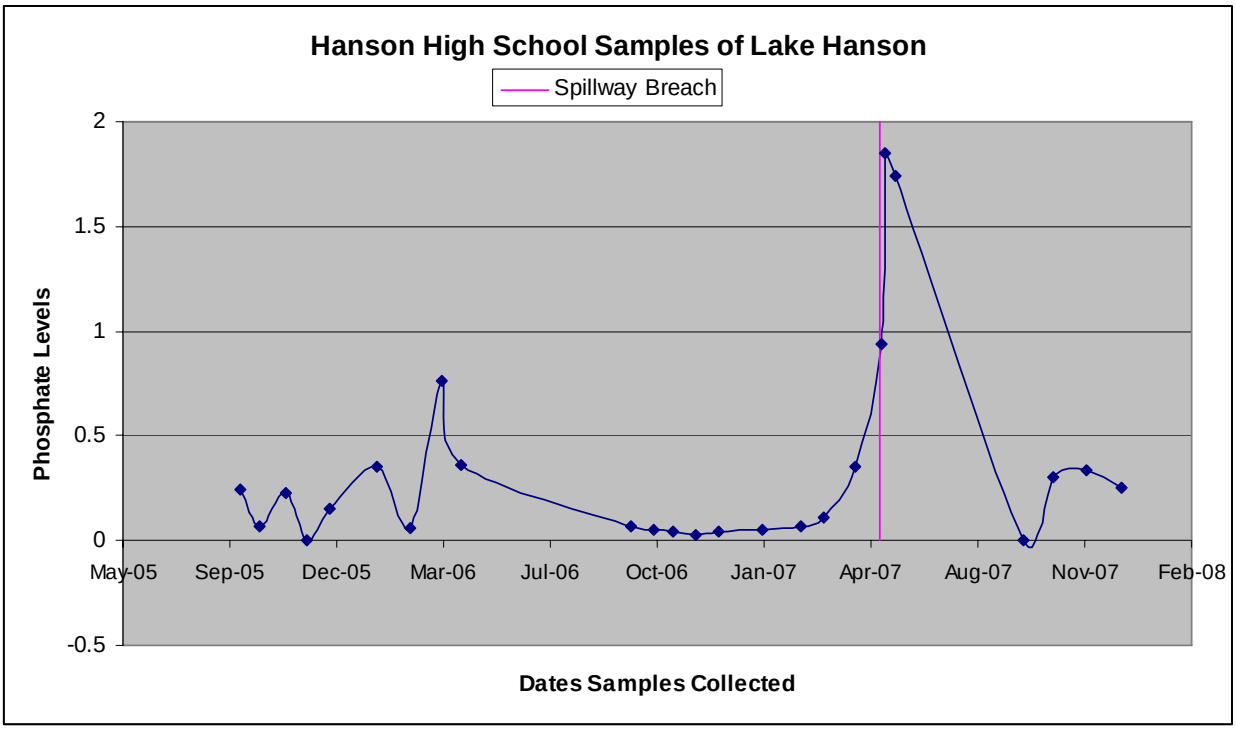

Figure 10: Hanson High School Samples of Lake Hanson.

PLANNED AND ACTUAL MILESTONES

Planned and actual milestones completed for the project can be found in Table 1. Some milestones will continue on after the completion of this project through the Lower James Implementation Project sponsored by the James River Water Development District.

Table 1: Planned Versus Completed Project Activities

Goal, Objective, Task	Milestones		Completion dates	
Objective 1: BMPs	**Planned**	**Accomplished**	**Intended**	**Actual**
Task 1:				
Grazing Systems	5000ac.	662	09/01/2007	On going
Riparian/Buffers	25 ac.	45.6	09/01/2007	10/31/2008
Grass Seeding	100ac.	0	09/01/2007	10/31/2008
Cons. Tillage/No-Till	5000ac.	Unknown	09/01/2007	10/31/2008
Tree Planting	50ac.	0	09/01/2007	10/31/2008
Objective 2: Nutrient Management				
Task 2: Livestock systems				
Nutrient Mgt. Systems	2 each	0.5	09/01/2007	On going
Task 3: Cabin systems				
Septic System Evaluation	1 each	1	09/01/2003	07/03/2006
Sanitary Sewer Feasibility	1 each	0	12/31/2004	None
Objective 3: In-Lake Restoration				
Task 4: Dredging				
Dredging	175000CY	121755	12/31/2004	Fall 2006
Task 5: Shoreline Stab.				
Shoreline Stabilization	800LF	1050	12/31/2006	10/31/2008
Objective 4: I&E				
Task 6: Progress Reporting				
Semi-Annual report	8	8	As Needed	As Needed
Project Newsletter	8	4	As Needed	As Needed
News Releases	10	8	As Needed	As Needed
Task 7: Tours/Meetings				
Annual Tour	5	3	As Needed	As Needed
Annual public Meetings	5	4	As Needed	As Needed
Task 8: Educational Workshops				
Grazing Mgt.	1	1	As Needed	As Needed
Cons. Tillage/No-Till	1	1	As Needed	As Needed
Task 9: Monitoring/Evaluation				
In-Lake sampling	40 samples	As Needed	As Needed	As Needed
BMP evaluations	As needed	As Needed	As Needed	As Needed

MONITORING RESULTS

Sampling of water coming from the dredge and lake water a distance from the dredge were taken monthly while the dredge was operating. All samples from these tests were well within the acceptable limit for suspended solids required by the 401 permit requirements.

A summary of load reductions from all practices implemented though this project are shown in Table 2. Reductions in Table 2 were calculated by:

- Grazing Management and AWMS - AnnAGNPS along with estimates on keeping cattle out of the lake in the pasture to the south of the lake.
- Keeping cattle out of the lake estimates – taking the amount of manure the cattle would produce in a day multiplied by the amount of days the animals would be allowed in the pasture. This number was then multiplied by a delivery rate of 50%. The estimated reduction by fencing the cattle out of the lake was taken to be 75%.
- Shoreline stabilization - STEPL's "Gully and Streambank Erosion" function.
- Lake sediment removal - completing a sediment survey on the lake and comparing it to the survey that was done before the project started.

Table 2: Load Reductions for the Lake Hanson/Pierre Creek Watershed Project

Product	**Annual Reductions**		
	P lb/year	N lb/year	Sed. ton/year
Grazing Management	498.76	2,607.33	7.90
Animal Waste Management Systems (AWMS)	20.00	49.70	0.00
Shoreline Stabilization	107.10	278.10	151.10
Total:	**625.86**	**2,935.13**	**159.00**
	In-Lake Removal		
	Sed CY	Sed Tons	P lb
Lake Sediment Removal (one time removal)	121,755.00	147,933.00	3,396.10
Total:	**121,755.00**	**147,933.00**	**3,396.10**

As seen in Table 2, the TMDL of reducing Phosphorus loading to the lake by 304 lb/year was attained.

BUDGET

Table 3: Lake Hanson Project Original Budget and Actual Expenditures

	Original Budget						Actual Expenditures					
Item	**319-EPA**	**CWF/otherSD**	**NRCS**	**Local Cash**	**Local In-Kind**	**Total**	**319-EPA**	**CWF/otherSD**	**NRCS**	**Local Cash**	**Local In-Kind**	**Total**
Personnel Support												
Project Coordinator Salary & Benefits	$138,000					$138,000	$171,361.18					$171,361.18
Administrative/Clerical Support	$32,000					$32,000	$10,256.58				$2,852.00	$13,108.58
Legal Counsel											$424.80	$424.80
Engineering Holding Ponds/Shoreline Stabilization	$20,000					$20,000	$45,526.69		$11,600.00		$3,430.00	$60,556.69
Mitigation Plan						$0	$209.00		$800.00			$1,009.00
Supplies/Office/Equipment/Travel												
Office Space: $200/mo.					$9,600	$9,600					$11,400.00	$11,400.00
Equipment & Supplies	$10,000					$10,000	$6,982.66				$549.00	$7,531.66
Travel: Vehicle/Ins./Mileage/Lodging	$24,000					$24,000	$4,662.53					$4,662.53
Objective 1: BMPs												
Task 1: Grassland/Cropland Mgt.												
Grazing Systems - 2,500 acres/5yr.					$5,000	$5,000					$386.00	$386.00
Fencing - 25,000 LF @ $.7/LF	$13,125				$4,375	$17,500	$6,335.76			$4,690.88	$1,199.42	$12,226.06
Water Development						$0						$0.00
Pipelines - 10,000 LF @ $1.70/Lf	$12,750				$4,250	$17,000	$19,496.42			$5,071.05	$12.00	$24,579.47
Tanks - 5 @ $1000.00	$3,750				$1,250	$5,000	$3,562.59			$1,382.78		$4,945.37
Ponds 5 @ $4,000	$15,000				$5,000	$20,000	$1,540.16			$513.38		$2,053.54
Wells 1 @ $2,500.00	$1,875				$625	$2,500	$0.00					$0.00
Rural Water Hkup. 1 @ $1,500.00	$1,125				$375	$1,500	$5,138.01				$1,660.04	$6,798.05
Riparian/Buffer Zones - $8,000.00			$6,000		$2,000	$8,000						$0.00
Grass Seeding - 200ac @ $100/ac.	$3,750		$15,000		$5,000	$23,750	$1,031.50			$558.60	$300.00	$1,890.10
Conservation/No-till - 5000 ac. @ $6/ac.					$30,000	$30,000						$0.00
Tree Planting - 50ac. @ $1500/ac.			$56,250		$18,750	$75,000						$0.00
Objective 2: Nutrient Management:												
Task 2: Livestock Nutrient Mgt.												
Ag Waste Systems & Nutr. Mgt. Plans												
1 @ $70,000.00	$52,500				$17,500	$70,000						$0.00
1 @ $5,000.00	$18,750				$6,250	$25,000						$0.00
Task 3: Wastewater Tests/Feasibility												
Residential Waste Mgt.												
Inventory/Dye Tests	$500					$500						$0.00
Septic/Sewer Feasibility Engineering	$1,000	$4,000				$5,000						$0.00
Objective 3: In-Lake Restoration												
Task 4: Dredging												
Dredging - In-lake & Sediment Trap	$200,000	$200,000		$85,000	$40,000	$525,000	$177,985.67	$200,000.00		$72,189.06	$65,848.56	$516,023.29
Task 5: Shoreline Stabilization												
Hard Riprap - 300LF @ $100/LF	$22,500				$7,500	$30,000	$58,148.00				$5,253.00	$63,401.00
Vegetative/Bio Restoration - 500LF	$26,250				$8,750	$35,000						$0.00
Objective 4: Information & Education												
Task 6: Progress reports/distribution												
Newspaper - Mailing/paper	$2,000					$2,000	$590.69				$2,052.50	$2,643.19
Task 7/8: Annual Tour & Meeting & Workshops												
Tour/Meetings/Workshops										$173.02	$265.28	$438.30
Task 9: Monitoring/Evaluation												
Water Quality Monitoring	$3,000.00					$3,000.00	$593.00					$593.00
Project Totals:	**$601,875**	**$204,000**	**$77,250**	**$85,000**	**$166,225**	**$1,134,350**	**$513,420.44**	**$200,000.00**	**$12,400.00**	**$84,578.77**	**$95,632.60**	**$906,031.81**

SPONSORS AND OTHER SUPPORTING AGENCIES

Hanson Conservation District
Project Sponsor

Lake Hanson Association
Project Advisor

Natural Resources Conservation Service (NRCS)
Technical assistance BMP planning

Farm Service Agency (FSA)
Technical assistance for ECP, CCRP, and Hanson County information

US Fish and Wildlife (USFWS)
Funding for BMPs

South Dakota Game, Fish and Parks (GFP)
Technical assistance and land for dredge spoils holding ponds

South Dakota Department of Environmental and Natural Resources (DENR)
Technical assistance for water monitoring and project administration
Financial Assistance

Environmental Protection Agency
Financial assistance

South Dakota Conservation Commission
Financial Assistance

South Dakota Lakes and Streams
Contractor for dredge activities

Lower James River Implementation Project
Taking on tasks started by this project

PUBLIC PARTICIPATION

The public was notified of opportunities to participate in the project through press releases, brochures, newsletters, and facts sheets distributed by mail. Meetings and other public forums were likewise used to inform and educate the public about the project. The audiences included watershed landowners, agricultural producers, lake shore property owners, sportsmen, and recreational lake users.

An inventory of lakeside cabin septic systems was done to determine if cabin septic systems are contributing pollutants to Lake Hanson. All cabin owners participated in the inventory.

In May 2007 storms with rain up to 10 inches caused the breach of the emergency spillway. Dredging was put on hold. Several public meetings were held in the community. Many of the concerned citizens wanted to know the best approach on how to cleanup and fix the emergency spillway. The majority did not want to wait because of health and safety issues. Private money was raised to begin work fixing the break.

Volunteer labor and donations made it possible to repair the breach and the lake. Without this help, the project may have been delayed further.

ASPECTS OF THE PROJECT THAT DID NOT WORK WELL

The dredging of the lake has had many setbacks starting with South Dakota Lakes and Streams (the intended dredging entity) filing chapter 11 bankruptcy. This setback took a couple years to overcome. Then after the dredging of the lake got underway many breakdowns happened from hitting rocks, cutter head needing replacement, breaching of the emergency spillway, and disagreements on the amount of material dredged out of the lake made the dredging process take a year longer than expected.

The pond reclamation has taken longer than what was originally expected due to the increased time of dredging, and the ability of getting equipment to work on the ponds. This was not completed when the project ended.

The animal waste management systems originally planned for construction at the beginning of the project fell though due to the lack of participation from the producers. In the final year of the project, one producer decided to move forward with a feasibility study and is scheduled to construct in 2009 with help from the Lower James River Implementation Project.

The untimely death of the project coordinator, Lynn Schulz, in June 2006 affected all aspects of the project. Many activities that were in progress at the time were not completed. Curt Hart was then hired to keep the project moving forward, and completed the project.

The septic system testing didn't take place when originally expected for several reasons, but did get done with 100% participation. A feasibility study for a community sewer system was not completed due to the lack of interest by the lake home owners.

FUTURE ACTIVITY RECOMMENDATIONS

Further sampling will continue and may show better water quality results since the project ended when the lake was experiencing low water levels due to drought like conditions. Mr. Posicak, Science Teacher at Hanson High School, will continue to bring students out to the lake for projects such as monitoring the water.

Currently there is some contamination coming from the lake homes around Lake Hanson. Therefore it is recommended that lakeside cabin septic tank testing, similar to the one completed for this project, be completed again. This could show if the septic leakage is getting worse. A feasibility study on options for a sanitary sewer is also recommended. If this is pursued in the future, it may lead to a community system that is monitored more closely than individual septic systems, and would have more safeguards on keeping contamination form the lake homes from getting into the lake.

Continue working with the producers on the south side of the lake with keeping cattle out of the lake. This will be done in part by the Lower James Implementation Project and NRCS. Keeping cattle out of the lake will reduce the amount of fecal contamination the lake receives and sedimentation from the cattle walking down the banks to drink from the lake.

Working with the animal feeding operation that has completed a feasibility for an animal waste system. This is also to be accomplished with the help of the Lower James Implementation Project 2009.

APPENDIX A

Procedure for Dye Testing

1. Determine the number of locations that carbon packets will be deployed. Purchase 4 times the number of sites that the carbon packets are to be deployed at. Use of a consistent size aquarium filter pack is necessary. Larger packets will provide a greater surface area to accumulate the dye.
2. Place 1 packet in a clean covered container of distilled water and allow to sit for 2 weeks before storing in a refrigerator in a dark bag. This packet should be used to verify that the carbon packets contain no substances that will affect the samples and can be used as a blank sample.
3. Deploy 2 packets at each site 2 weeks before the scheduled dye date.
4. After 1 week of deployment, gather 1 packet from each site and refrigerate in dark packets until testing can be completed.
5. The day dye is to be added, gather the remaining packets and place the two additional packets of carbon at each sample site prior to adding the dye.
6. Add a consistent volume of dye at each location. For septic tank testing in small lakes (<100 acres), 8 ounces per system is recommended, for large lakes, 16 ounces should be considered.
7. 1 week after dye testing remove 1 packet from each of the locations and refrigerate in a dark bag.
8. 2 weeks after dye testing, remove the final packets from each site and refrigerate~~d~~ in a dark bag until testing.

Lab procedure for testing:

1. Cut open each packet and remove all of the carbon to a sealable container with enough room to hold the entire packet.
2. Add a measured volume of Isopropyl alcohol to each container. Add 50 mL of alcohol to every 25 mL of carbon.
3. Allow 1 hour for extraction to complete.
4. Filter the extract through a glass fiber filter to remove excess turbidity from the sample.

If presence or absence is desired, place a consistent volume of the filtered extract into glass vials for an eye test.

If quantifiable results are desired, the filtered samples may be run through a spectrophotometer.

1. A wavelength scan can be completed on a spike sample to determine the maximum absorbance for the specific dye used.
2. For Bright Dyes Fluorescent Yellow Green, maximum absorbance is reached at 490 nm.
3. When scanning samples, it is recommended that 10% blanks and replicates are completed.

APPENDIX B

THE J.A.M.E.S. PROJECT 2005-06

LAKE/RIVER= **Lake Hanson**

• DATE	9-15	10-3	10-27	11-16	12-7	1-20	2-21	3-22	4-10
• AIR TEMP	25.5°	28.1°	10.9°	9.1°	-10.5°	8.1°	5.4°	8.0°	23.4°
• WATER TEMP	21.3°	18.7°	8.5°	3.4°	0.3°	0.2°	4.4°	4.2°	13.6°
• DISSOLVED OXYGEN	7.5	10.4	6.8	10.4	8.5	8.1	10.9	10.0	9.1
• NITRATE	0	.44	.97	.97	.44	0.44	.06	.22	.26
• PHOSPHATE	.24	.07	.23	.00	.15	.35	.06	.76	.36
• TURBIDITY	65	102	78	125	165	155	95	75	61
• FECAL COLIFORM	96	2	2	47	4	1	0	0	32
• BOD	4.0	3.6	3.1	2.7	2.4	3.2	4.2	4.3	3.4
• TDS	683	1114	1068	850	770	350	971	1125	1118
• HARDNESS	30	30	35	30	30	25	15	50	25
• pH	8.46	7.25	7.26	7.17	7.04	7.08	7.09	7.00	7.47
• ALKALINITY	250	110	90	100	50	45	190	180	200
• AMMONIA	.20	.20	.30	.20	.20	.30	.25	.25	.18
• WQI	57.31	68.19	64.62	76.04	74.59	79.22	76.52	71.49	75.75

THE
J.A.M.E.S.
PROJECT

2006-07= Lake Hanson

• DATE	9-15	10-6	10-24	11-15	12-6	1-17	2-22	3-15	4-13	5-8	5-11	5-21
• AIR TEMP	23.5	26.7	12.5	0.6	3.5	-2.3	3.3	8.1	15.3	21.7	28.6	28.1
• WATER TEMP	19.4	16.2	5.5	4.0	0.5	1.0	2.0	5.0	8.5	21.9	25.5	23.7
• DISSOLVED OXYGEN	5.8	5.5	5.6	5.5	4.0	13.6	5.0	7.8	10.5	4.9	5.6	6.0
• NITRATE	1.14	1.6	1.5	1.4	1.4	1.3	1.7	1.1	1.6	1.88	2.92	1.60
• PHOSPHATE	0.07	0.05	0.04	0.03	0.04	0.05	0.07	0.11	.35	0.94	1.85	1.74
• TURBIDITY	51	37	25	85	37	55	30	55	75	10	10	25
• FECAL COLIFORM	2	0	40	20	1	174	268	280	170	1,543	1,106	953
• BOD	3.2	3.6	4.0	3.4	2.2	2.1	0.7	2.1	3.7	3.9	4.2	4.0
• TDS	1020	1025	950	1080	920	960	463	74	490	132	205	415
• HARDNESS	45	50	50	50	50	55	40	20	35	20	30	25
• pH	6.89	7.01	6.98	7.11	7.15	7.25	7.21	7.10	7.03	6.88	6.80	6.73
• ALKALINITY	300	300	100	75	70	300	100	0	160	120	60	350
• AMMONIA	.20	.50	.50	.25	.20	.25	.20	.10	0	0.75	0.50	0.20
• WQI	70.54	74.93	67.90	67.86	72.02	65.31	68.72	72.4	66.95	56.83	55.24	57.24

***Emergency spillway broke on 5-7-07…7-10 inch rainfall**

THE J.A.M.E.S. PROJECT 2007-08= Lake Hanson

• DATE	9/17	10/15	11/16	12/19					
• AIR TEMP	27.3	25.2	16.8	1.5					
• WATER TEMP	17.3	14.8	7.5	.10					
• DO	19.9	18.8	16.6	14.7					
• NITRATE	.008	.12	.70	.04					
• NITRATE 2	.044	.066	.88	.20					
• PHOSPHATE	0.00	.30	.34	.25					
• PHOSPHATE 2	0.22	.26	.04	.12					
• TURBIDITY	65cm	55cm	38cm	57cm					
• FECAL COL	27	19	5	35					
• BOD	2.9	4.6	4.1	4.8					
• TDS	1123	1198	1184	863					
• HARDNESS	1.6	1.4	1.5	.9					
• HARDNESS 2	10	25	25	42					
• pH	8.0	8.2	8.8	8.7					
• Ph 2	8.25	8.4	8.8	7.75					
• ALKALINITY	360	260	200	240					
• AMMONIA	.18	.18	.25	.20					
• CONDUCTIVITY	1175	1257	2021	1340					
• SALINITY	1.75	1.40	1.69	1.08					
• WQI	66.22	64.16	64.83	62.73					

Origins of the WQI

To develop the WQI, the National Sanitation Foundation selected 142 people that represented a wide range of positions at the local, state, and national level. Through a series of questionnaires, each panelist was asked to consider 35 water quality tests for possible inclusion in an index. This number was finally reduced to nine tests.

The weighting curve charts are also the product of repeated questionnaires. Respondents were asked to graph the level of water quality ranging from "0"(worst) to "100" (best) as determined by the raw test data. The weighted curves are a result of averaging all the curves drawn. These curves reflect the best professional judgment of the respondents to an arbitrary scale of water quality (0-100)

APPENDIX C

Region takes stock after storm clouds recede

Ross Dolan The Daily Republic

Published Tuesday, May 08, 2007

ALEXANDRIA — What began as flooding problems for lakeside homeowners became communitywide concern this weekend with the blowout of an earthen dam at the southwest end of Lake Hanson, two miles south of Alexandria.

As heavy rains hit over the weekend, erosion started at the dam's emergency spillway and worked its way back to the face of the dam, creating a path for the dam's rapid deterioration.

Even with continuing inflows from weekend rains that dumped nine inches of water on parts of Hanson County, the 70-foot wide breach is rapidly emptying the 60-acre lake.

Ross Dolan/Republic Lake Hanson Project Coordinator Curt Hart, left, and Hanson County Commissioner Tom Bell discuss options for the repair of a dam breach at the southwest end of the lake. Heavy rains caused erosion that blew out a section of dam early Sunday morning, washing debris downstream to the James River three miles away.

"All day Saturday, we knew we had a problem," said Curt Hart, Lake Hanson Restoration Project coordinator.

Water was rising up to and into the doors of some homes, he said.

A 3:30 a.m. Sunday check of the lake, said Hart, showed water levels up to the walking bridge that crossed the spillway at the dam's northwest end. By 5:30 a.m., a breach at the opposite (southwest) end of the dam caused water levels to drop six feet. The incident eliminated further damage to lakeside homes, but it also destroyed a major recreational facility.

Water continued to cascade through the breach Monday, exposing previously submerged sandbars at the lake's east end and scattering dirt and rock across the picturesque landscape below the dam. Lake levels were bolstered from cascades of water sent downstream, but it's only a matter of time before the entire lake empties, said Hart.

If money can be found to repair the breach, Hart is confident the lake, a popular attraction for boaters and fishermen, will recover quickly. He said private donations or FEMA money likely would be the best source of repair funding, but a damage estimate would first be required. "We'll (explore) every avenue for funding that we can," Hart said.

"I don't know who will give the estimate," he said.

The weekend rains wiped out dredging efforts, which are part of a million dollar restoration project. About $150,000 was used to improve the spillway in 1998, said Hanson County Commissioner Tom Bell.

"This is devastating to us," Bell said. "We put a lot of time and effort out here and to have this happen overnight is pretty shocking and hard to believe."

He had no estimate of the economic loss to area communities.

Besides the 70-foot-wide breach, heavy rains also damaged the lake's main spillway, sweeping away rock-filled gabions — rock-filled wire mesh baskets — and eroding banks to within six feet of the Northshore Drive roadway.

RELATED CONTENT

Ross Dolan Archive

But there are positives, said Hart.

The springs that feed the lake pour in nearly 3 million gallons daily, he said.

“It stays clean, even in the driest year,” he said. “And it had a nice beach with lifeguards.”

He predicted a rapid fill once the dam is repaired.

Local and state officials met at the dam Monday to assess the damage. The structure originally was built in the late 1930s as a Works Progress Administration project.

Jeff Peters, a civil engineer with the state Department of Game, Fish and Parks, called the damage “significant,” but wouldn’t guess on repair costs. Peters said the breach, as difficult as it is, could be a “cleansing” for the lake. Past experiences with breaches showed that once a dam is repaired, lake fisheries can rebound rapidly, Peters said.

Hanson High School Principal Jim Bridge said the situation is a blow to his school’s ecology class, taught by Steve Pociask, himself a lake resident for 30 years.

“They’ve taken a lot of ownership of the lake out here,” Bridge said. The class participated in water testing and a fisheries inventory in past weeks.

The storm’s effects were also being felt elsewhere in the county.

Bridge said his district will not bus students to school because of extensive damage to county roads. “It’s hard to drive buses on gravel roads when they’re soft and wet,” he said. School opened one hour late Monday but will have a regular 8:25 a.m. start today.

“We hope to sort out bus routes by Wednesday,” he said.

Hanson County Emergency Management Director Ray Thomas, who also works part-time with the Hanson County Highway Department, said crews were busy hauling rock to repair washed out bridge abutments and other damage to area roads. Thomas, who has held his EMD position for nearly 10 years, said no other weather event during his tenure produced as much damage to area roads.

Hanson County Sheriff Mark Kessler cautioned drivers to be mindful of closed roads, which are more numerous in the northeast part of the county.

If people go around barricades, they are at risk for civil penalties. Those who choose to violate road closure signs and get stuck could face a long wait for help, he said.

“And we will write tickets,” Kessler said.

Repairs at Lake Hanson put on hold

Austin Kaus and Ross Dolan, The Daily Republic

Published Friday, May 18, 2007

ALEXANDRIA — It may be years before fishing is fully restored at Lake Hanson, the recreational lake near here that was drained when floodwaters breached the lake's dam earlier this month.

Todd St. Sauver, regional fisheries manager for the state Department of Game, Fish & Parks, said it will take at least three years to completely rebuild the fish population of Lake Hanson, although some of that depends on when the dam is repaired.

"We hope that someday the dam will be rebuilt and we can manage a fishery there again," he said. "The speed of that recovery will depend a lot upon our source of fish."

Laura Wehde/Republic - There still is water in Lake Hanson, but it is nowhere near its usual levels. The dam at the lake was breached during a heavy rain earlier this month.

St. Sauver said the GF&P will work to restore populations of crappie and bluegills as soon as the dam is repaired.

Fixing the dam, meanwhile, is the most pressing problem.

Those associated with the project say they are awaiting word on whether Hanson County is declared a disaster by President Bush. If that happens, dam repairs could be eligible for federal support.

"I've got a good feeling FEMA will help us," said Restoration Project Coordinator Curt Hart, "but we'll have to wait and see."

Heavy rainfall the weekend of May 5 led to the dam's demise. Since then, workers have placed rock to stabilize areas near the dam's northwest spillway, but the main breach remains unplugged.

"In two hours (after the dam breached), we lost six to seven feet of the lake," said Hart. "In the days since the event, we're probably down another seven feet."

Hart said 1,000-pound rocks have been added as rip-rap to prevent further erosion at the dam's spillway. The larger rocks will replace the rock-filled gabion baskets at the site and prevent the washout of Northshore Drive.

"We haven't done anything at the dam," he said. "We've explored a few possibilities but the state hasn't dictated anything to us yet."

Darrell Raschke, James River Water Development District manager, is confident the president will approve Gov. Mike Rounds' request to have Hanson and numerous other South Dakota counties a disaster area.

He estimates costs to repair the area will be approximately $1 million.

Hart said alternative funding options are being explored "in case state and federal help doesn't materialize."

"It takes a lot of money," said Raschke. "We're going to have some bake sales and raise some money."Lake Hanson is state-owned and the state Office of School and Public Lands owns the dam structure. The office doesn't have any reconstruction funds, said Hart, but will offer technical expertise on rebuilding the dam if public or private funding can be found.

Meanwhile, said Hart, flows have decreased into the east end of Lake Hanson.

“There’s still a lot of water pooling at the dam end,” said Hart, who has a home on the lake, “but it’s down every day.”

“James River Development has been very helpful with our lake over the last year,” he said.

The district helped pay for dredging and spillway improvements, said Hart, who had no information of specific grant amounts from the district.

“Realistically, if it’s fixed tomorrow, the summer’s pretty much shot here,” said Hart. “We’d like to get it fixed as soon as possible, but we’ve got to make sure it’s done right.”

One way or the other, said Hart, the dam will be fixed. He is confident the area will recover once repairs are finally made.

“On a normal July day, with no rain for a month, we’re still gaining about 3 million gallons of water a day, so there’s quick recovery there,” he said.

The downside of having such a large amount of moving water is the increased difficulty in continuing a three-year dredging process. Thanks to the flood, officials will be restarting the entire ordeal.

“We’ve lost all of our dredging process,” he said. “It’s a lot of sediment because of the extreme turnover of water in the lake.”

Julie Brookbank has a cabin on the lake that received very minor damage. Still, she said she is “pretty sad over the whole thing.”

She also has been impressed with the recovery process so far.

“We’ve got some very dedicated people over there who live there full time,” she said. “Honestly, I think recovery is moving more quickly than I expected. Any progress is good progress.”

Officials eye recovery at Lake Hanson, dam

Associated Press - May 29, 2007 12:15 PM ET

ALEXANDRIA, S.D. (AP) - The Game, Fish and Parks Department says it will take at least three years to restore the fish population at Lake Hanson, a state-owned lake near Alexandria that was drained when floodwaters breached its dam the weekend of May fifth and sixth.

Since the flood, workers have stabilized areas near the dam's northwest spillway.

Curt Hart, the restoration project coordinator, says the lake dropped up to seven feet in the two hours after the dam was breached -- and the water loss continued.

Hart says thousand-pound rocks were added as riprap to prevent further erosion at the spillway.

Hart says the dam will be fixed one way or the other.

No FEMA help, but Lake Hanson dam repaired and ready for spring

Austin Kaus The Daily Republic
Published Monday, January 07, 2008

ALEXANDRIA — Last year's flood damage to a dam in Hanson County has been repaired without the help of the Federal Emergency Management Agency, prompting disappointment from the project coordinator.

Heavy rainfall the weekend of May 5 destroyed the dam at Lake Hanson. Restoration Project Coordinator Curt Hart said initial statements by FEMA officials indicated that the agency would provide funds to assist with repairs.

However, the swift reaction of local officials to repair the damage caused by the breach apparently discouraged FEMA from assisting with the repairs, Hart said.

"We almost immediately started to put things in place to try to fix it," he said. "They told us that they weren't too happy that we were proceeding, but that they were going to help us … to get the lake back to where it was. They did not do that."

Using privately donated money and supplies, Hart said 60,000 tons of material was used to repair the 70-foot-wide breach.

Despite a disaster declaration in Hanson County following the storms, Hart said no state or federal funding was received to assist with repair. If FEMA had assisted, the project would have been funded 75 percent by the agency, with remaining funds coming from the state.

Hart said no state money can be distributed if FEMA chooses not to assist.

The state Office of School and Public Lands, which owns the dam, appealed the decision three months ago, but Hart said he isn't expecting FEMA's decision to change.

"They're the ones that make the decision through the appeal process, too," he said. "I think we're kind of on our own here as far as repairs."

Even though the dam itself has been repaired, Hart said there is still work to be done. Hart said there is a fund of $60,000 available to repair other damage, and he is hoping that another $40,000 — also from donations — will come in before the repair process begins.

Hart said he feels comfortable that the repaired dam will hold, unless the lake faces another extreme storm.

He feels FEMA wanted officials to wait at least a year before repairing the dam, an idea that Hart said was simply unsafe due the amount of unhealthy material in the water.

"I think they wanted us to sit on this for two or three years and we weren't willing to do that," he said. "Our tests that we'd done on the water were terrible. We had health concerns."

The lack of assistance from the agency has left Hart feeling deceived.

"FEMA's duty is to bring you back to where you were," he said. "They were not willing to do that. I don't feel uncomfortable at all saying that they told us they were going to help us and then they didn't."