The Nebraska "CLEAR" Program

Helping Restore Community Lakes and Ponds

Community Lakes Enhancement And Restoration

CLEAR

The **CLEAR** program was ***instrumental in the rehabilitation*** of an under-utilized piece of City property. **Because of the funds** provided, a neglected storm water retention cell was modified to allow for proper stormwater drainage, erosion control measures were taken and the **area was transformed into a City Park**. The area now includes playground equipment, a picnic area, a hike/bike trail and a lake that provides an excellent fishery for the citizens of Grand Island. Many now ***consider this area a real jewel*** in our Park system.

Steve Paustian
Parks and Recreation Director
Grand Island

WELCOME

The Community Lakes Program represents a very successful effort that the Nebraska Department of Environmental Quality (NDEQ) has undertaken to reach and to positively impact Nebraska citizens. The program has helped communities renovate their park ponds and stimulate the upgrade of other park amenities. The restoration efforts at these aging and under-utilized facilities have returned these areas to being appealing gathering locations within their communities.

I visited many of these projects after the renovations were completed. It's gratifying to see how these restoration efforts draw families back to these parks, and how the restored lake areas are once again important and appreciated community resources. From conversations I have had with individuals and community leaders, it is clear that the efforts of the Community Lakes Program have provided many tangible benefits in communities all across the state.

The program has been an excellent example of the results that can be achieved from local and state collaborative efforts. The Nebraska Department of Environmental Quality, the Nebraska Game and Parks Commission and University of Nebraska–Lincoln Extension, through the CLEAR Team, provided their expertise and worked cooperatively with participating communities. The Nebraska Environmental Trust provided generous financial support to these local efforts, as well.

The results of these local and state efforts will benefit participating communities for many years to come.

Michael J. Linder, Director
Nebraska Department of Environmental Quality

The NEBRASKA "CLEAR" Program

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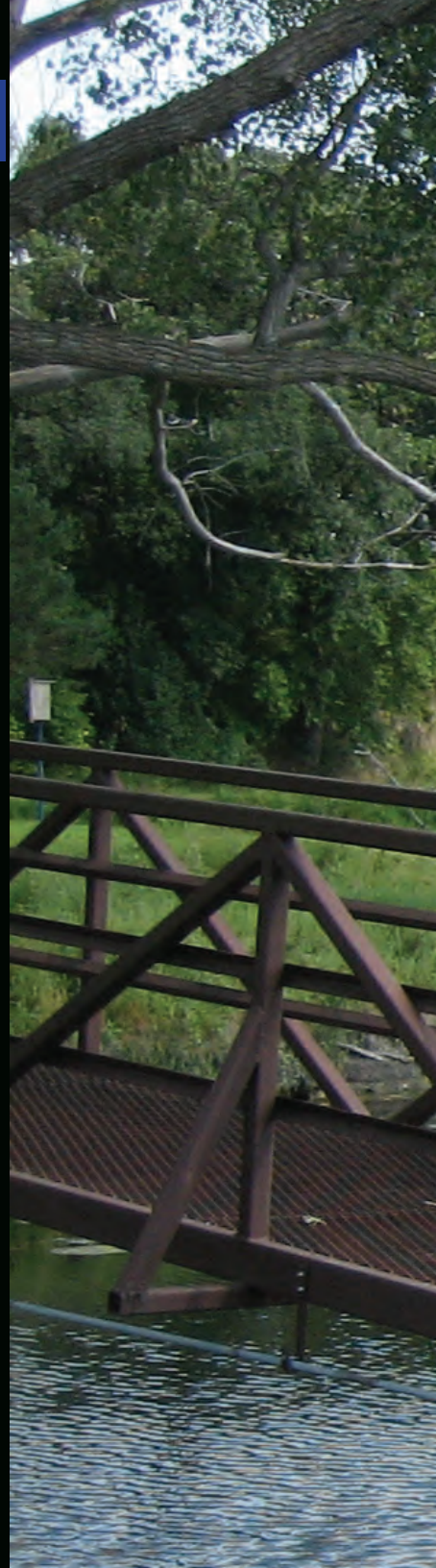


Contributors

This book was designed, written, compiled and edited by faculty and staff at the University of Nebraska–Lincoln's Institute of Agriculture and Natural Resources under a Clean Water Act Section 319 grant from the Nebraska Department of Environmental Quality. Primary UNL contributors were Steven W. Ress, Renee' J. Lanik, Cheryl Alberts, Sandi Alswager Karstens and Dr. Bruce I. Dvorak, P.E. Generous assistance in bringing the book to fruition came from Elbert Traylor, Paul Brakhage and Jim Bunstock, Nebraska Department of Environmental Quality; Rick Eades, Nebraska Game and Parks Commission; and Tadd Barrow, University of Nebraska–Lincoln Extension.

INTRODUCTION

The most rewarding experience in public service is to see your efforts directly and positively impact the citizens you serve. The community lakes program has given my CLEAR Team colleagues and me that gift.

We were fortunate to find a niche in our separate programs that allowed us to collaborate in a joint effort to assist Nebraska communities in renovating their park ponds and in the process restoring the luster of the parks themselves. Community leaders report that citizens are returning again to their parks for reunions, ceremonies and recreation. Children again ride their bicycles to the parks for an afternoon of fishing, frog chasing and tadpole catching. The program produced environmental, social and cultural rewards beyond our dreams.

This book is a celebration of the spirit of the communities that participated in the community lakes program. We thank their community leaders who had the vision to work with us to bring these projects to fruition. It is our hope that the citizens of these communities will enjoy many years of gathering with family and friends in these restored parks.

Elbert Traylor
Nebraska Department of Environmental Quality

Nebraska Communities, Large and Small, Benefit from the CLEAR program

Despite what some might view as the treeless, lakeless expanse of the Great Plains, Nebraskans prize their lakes and ponds, big or small, for their fishing, recreation and family fun potential.

Communities across the state typically have a local park developed around a small pond or lake. Many of these were built in the decade of the 1930s through Depression-era programs such as the federal Works Project Administration (WPA) and became focal points for community social and recreational activities. Over time they suffered, however. Shorelines eroded, ponds "silted in" from sedimentation during flooding and were overgrown with aquatic weeds and algae. Parks often degraded right along with their pond; the declines often accelerated as they became targets for vandals and dumping grounds for discarded appliances, old tires and other refuse. The parks and ponds stopped being a social, cultural and economic asset for the communities and instead became health and safety liabilities.

By the late 1990s rebuilding and reinvigorating parks and ponds became a goal of the Nebraska Department of Environmental Quality (NDEQ) as part of their responsibility to implement the state's Nonpoint Source (NPS) Management Program.

Funded primarily through Section 319 of the federal Clean Water Act (CWA) through annual grants from the U.S. Environmental Protection Agency (EPA), Nebraska's

NPS management program funding increased significantly in 1999, creating opportunities for NDEQ to develop several unique sub-programs to target under-served water quality issues.

One of these was the Community Lakes Restoration Assistance (CLaRA) program. CLaRA was subsequently revised and linked with funds from the Nebraska Environmental Trust Fund (NETF) to create the Community Lakes Enhancement and Restoration (CLEAR) program. The goal was to provide dedicated funds communities could easily access to restore small community park ponds.

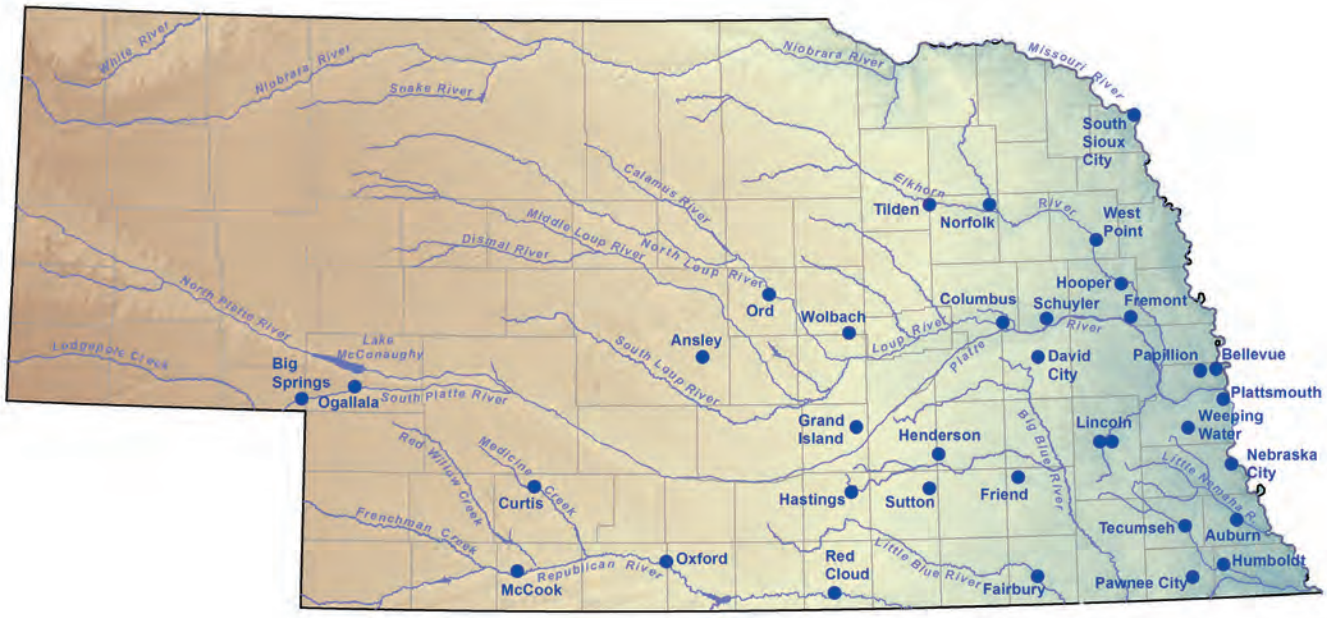
Primary program objectives were to restore aesthetics and improve water quality and aquatic habitat to a level that would sustain a warm water fishery. It was also expected that these projects would produce a pleasing environment where families could gather for social functions and recreation. The working model was to create opportunities for youth to ride their bikes to the park pond for an afternoon of fishing.

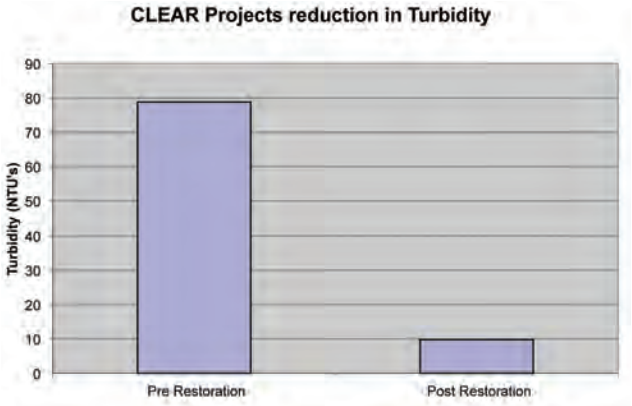
The community turns out in force for dedication of their restored lake at Ord.

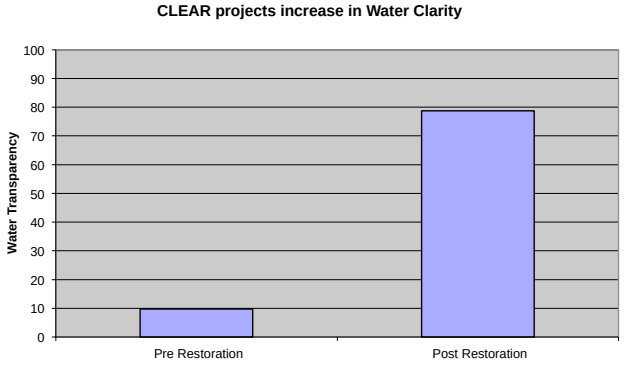
CLEAR program

CLEAR was developed as an efficient way to assist communities in restoring their local park ponds. A single application and review for mulitple funding sources made the process easy for towns. NDEQ serves as the grant manager for both CWA Section 319 and NETF funds. The Nebraska Game and Parks Commission (NGPC) provides fisheries expertise, fish for post-project stocking and, for some projects, funding to build handicap fishing access. University of Nebraska–Lincoln Extension (UNL) provides expertise in local outreach to promote the projects and coordinate school-based volunteer monitoring programs to engage students in conducting pre- and post-project water quality monitoring. Collectively, the three agencies (CLEAR team) receive and evaluate project applications, assist in design modifications and recommend projects for funding. NDEQ's director makes the final approval with concurrence from the EPA's Region VII office.

Eligibility criteria and prescribed practices were developed for CLEAR to assure NETF and EPA those funds would be appropriately expended. This allowed the team maximum flexibility in allocating NETF and CWA Section 319 funds to individual projects without cumbersome individual reviews by the separate funding sources.







Criteria for CLEAR projects:

1. Pond must be publicly owned and have public access.

2. Pond must be less than 20 acres in size (target is under five acres).

3. Pond must be within or directly adjacent to the community to facilitate pedestrian travel to the site.

4. Cost for NETF and CWA Section 319 funds may not exceed $300,000 with a community match not less than 15 percent (at least 5 percent in cash).

5. Projects must include an outreach component.

6. Pond must be capable of sustaining a warm water fishery to be stocked by NGPC at completion of the project.

Prescribed Practices

Generally limited to:

1. Sediment removal
2. Shoreline stabilization
3. Improving inlet and outlet structures
4. Installing aeration systems
5. Reducing significant pollution source (watershed treatment)*

6. Monitoring supplies for educational programs*
7. Handicap fishing access**
8. Development costs (engineering and design)
9. Educational tools and materials, including signage

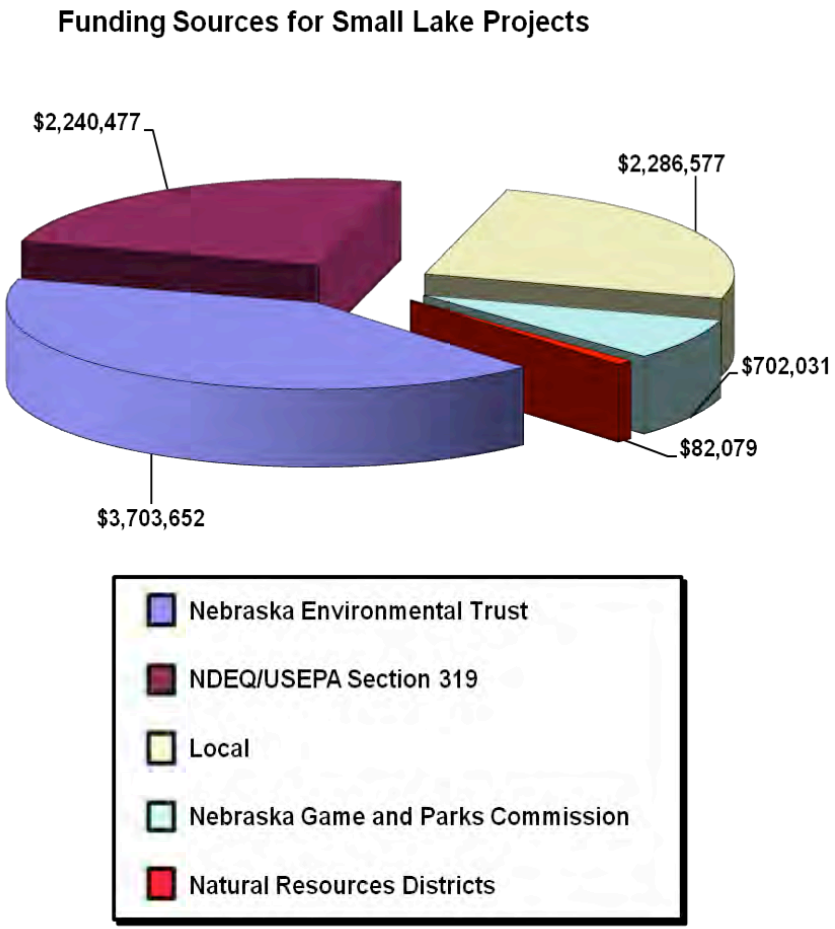
* These activities are reviewed and approved on a case-by-case basis.

** Dedicated handicap fishing decks/piers are reviewed and approved separately. These structures are funded through NGPC Urban Fisheries Program.

CLEAR allows a single entry point into the application process through any member of the CLEAR team. Following initial contact, the CLEAR team visits the site and discusses project needs and the requirements with community leaders. If the pond meets program criteria, communities are invited to submit a pre-proposal with a general scope of the proposed project. The team evaluates these pre-proposals and determines if the project is likely to be accepted for funding. Communities are given non-binding "pre-approval" if the proposal is acceptable and funds are temporarily earmarked pending receipt of a final plan.

After pre-approval, the community is asked to submit a formal application with detailed construction plans. Communities are encouraged, and sometimes required, to contract professional engineering services if significant structural work is part of the project. Some communities use staff engineers where structural work is minor.

Nebraska Game and Parks Commision stock fish after a CLEAR restoration project is completed.



Formal applications are received and reviewed by the CLEAR team to assure all program and project requirements are met. Completed applications are then forwarded to EPA for concurrence on the Section 319 funds. Accepted applications are recommended to NDEQ's director for final approval. Upon approval, a cooperative agreement is signed between the community and NDEQ authorizing CLEAR funding for the project.

Funds are disbursed to communities as reimbursement for completed work. This sometimes poses hardships on small communities that lack sufficient cash reserves to make large payments to contractors before reimbursement is received from NDEQ. This is resolved by allowing communities to establish a line of credit for short-term loans with a local bank and to claim the interest payments as part of their cash match. Though not often used, this has proven to be effective for some communities.

CLEAR was further revised in 2008 to improve allocation of pooled NETF and CWA Section 319 funds. The CLEAR team no longer requests a master grant of uncommitted funds from NETF. The current approach is to continue soliciting eligible projects and assist in initial planning and design of individual projects. The CLEAR team then submits a grant request to NETF for specific projects where the community has completed the planning process sufficiently to be pre-approved as a CLEAR project.

Community Lakes Programs Evolve

The initial Community Lakes Restoration Assistance (CLaRA) program was developed in 1999 by NDEQ as a sub-program of the state nonpoint source management program. CLaRA provided grants up to $75,000 to help communities rehabilitate aging and impaired park ponds. If necessary, the communities had to separately solicit additional financial support from other sources. Six communities participated in the CLaRA program. These were Auburn, David City, Humboldt, Nebraska City, Plattsmouth and Wolbach. These projects were limited to sediment removal, shoreline stabilization, aquatic habitat enhancement, aeration, inlet/outlet control and outreach. Local Natural Resources Districts, NDEQ, NGPC and UNL helped design many of these projects.

CLaRA inspired an inter-agency team from NDEQ, NGPC and UNL to create a second-generation program renamed Community Lakes Enhancement and Restoration (CLEAR) in 2000. The revised program provided more funding and a streamlined selection, funding and implementation process.

CLEAR secured a master grant of $1.85 million in 2001 from NETF to pool with up to $800,000 dedicated Section 319 funds through NDEQ to support restoration of other community park ponds. An additional 17 communities participated in CLEAR I. These communities were Pawnee City, Fairbury, Sutton, Ord, Tilden, Ansley, West Point, Grand Island, Lincoln, Weeping Water, Henderson, Fremont, McCook, Bellevue, South Sioux City, Red Cloud and Norfolk.

In 2005, CLEAR got a second NETF grant of $1.05 million to pool with up to $850,000 Section 319 funds to extend the program again. Nine more communities participated in CLEAR II: These were Tecumseh, Schuyler, Papillion, Ogallala, Friend, Curtis, Hastings, Columbus and Hooper. Combined investment in these nine projects was nearly $2.4 million. Most of these communities invested money to renovate other park amenities.

A third NETF grant (CLEAR III) supported projects in Oxford and Big Springs. That grant was awarded in 2009.

Conclusion

Communities participating in each of these projects reported significant environmental, social and economic benefits. Park use increased dramatically after restoration efforts and family reunions, community social functions, recreational activities and special events returned to their parks. At the same time, vandalism and illegal dumping virtually disappeared. Ponds were again heavily used by area youth for fishing, and many schools that participated in volunteer monitoring during the project continued this and other activities as part of an outdoor curriculum. All projects reached water quality standards by project end.

By nearly any measure, CLEAR has been an unqualified success. More than 30 Nebraska communities now have restored ponds and renovated park facilities for renewed use and interest. These parks have returned to being the center of community and family social, cultural and recreational activities they once were and were originally intended to be.

CLEAR was recognized by the Environmental Council of States (ECOS) and the North American Lake Management Society (NALMS) as an outstanding example of innovative state programs to address environmental problems. It has been well received by EPA and presented to other states as an example of how Section 319 funds can be leveraged with other funds and other programs to help communities with local environmental problems.

The combined investment in these projects was nearly $6.5 million. Other communities continue seeking CLEAR assistance in considering restoration projects for their own park ponds.

Acknowledgements

The CLEAR Team members listed below were instrumental in assisting communities in implementing successful projects. Their contributions, along with many other colleagues and community leaders with the vision and endurance to make their projects successful, are greatly appreciated.

Paul Brakhage - Nebraska Department of Environmental Quality
Rick Eades - Nebraska Game and Parks Commission
Tadd Barrow - University of Nebraska–Lincoln Extension
Elbert Traylor - Nebraska Department of Environmental Quality

LAKE ANSLEY

Community ...

Lake Ansley originally was part of Mud Creek, which flows through the northwest corner of town. In the 1890s and early 1900s the creek powered a water wheel and later steam engines to make electricity. These generating plants were among the earliest of their kind in Nebraska. In the 1960s, part of Mud Creek was dammed to form a four-acre lake. The lake has been a popular fishing spot and, since it is next to Highway 2, it is also an attraction for travelers. A surrounding park features a baseball diamond and picnic shelters, as well as facilities for camping, tennis and basketball.

Challenges ...

Forty years of sediment and organic material accumulated on the lake bottom, decreasing the lake's maximum depths by eight to nine feet. High nutrient concentrations led to frequent algae blooms, causing the water to become turbid (or cloudy). In addition to stormwater runoff impacts, natural spring activity had decreased and there was seepage in one corner of the lake, which made maintaining water levels difficult.

Solutions ...

In 2002, Ansley received funding from the CLEAR program. Village and grant funds were used to accomplish several objectives including stormwater diversion, lake deepening, shoreline stabilization and bottom sealing. Runoff problems from Highway 2 were addressed by installing a culvert pipe and two drop inlets that completely diverted stormwater around the lake. An earthen berm was constructed at the upper end of the lake for addi-

tional stormwater protection. About 35,000 cubic yards of sediment were removed from the lake, yielding depths of 10 to 12 feet across 25 percent of the lake. A compacted soil liner was installed to reduce seepage to less than a quarter inch per day. The applied science class at Ansley High School helped with water quality monitoring. Other project activities included handicap access enhancements, removing an old siphon tube and building an emergency spillway.

Results ...

Significant water quality improvements resulted from this project, the largest being in clarity, which increased from 18 inches to 89 inches. In addition, phosphorus decreased by 73 percent, nitrogen by 56 percent and turbidity by 90 percent. The lake has been restocked with largemouth bass, bluegill and channel catfish. Lake Ansley has returned as the focal point of the park and will continue to provide community members a place to enjoy a quality outdoor experience. The two-year project cost approximately $257,000, with $223,000 coming from CLEAR and $34,000 coming from the village. Consulting services were provided by Tagge Engineering Consultants.

ROTARY ISLAND LAKE

Community ...

Auburn's Rotary Island Lake resulted from another construction project — building an Army National Guard armory that needed fill dirt. When originally formed, the 4.7-acre lake had a nearly uniform depth of eight to 10 feet. As a result of sedimentation from severely eroded shorelines, the lake had lost more than half of its original eight feet of depth.

Challenges ...

In 1998, the City of Auburn teamed with the Auburn Rotary Club and Auburn Optimists to initiate efforts to restore the lake. With funding assistance from the Nebraska Environmental Trust, Nebraska Department of Environmental Quality and U.S. Environmental Protection Agency, the city was able to address sedimentation concerns.

Solutions ...

Hydraulic dredging brought maximum lake depths back into the 10-foot range to support fish and reduce re-suspension of bottom sediments. About 1,260 feet of shoreline was graded, re-sloped and treated with a combination of rock riprap and shore guard to drastically reduce erosion.

Results ...

The project was finished and the lake was re-stocked with sport fish in 2001. The renovation project cost was $183,347. Of this, $74,647 was provided through a Section 319 grant from the Nebraska Department of Environmental Quality and U.S. Environmental Protection Agency.

Additional project contributions were from the Nebraska Environmental Trust ($58,700) and City of Auburn ($50,000). Other project partners include the Auburn Rotary Club, Auburn Optimists, Nemaha County, Southeast Nebraska Development District and the Nemaha Natural Resources District.

BELLEVUE

HAWORTH PARK POND

Community ...

Haworth Park Pond is in historic Bellevue along River Road in Haworth Park, just 100 yards west of the Missouri River. Bellevue, home of the U.S. Air Force's Offutt Air Force Base, borders Omaha. The pond was built through a dredging operation more than 30 years ago and receives drainage only from the area immediately surrounding the pond. When it was built, maximum depths were more than 12 feet. Historic flooding on the nearby Missouri River impacted the pond many times, primarily by depositing sediment that gradually reduced pond depths.

Challenges ...

Flooding impacted Haworth Park Pond so many times over the years, that by 2002 maximum pond depths were reduced to three to four feet, or one-third to one-fourth its original depth. Also in 2002, the City of Bellevue began dredging the pond (a project not funded by CLEAR), which was successful in restoring its former maximum depths to 12 feet. As part of that project, shoreline grading and bank stabilization were also completed. The Nebraska Game and Parks Commission removed rough fish and replaced them with largemouth bass, channel catfish and bluegill. Although the pond now had adequate depths, low dissolved oxygen caused winter fish kills.

Solutions ...

In 2004, the City of Bellevue consulted CLEAR about the winter fish kills. CLEAR recommended that an aeration system be installed to help avoid a similar occurrence in the future.

Results ...

In the fall of 2004, the City of Bellevue had an aeration system installed in the lake. Since the installation of this system, there have been no fish kills. The total cost of the project was $8,172. Project funding was provided through the Nebraska Department of Environmental Quality and U.S. Environmental Protection Agency ($6,800), and the City of Bellevue ($1,372).

BIG SPRINGS COMMUNITY LAKE

Community ...

Big Springs is located in Deuel County. A one-acre community lake was constructed by volunteers in 1927 as part of a water system project. Given that the lake sits adjacent to South Platte High School, a tremendous outdoor classroom opportunity existed. Over the years, fish were stocked and some facilities were added by various civic groups and the village, however, use of this lake was minimal due to the lack of depth and access issues.

Challenges ...

Because the lake had only a maximum depth of five feet, it was susceptible to algae blooms and high turbidity. The lake also didn't support a large fishery due to its shallow depth, lack of habitat, poor water quality, lack of water level controls and steep shorelines. Given its shallowness and protection from wind, dissolved oxygen was also a concern, particularly during summer months with high temperatures and winter months with heavy snow and ice cover. In addition to all of these water-quality issues associated with the lake, there were also concerns about its high seepage rate, which was nearly two inches per day. Supplemental water for the lake came from groundwater pumped from a nearby well. In 2009 alone, 2.8 million gallons of supplemental water was pumped into the lake.

The village, civic groups and youth organizations were all concerned about degradation of this community resource and that it had become largely unusable to people in the area. Everyone recognized that a useable site would provide excellent outdoor educational opportunities for South Platte Public Schools students, as well as for family recreation. The village was also concerned about high

costs of pumping supplemental water into the lake.

Solutions ...

In 2009, Big Springs was approved for assistance through the CLEAR program. Given that the drainage area was mainly comprised of idle acres in grass, there was no watershed component to this project. Primary objectives for the project included removing 2,500 cubic yards of sediment, lake bottom contouring, nuisance tree and brush removal, shoreline shaping and planting, establishment of aquatic habitat and installing a liner to reduce seepage. The village also addressed access problems to facilitate use of this area by students and residents. The lake was stocked with bluegill, channel catfish and largemouth bass in 2010.

Results ...

With the project complete, the Village of Big Springs, in conjunction with local schools, will expand educational and recreational uses of the lake. Students will continue lake monitoring efforts that began before project construction. This will result in better understanding of watershed and lake management concepts and the potential impacts of nutrients and sediments found in runoff. The project was completed in 2010 at a cost of $204,000. Of this amount, $176,810 was provided through the CLEAR program and $27,305 was provided by Big Springs. Other project partners include the Panhandle Resource Conservation and Development District, and T.C. Engineering Inc.

HOSPITAL LAKE

Community ...

Hospital Lake was created from a borrow pit that was the result of the construction of a new healthcare campus for Columbus Community Hospital that broke ground in May 2000. The main feature of that project is a four-story, 153,000-square-foot building that was occupied in August 2002. The new lake became a home to migratory waterfowl and had gamefish in it, but the Nebraska Game and Parks Commission determined that they would not survive normal Nebraska winters due to the lake's shallowness.

Challenges ...

Because of its shallow depth, the lake didn't support much aquatic habitat and a lake management and education plan didn't exist. Lake access also was inadequate. Early on, its ownership was rededicated from the nonprofit Columbus Community Hospital to a public agency to make it more accessible for public fishing and recreation. Early problems with the lake included dense growth of nuisance vegetation and susceptibility to algae blooms because of depths ranging from one to seven feet. The lake is primarily supported by groundwater, as very little overland runoff reaches the lake.

Solutions ...

The lake's reconstruction under the CLEAR program began with excavating about 60,000 cubic yards of sediment to increase lake depth to as much as 12 feet. Much of that sediment was distributed along the lake's shoreline. The lakebed was sculpted to an irregular shape to provide

diverse aquatic habitat and the shoreline was shaped and sloped for vegetation and access. Existing rubble and trash were removed and the lake's inlet was reconstructed with corrugated metal pipes and a low flow liner. A handicap-accessible fishing deck was built into the south-east corner of the lake. Trails, connecting the park and lake to residential areas south and east of the lake were constructed and the Lower Loup NRD provided and planted small trees at the site to begin a landscaping program.

Results ...

Water quality monitoring of the lake in 2007 and 2009 indicated the reconstructed lake had good water clarity with low concentrations of nitrogen, phosphorus and algae. Largemouth bass and bluegill, which were in the lake before the reconstruction project began, have flourished since its completion; there are no carp or other rough fish in the lake. This two-year project was completed at a cost of $296,120. Project contributions come through the CLEAR program ($244,000) and community match ($52,120). Project partners included the City of Columbus, Lower Loup Natural Resources District, Columbus School District, Columbus Community Hospital and Kirkham Michael Consultants.

YOUTH RECREATIONAL LAKE

Community ...

Curtis Youth Recreational Lake is located on the southeast corner of town. The 1.7-acre lake was built by volunteer labor in 1992. The lake had an average depth of about three feet. Over the years, the city and local civic groups cooperated to have fish stocked and to build parking and walking facilities. The lake receives runoff water from a small rural/urban watershed. When needed, additional water is supplied by a nearby well. The lake has been used for fishing, as a family recreation area and for outdoor education by local schools and the local natural resources district.

Challenges ...

This small lake suffered from several problems, including high turbidity, algae blooms, lack of depth, and the lack of an outflow structure to control water levels. Water depths were the most significant problem, as maximum depths were only a few feet. All contributed to periodic fish kills. Seepage rates of about two inches per day in the summer also necessitated adding well water, which in 2006, come to an estimated 4.8 million gallons.

Solutions ...

After draining, about 19,360 cubic yards of sediment were removed from the lakebed, increasing depths to 10 feet. The lakebed was sculpted to an irregular shape to improve water quality and support fish habitat. Adding clay sealed the bottom. Excavated sediment was used as a base for a new city multi-use building. Shorelines were gradually sloped, covered with an erosion control blanket and seeded

with native grasses, including Prairie Cord grass. A cover crop was planted as intermediate care and for initial production of fish food. Cedar trees were also placed on the lake bottom for habitat. Wetland areas were constructed around the perimeter of the lake to filter stormwater runoff and an aeration system was installed to provide adequate dissolved oxygen for fish. When the project was completed, no vehicle traffic was allowed within 100 feet of the lake and steps were taken to keep trash and debris at bay.

Results ...

Post-project sampling showed dramatic reductions in sediment, phosphorus and nitrogen loading of the lake, resulting in big improvements in water quality. The seven-month project was completed in September 2007 at a cost of about $153,766. Of this, CLEAR contributed $99,339 while the city contributed $54,427. Other project partners included Medicine Valley Public Schools, Medicine Valley High School FFA, Middle Republican Natural Resources District and T.C. Engineering Inc.

DAVID CITY PARK LAKE

Community ...

A primary feature of David City's 12-acre public park, established in 1889, are two lakes with a combined surface area of about 6.3 acres. The park also features playgrounds, picnic shelters, basketball, tennis and volleyball courts, a campground, swimming pool, city football field and municipal auditorium. The lakes are fed by runoff from a 1,640-acre watershed comprised primarily of farmland. Sediment carried by this runoff gradually decreased depths of the lakes to about three feet, making them unsuitable for fishing and other recreational uses. In addition, shorelines of the lakes were covered with broken concrete, rocks, rubble and other debris, making access hazardous.

Challenges ...

Because of the deteriorating condition of the lakes, David City got a three-year grant from the Nebraska Environmental Trust for a project to remove sediment and restore shorelines. Project goals were to improve water quality, restore habitat and increase use of the lakes and park.

Solutions ...

The Natural Resources Conservation Service provided funds for 75 percent of the cost to build soil erosion controls for 200 acres of highly erodible land within the watershed. This cost, based on terracing and building a riparian conservation reserve, was about $53,124. The Lower Platte North Natural Resources District also committed $35,250 to fund 75 percent of key watershed treatment costs, plant trees, and build a sediment trap and trails.

In addition to other improvements within the watershed feeding the lakes, in-lake improvements included removing 40,000 cubic yards of sediment to increase depth from about three feet to between 12 and 15 feet. Some of the excavated soil was used by the golf course, in the park and for other community projects. Debris along 3,520 feet of shoreline was removed and the shoreline was shaped and sloped to support vegetation. About 500 feet was lined with riprap, the rest was armored with vegetative mat. Three bottom aerators were installed in each lake and lake level controls were added to allow the city to vary water levels by about two feet. The two high schools developed an open-air classroom curriculum focused on monitoring water quality in accordance with a lake management plan that was developed as part of the project.

Results ...

The three-year project was completed in May 2003 at a cost of $842,590. Project partners included the Lower Platte North Natural Resources District, U.S. Department of Agriculture's Natural Resources Conservation Service, Nebraska Department of Environmental Quality, University of Nebraska–Lincoln, Nebraska Game and Parks Commission, Butler County Roads Department, local businesses, David City Aquinas High School, David City Golf Course, City of David City, Jacobson Helgoth Consultants and owners of a private lake west of the park.

CRYSTAL SPRING LAKE

Community ...

Crystal Spring Lakes, near Fairbury, were built in 1934 in Crystal Spring Park. The lakes comprise a series of three borrow pits totaling about 18 surface acres. Though they do receive some surface runoff, the primary water source is groundwater; the springs are also the source of Fairbury's drinking water. Owned by the city, Crystal Spring Park has camping pads with electrical hookups, restrooms and showers, picnic shelters and playground equipment.

Challenges ...

Before 1978, external sources of sediment and nutrients to the lakes included overland runoff from adjacent pasture ground and floodwater from the Little Blue River. That year the city and the Little Blue Natural Resources District (LBNRD) shared costs to build a levy to protect the lakes, park area, and city wells from runoff and river floodwaters. With sediment and nutrient sources under control, Fairbury needed help restoring the lakes. During a water quality monitoring program in 1994, it was determined accumulated sediments had made the lakes too shallow, reduced water clarity and rendered the water too high in nutrients. Past floods had also damaged shorelines and these areas needed stabilizing to correct past erosion issues and prevent future shore damage.

Solutions ...

From 1994 to 2002, Fairbury received several grants to restore and renovate the lakes. Major contributors were Nebraska Environmental Trust Fund (NETF), Nebraska

Department of Environmental Quality (NDEQ), Little Blue NRD (LBNRD) and Nebraska Game and Parks Commission (NGPC). Renovation essentially occurred in three phases with the three lakes being rehabilitated one after another. They were dredged and reshaped, shorelines were seeded or stabilized with riprap, more than 280 trees were planted in the surrounding park, an aeration system was installed, and the lakes were stocked with channel catfish, largemouth bass and rainbow trout.

Results ...

In removing about 22,000 cubic yards of sediment from each lake, depths of at least 10 feet were achieved. Water clarity increased from eight inches before the project, to 36 inches afterward, a 350 percent improvement. Crystal Spring Lakes are now the site of youth fishing classes, fishing tournaments and camping. The entire project took about eight years and was funded through grants by the NETF ($224,000) and NDEQ ($30,000). Additional funding was provided by the NGPC, LBNRD and City of Fairbury.

JOHNSON LAKE

Community ...

Fremont's Johnson Lake began in 1983 as a dredged borrow pit for materials to build a Highway 275 railroad overpass. Eight years later the city acquired the 10-acre lake by trading land they owned to the state. The city later acquired additional properties to the south and west of the lake to build a multi-use use park that will eventually include an aquatic pool, miniature golf, softball diamonds and playground. The plan is for Johnson Lake to become an anchor to the park complex, complete with paddleboats, fishing, ice-skating and walking paths. The lake will also be next to a new middle school, which will make it a focal point for educational use.

Challenges ...

The lake can support fishing, but there were a number of issues needing to be resolved for that to happen. Fed by groundwater, the lake has a mean depth of nearly 15 feet and is more than 24 feet deep in some spots. Steep grades above and below the lake's surface raised safety concerns. Water clarity was excellent, but the lake bottom was flat and featureless.

The lake had been stocked with fish on several occasions but the stockings had limited success, partly because of a distinct thermocline about four feet below the water's surface. Below that point it is assumed there is little or no dissolved oxygen in the water, contributing to partial fish kills.

Solutions ...

CLEAR designed a project to include a fishery and to

remove water quality issues. The project targeted lack of spawning areas, lack of adequate access, lack of water circulation and lack of fish diversity. Also targeted was increasing spawning habitat by building a southerly leg on the lake with depths of four to seven feet, construction of a boat ramp and dock, beach and fishing pads.

Impairments were eliminated through a combination of structural and fisheries management changes, with the plan allowing for parking lots shared between the middle school, aquatic park and lake. Pedestrian paths connect the sites. Improvements were made while focusing on the lake's impairments as a fishery. Engineering services were provided by Schemmer Consultants.

Spawning areas were improved by creating three sand points and sand bars by pushing some of the sandy material excavated from the shallow, south expansion into the main lake. Building a concrete boat ramp and dock increased access. To solve the lake's low dissolved oxygen conditions, a submerged compressed air circulation system was installed to mix deeper portions of the lake.

Results ...

The one-year project was completed at a cost of $322,460. Of this amount, $274,592 was provided through CLEAR, $41,178 was provided by the City of Fremont, and $6,690 was provided by the Nebraska Game and Parks Commission.

FRIEND LAKE

Community ...

Friend Lake was created in the early 1970s as a 1.1-acre pond in a residential neighborhood on the south side of town. The lake sits just west of the golf course near the city's 10-acre park that has recreational and picnicking facilities. Over the years, the pond steadily accumulated sediment that reduced its maximum depth to less than four feet, which wasn't enough to ensure fish survival. It also promoted algae growth and unpleasant odors; Community concerns were that it would become a weed-filled marsh. Access to the shoreline also was hampered from lack of a permanent trail.

Challenges ...

In addition to stormwater runoff from a small drainage area, the city recharges the pond from one of its wells about once per month. Nonetheless, the pond's shoreline and inlet were weed-choked and only a few carp existed in the pond before project work began. In 2006 water sampling confirmed that phosphorus, nitrogen and chlorophyll were all high and water clarity was poor.

Solutions ...

Restoration plans for the lake, with help from the CLEAR program, were straightforward: eliminate the water quality and fishery impairment problems so the pond would once again be a place for community fishing and outdoor recreation pursuits. Project objectives were: 1. Maintain aquatic macrophyte coverage to less than 25 percent of surface area and reduce phosphorus, nitrogen and chlorophyll by at least 50 percent. 2. Increase lake depths to 10-12 feet across 25 percent of the pond, eight to 10 feet over another 25 percent

and eight feet or less over the remaining 50 percent. 3. Establish a healthy population of bass, bluegill and catfish. 4. Construct recreational trails and parking. 5. Use the project to educate the community on water quality issues and environmental stewardship.

Results ...

In November 2007 the lake was drained and that spring, excavation of sediment was completed to restore the pond to desired depths. Some of the removed sediment was placed in low-lying areas around the lake and shaped for future trail construction. Plans went ahead to build a walking trail around the lake, as well as off-street parking and a picnic shelter. To help control further sedimentation of the lake, a sediment basin was built on the west inlet side of the lake. About two acres around the pond have been seeded with grasses to control erosion. The Nebraska Game and Parks Commission stocked bluegill and largemouth bass and a fishing deck was built in the southeast corner of the lake. Local public schools are working with water quality programs at the University of Nebraska–Lincoln on comprehensive environmental stewardship education for local students, using the lake as a focal point.

Total cost of the one-year project, completed in June 2008, was $185,130. CLEAR contributed $98,100, while the community provided $87,030. Other project partners included the Friend Public Schools, Lower Big Blue Natural Resources District and Kirkham Michael Consultants.

SUCKS LAKE

Community ...

Grand Island's Sucks Lake was developed in the early 1950s from a sand and gravel operation owned by August A. Suck. In 1966, Sucks Lake and surrounding property were deeded to the City of Grand Island. Rainfall in the 296-acre watershed provides the only inflow to the lake, which has a surface area of about 3.3 acres.

Over time, Grand Island became more interested in the lake's recreational potential, leading the city to stock it with fish and build trails and park areas around it. Trails around the lake connect with the city's trail system, and the park area is used for picnicking and other family activities. The lake was used for fishing when it was productive.

Challenges ...

Over the years, sediment carried with stormwater runoff entered the lake, impairing water quality and decreasing depths. As a result, fish populations declined, winter fish kills occurred and the lake experienced algae blooms. The lake's shoreline also eroded, making the banks in many areas too steep for anglers to reach the shoreline. In other areas, the slope was too gradual for anglers to access the deeper water.

Solutions ...

In 2003, Grand Island received funding through the CLEAR program to restore the lake. The first phase of construction was to install storm sewer pipe, construct a dam, and build a detention cell at the east end of the lake. To prevent future runoff from impairing the lake, stormwater runoff was diverted to this detention cell and then directly into

the storm sewer system. The lake was dredged to remove accumulated sediment and organic material, which also restored depth. About 25,000 cubic yards of sediment were removed, increasing depth in shallow areas from two feet to 15 feet. There are 2,400 feet of shoreline around Sucks Lake; 300 feet was stabilized using vinyl sheet piling. The remainder was reshaped and seeded to reduce slope and decrease future erosion.

Results ...

This project expanded lake uses to include education via an outdoor classroom setting, ice-skating and improved fishing. The Nebraska Game and Parks Commission stocked the lake with largemouth bass, bluegill, rainbow trout and channel catfish. In conjunction with lake quality improvements, the city made many improvements to the surrounding park, including new playgrounds, picnic shelters, parking lots, a handicap-accessible fishing pier and restrooms. A decrease in turbidity and algae has resulted in outstanding water clarity, which allows for aquatic vegetation.

The 18-month project cost approximately $373,318 with $300,000 provided through the CLEAR program and $73,318 contributed by the community. Project partners included the Central Platte Natural Resources District and Olsson Associates Consulting.

The restored lake is ready for a variety of recreational activities.

HEARTWELL LAKE

Community ...

Prominent businessman J. B. Heartwell constructed Hastings' Heartwell Park and Lake in 1886 for his family and friends. It was generally open to the public and was unique in that it was designed by a landscape architect and was the region's first planned residential neighborhood to include landscaping as a vital component. It was abandoned in 1896 and used by local cold storage companies to cut blocks of ice out of the lake. In 1899, the City of Hastings purchased the 20-acre property, which included the park and lake. The lake was soon connected to the city's storm sewer system as a source of water.

Challenges ...

The lake has been difficult to maintain because of intermittent water flows. Water quality problems have resulted in documented fish kills in 1937, 1960, 1962, 1987 and 2001. Additionally, silt and garbage have been a constant problem and decreased depth due to sediment inflow results in annual lake-wide algae growth that is unhealthy for the lake and its inhabitants.

Solutions ...

Dredging the lake and collecting trash and sediment prior to entering the lake has kept algal blooms to a minimum and has slowed the sedimentation process at the lake. Continuous Deflective System (CDS) stormwater units were installed at the lake's south inlet points to effectively trap sediment and garbage before it enters the lake. This helps improve water quality. In addition, a public awareness campaign has helped decrease garbage, sediment and oil coming into the lake. The City of Hastings' public

awareness campaign placed “no dumping” decals along curbs of 245 of 416 storm drains leading to the lake.

Results ...

Installation of CDS units has helped prevent unsightly pollutants from entering the lake. Increasing lake depth has also improved lake water quality. Total cost of the dredging and CDS project was $405,133. Of this, the CLEAR program provided $254,550 while the Little Blue NRD provided $100,000 and the City contributed $50,583.

LAKEVIEW PARK LAKE

Community ...

In 1967, Henderson used a grant to buy 55 acres on the southwest edge of town for a park. Facilities include a swimming pool, tennis courts, picnic shelters, playground equipment and trails. It was named Lakeview Park in 1978. The park lake was built a year before that by damming Galloway Creek, a small creek running through the middle of the park. The original lake ranged in depth from two to 12 feet, and was approximately 2,400 feet long and 25 to 175 feet wide. The creek feeding the lake gets most of its water from precipitation and irrigation runoff water from 2,300 acres of farmland in the watershed.

Challenges ...

Over many years, sediment carried with runoff water built up in the lake, causing depths and water quality to decline. Shallow and turbid conditions made the lake unsuitable for fish and excess nutrients in the water resulted in recurring algae blooms. The lake was dredged in the mid-1980s to remove this sediment, but by 2003 it had built up again, indicating a need for more permanent solutions. Broken concrete blocks, originally used for shoreline stabilization, had become a safety hazard for lake users and made it difficult to get near the shoreline. Displacement of the blocks also caused shoreline erosion.

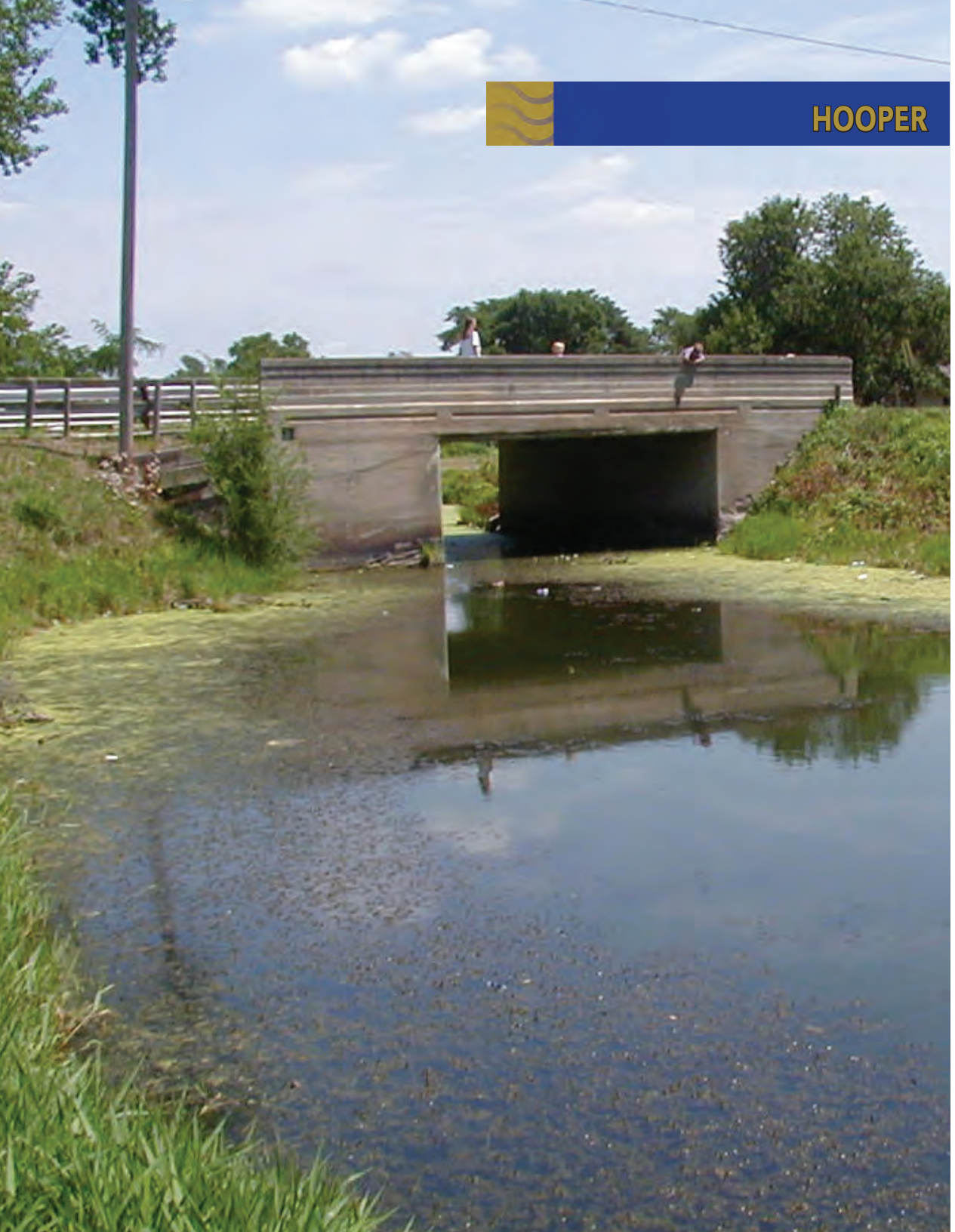
Solutions ...

In 2003, Henderson received funding from the CLEAR program. About 40,000 cubic yards of sediment were excavated from the lakebed making 55 percent of the lake at least eight feet deep. Concrete rubble was removed

from shorelines and replaced with permanent stabilization structures and vegetation to prevent future erosion. Fish habitat was improved with aquatic structures for spawning at various locations in the lake. To prevent future sedimentation, a three-acre sediment basin was constructed directly upstream of the lake. An underwater berm built at the upstream portion of the lake also acts as a sediment trap. Plant growth will be allowed in this area to help keep finer sediments from reaching the lake. It also provides habitat and food for the lake's aquatic life.

Results ...

The lake is now deep enough to support fish, and eroding shoreline areas have been stabilized. Structural measures have reduced the transport of sediment to the lake. The lake is stocked with largemouth bass, bluegill and channel catfish. Several other park improvements have also been completed. They include handicap access to the park and parking pads at the lake, widened and gently sloped sidewalks and paved fishing pads. The two-and-a-half year project cost approximately $380,000 with $300,000 provided from the CLEAR program, $60,000 from the community and $20,000 from the Upper Big Blue Natural Resources District. Consulting services were provided by EA Engineering, Science, and Technology, Inc.



HOOPER MEMORIAL PARK

Community ...

Hooper's Memorial Park includes a shallow muddy segment of an old river oxbow south of the Elkhorn River. It was built in the 1960s when a levee was constructed around the north side of Hooper that isolated an approximately 3,600-foot-long segment of the oxbow within the city. The "Old Lake Restoration Project" presented the city with an opportunity to enhance its recreational facilities and expand an important community asset for residents and visitors.

Challenges ...

The oxbow collects stormwater from the area between the levee and railroad tracks to the south. The city had dredged the oxbow in the past, but a steady accumulation of sediment continually reduced lake depths to two feet. Shallow depths made the water unsuitable for fish survival and nutrients from the stormwater promoted algae growth and unpleasant odors. The city treated the lake with copper sulfate to kill vegetation and algae but treatments were unsuccessful.

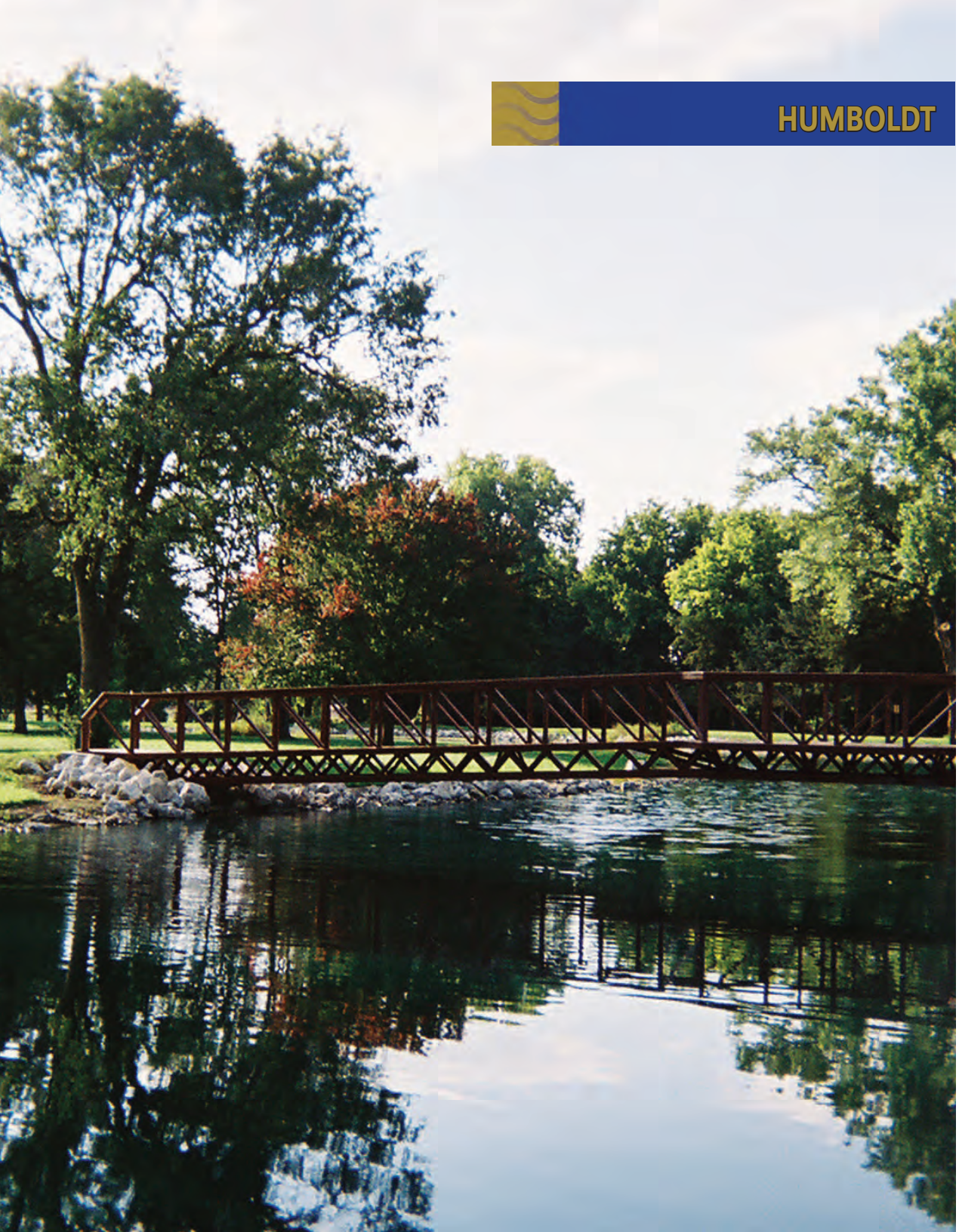
Solutions ...

In 2007, Hooper was approved for funding through the CLEAR program. Hooper's Old Lake Restoration project started after the lake was pumped to allow for more efficient excavation of sediments. Suitable side slopes and shallow areas between three jetties were established along the north side of the lake to accommodate plant introduction and enhance wetlands. The lake was excavated to a depth of 12 feet over an area constituting

approximately 25 percent of the surface area, to a depth of eight to 10 feet across another 25 percent of the lake, and to a depth of eight feet or less across the remaining 50 percent of the lake. Handicap access was provided and the lake was stocked with largemouth bass, bluegill and channel catfish. The local University of Nebraska–Lincoln Extension office demonstrated water testing and lake maintenance to local students.

Results ...

Once the restoration work was completed in September 2008, the water level raised about 1.5 feet above pre-restoration levels due to closed springs being re-opened. Residents remain supportive of the work. The city has held a clean-up day to remove glass and other debris from the area. Total project cost was $252,980 with $211,140 coming through the CLEAR program and local funding provided $41,740. Engineering Services were provided by Kirkham Michael Consultants.



HUMBOLDT

SOUTH PARK LAKES

Community ...

The Civilian Conservation Corps built Humboldt's South Park Lakes in the Depression years of the 1930s. The lakes have been popular for picnicking, fishing and camping for many decades since. West and East lakes cover two and one surface acres, respectively. Other park features include playground equipment, baseball diamonds, tennis and basketball courts, horseshoe pits, an outdoor heated swimming pool, restrooms, picnic tables and shelters, and 12 camper sites with electrical hookups.

Challenges ...

Before 1999 the lakes were only three to five feet deep with four to six feet of sediment having accumulated over the years. Shorelines were in poor condition and surrounding areas needed landscaping to prevent more sediment runoff into the lake. Sediments had also turned the water turbid, with clarity of only seven to 10 inches.

Solutions ...

In 1999 Humboldt received funding from the Nebraska Environmental Trust Fund (NETF) to dredge the West Lake and in 2000 received a grant from the Nebraska Department of Environmental Quality(NDEQ)/U.S. Environmental Protection Agency (EPA) for further renovations to the lakes. Phase 1, to remove sediment from the bottom of West Lake, was completed in 1999. Depths increased from three to five feet, to seven to 11 feet over at least 25 percent of the lake. The lake was also re-contoured and

re-graded. An attempt was made to reuse existing riprap and shoreline stabilization techniques, but there were still 200 feet of unprotected shoreline that had already started eroding. Grant funds provided new riprap for improved stabilization of these areas. A handicap fishing pier was added and a 90-foot pedestrian bridge was built across the lake using community funds.

Results ...

Lake dredging improved water clarity from seven to 10 inches to more than 24 inches. With shorelines stabilized, future sedimentation should be minimized. Improvements to South Park Lakes restored aquatic habitat for a viable fishery, which consists of largemouth bass, bluegill and channel catfish. The total cost of this project was $67,664 with $37,000 provided by the NETF, NDEQ and EPA, and $30,387 provided by the community. The U.S. Department of Agriculture's Natural Resources Conservation Service and Southeast Nebraska Development District provided technical expertise for the project.

BOWLING LAKE

Community ...

Bowling Lake and park are near NW 48th and West Cumming streets, in the northwest corner of the Lincoln Airport. The lake and surrounding property are owned by the Lincoln Airport Authority and leased to the City of Lincoln. The lake was originally constructed for water skiing and recreation by U.S. Air Force personnel who were stationed at the former Lincoln Air Base. It is now used for fishing, picnicking, hiking, wildlife viewing, non-motorized boating, ice-skating and special events.

Challenges ...

Bowling Lake is isolated by a man-made dike from an adjacent unnamed intermittent stream that drains approximately 750 acres of prairie into Oak Creek. However, this drainage, were it to be diverted into the lake, does not have enough water to maintain the lake at its basic, conservation pool level. That has led to lake water levels being maintained by additional mechanical pumping from nearby Oak Creek. Unfortunately, this pump lacked a screening device to prevent unwanted fish from entering Bowling Lake. Due to the lake's overall shallowness, fish kills had been documented five times. Shoreline erosion from wind-generated waves also inhibited growth of aquatic macrophytes by scouring and shading.

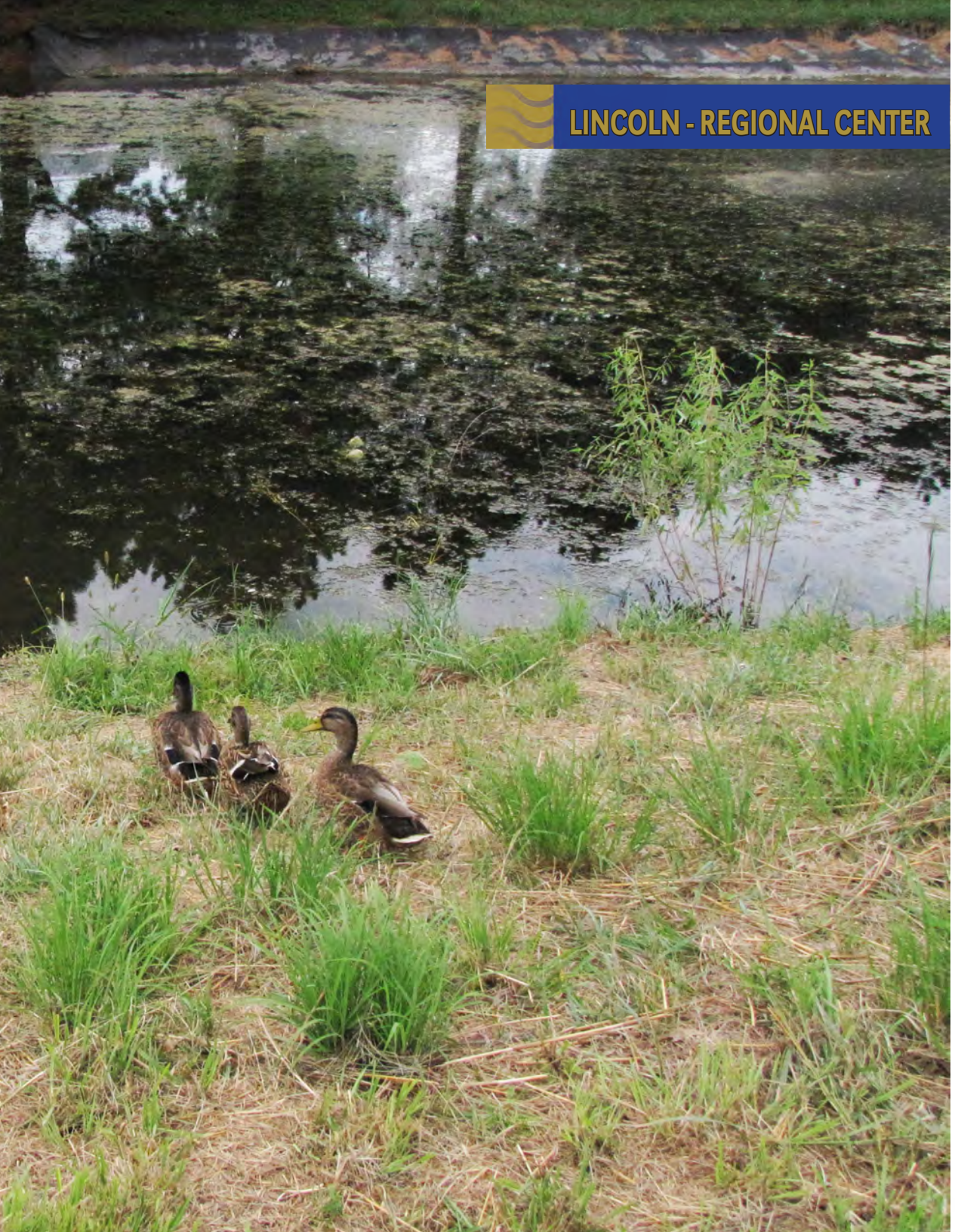
Solutions ...

The Bowling Lake Aquatic Habitat Rehabilitation Project, coordinated by the Nebraska Game and Parks Commission, was implemented in two phases. Phase 1 involved excavating 120,000 cubic yards of sediment from the lake basin and adjacent pond. Phase 2 involved the excavation

and relocation of 83,000 cubic yards of additional sediment from the lake basin. This was accomplished during the process of reshaping banks to improve angler access, stabilizing shorelines, constructing a second access to the island and further deepening the lake. A fish screen was also installed as part of the new pump system to prevent the introduction of rough fish from the stream.

Results ...

As a result of the two construction phases, 76 acre-feet of sediment were permanently removed from the basin, increasing the lake's volume from a pre-construction total of 125 acre-feet to a post construction total of 201 acre-feet. Further, eight acres of the main lake were now 10 feet or more in depth, and 2.1 acres of the adjacent pond exceeded 10-foot depths. Vegetation coverage was increased to 25 percent of the surface area, average summer chlorophyll concentrations and pH levels were lowered. The project was completed at a cost of $833,076. Funding sources contributing to the project include Nebraska Game and Parks Commission, Nebraska Environmental Trust Fund, Nebraska Department of Environmental Quality and the U.S. Environmental Protection Agency. Engineering Services were provided by the Flatwater Group, Inc.



REGIONAL CENTER LAKE

Community ...

Southwest Lincoln's public Regional Center Lake is on Lincoln Regional Center grounds operated by the Nebraska Health and Human Services System. The lake, which is less than one surface acre, is supplied primarily by runoff from a small watershed area. Supplemental water is periodically added to the lake from a potable water line. The lake has historically been used for fishing and picnicking.

Challenges ...

Over the years, sediment had steadily built up in the lake from shoreline erosion and storm-water runoff, decreasing overall lake depth and water clarity. By 2002 maximum lake depth had declined from 14 feet to 5.5 feet. Shorelines had eroded in several places; Areas that had previously been stabilized with riprap were in disrepair and had become a hazard to anyone attempting to get close to the water's edge. Accumulated sediments impaired water clarity, making it difficult for sight-feeding fish to survive and for aquatic vegetation to thrive. These conditions also increased algae blooms and nearly eliminated the fish. The lake also lost water from seepage due to deposits of sand and gravel in the lakebed. This made it necessary to periodically add water using the potable water supply to maintain water levels.

Solutions ...

In 2002, the Nebraska Health and Human Services System received CLEAR funding to restore the lake. About 3,700 cubic yards of sediment were removed from the lakebed, leaving roughly 7 percent of the lake 10 feet deep, 23 percent eight feet deep and 44 percent at least four feet deep. A clay liner was built along the lake bottom and side slopes to reduce water seepage. Shorelines were reshaped and old riprap was removed. Shorelines were stabilized with a permanent turf reinforcement matrix and seeded with water-tolerant plants. Weed barriers were placed intermittently along the shoreline to provide open access for fishing. Fish habitat was improved by adding underwater aquatic habitat structures. When the renovations were finished the lake was restocked with largemouth bass, bluegill and channel catfish.

Results ...

Increasing depth, clarity and spawning areas made the Lincoln Regional Center Lake a sustainable fisheries environment for anglers. In addition to water quality, removing riprap and adding shoreline landscaping also improved aesthetics. Drinking water will also be conserved now that less will be needed to maintain lake water levels. The cost of the project was approximately $79,000. Of this, $67,000 was provided through the CLEAR program, and the Nebraska Department of Health and Human Services provided $12,000. Engineering services were provided by EA Engineering, Science, and Technology, Inc.

BARNETT POND SYSTEM

Community ...

McCook's Barnett Pond System was created in 1956 to supply gravel for local construction projects. The ponds were stocked with game fish which did well until recent years. As sedimentation increased, the natural springs provided very little fresh water to the ponds.

Challenges ...

Maximum pond depths of six feet were poor conditions for fish to survive cold winter and hot summer months. The fish that did survive were mainly rough fish such as carp and bullheads. Additionally, high populations of waterfowl were detrimental to water quality which was facilitated by the city starting a feeding program to entice migratory birds to the area.

Solutions ...

Based on recommendations from state officials, dredging resulted in some 10-12 foot depths in the pond, while some shallows were maintained for spawning. The U.S. Department of Agriculture's Natural Resources Conservation Service located natural springs, which were focus areas for sediment removal. Existing fish were eliminated prior to dredging. A bank stabilization program was also implemented to decrease sedimentation and improve access for people of all ages and physical abilities. After project completion, the pond was stocked with largemouth bass, bluegill and channel catfish.

Results ...

The lake renovation has provided recreational opportunities within walking distance of McCook. Area students researched methods to decrease geese populations, and as students work with the community and cooperating agencies, they will problem-solve using wise environmental restoration decisions. They will learn the effects every decision has on the biological diversity of the environment through hands-on experiences in this newly established outdoor classroom. Educational activities are centered around the changes in water quality, changes in geese populations and future recreation management. Information will be used to promote environmental awareness and conservation in the community. The project was completed at a cost of $243,274. Of this amount, $226,874 was provided through the CLEAR program while the City contributed $16,400.

STEINHART PARK

Community ...

Nebraska City's Steinhart Park is the city's largest and most-used park. About 54.4 acres in size, it features baseball diamonds, basketball and tennis courts, horseshoe pits, outdoor ice skating rink, playgrounds, restrooms, a shelter, sledding slide and swimming pool. In the early 1900s, a 1.6-acre pond was created on site by building an earthen dam.

Challenges ...

By 2000, the maximum depth of the pond was just five feet. To prevent winter fish kills, a fountain was installed to prevent freezing. The fountain was only a temporary solution to the depth problem. More intensive modifications were needed to make the pond sustainable for fish and to prevent sediment from further decreasing depth. Modifications to areas surrounding the pond were needed, as well. Much of the shoreline was too steep, with several near-vertical drop-offs of six to 10 feet. These steep areas had eroded, impairing water clarity and creating a safety hazard for those accessing the pond.

Solutions ...

In 2000, funding to restore the pond was received through the CLEAR program. To create a more sustainable fishery, the pond was excavated to depths of 12 feet over approximately half its area. More than 9,000 cubic yards of sediment were removed to achieve these depths. In conjunction with renovating the pond bottom, 600 hundred feet of shoreline was stabilized using 280 tons of rock, 490 linear feet of sheet piling and two retaining

walls. Some steep areas were graded to decrease slope, providing the added benefit of expanding the pond surface area from 1.6 acres to two acres. All surrounding land was seeded to native grasses to help prevent soil erosion. The final project step was stocking largemouth bass, bluegill, channel catfish and rainbow trout.

Results ...

Water quality improvements paved the way for other improvements to the area, including a handicap-accessible fishing pier and extensive landscaping by TreesAmerica. The revitalized pond is now used more for a multitude of recreational purposes and community events. The total cost of the two-year project was approximately $230,000. Of this amount, $172,000 was provided by the CLEAR program, $45,000 was provided by Nebraska City, $2,000 was provided by the Nemaha Natural Resources District, and $2,000 was provided by the Nebraska Game and Parks Commission. Other project partners include TreesAmerica, The American Meter Company, and the Richard P. Kimmel and Laurene Kimmel Foundation. Engineering services were provided by JEO Consultants.

TA-HA-ZOUKA AND SKYVIEW LAKES

Community ...

Norfolk's two public lakes, Ta-Ha-Zouka Park Lake and Skyview Lake, are both used extensively. Ta-Ha-Zouka was established in 1936 as part of a park development project during the Depression. Skyview Lake is a 50-surface-acre reservoir located within Norfolk's city limits. It was built in 1971 for flood control and recreation purposes.

Challenges ...

While water quality at Skyview Lake had been good historically, sedimentation and nutrient loading were degrading the lake. Trend assessments indicated lake nutrients were increasing, more algae was growing and water clarity was decreasing. Water quality problems at Ta-Ha-Zouka Park Lake had been deteriorating for years due to poor dissolved oxygen and shallow depths that contributed to excessive weed growth.

Solutions ...

In 1995, public concerns regarding the impact of watershed development on water quality at Skyview Lake led the city and Lower Elkhorn Natural Resource District (LENRD) into discussions with the USDA-Natural Resources Conservation Service (USDA-NRCS), Nebraska Game and Parks Commission (NGPC) and Nebraska Department of Environmental Quality (NDEQ). The main focus of these discussions was the construction of a two-acre wetland area above the lake. The wetland complex was

designed by the USDA and constructed by the LENRD in 1997. In 2004, the City of Norfolk leveraged funds dedicated to the renovation of Ta-Ha-Zouka Park Lake to secure USEPA/NDEQ funding to renovate Skyview Lake. Both lakes were completely drained. Over 30,000 cubic yards of sediment were removed from Ta-Ha-Zouka Park Lake and more than 35,000 cubic yards were removed from Skyview Lake. Additional work included aeration systems at Ta-Ha-Zouka Park Lake and shoreline protection jetties at Skyview. The NGPC stocked game fish in both lakes.

Results ...

The constructed wetland above Skyview Lake has reduced sedimentation by 65 percent and phosphorus loading by 45 percent. The removal of sediment and other enhancements have improved water quality and recreational opportunities at both lakes. The total cost of these projects was approximately $401,462. Of this amount, $200,000 was provided by the City of Norfolk, NDEQ and EPA contributed $160,000, the NRD provided $34,500 and $6,963 came from the NGPC.

HUMPHREYS POND

Community ...

Humphreys Pond was originally a sand pit that filled with groundwater. In 1992, the Ira Humphreys' Estate was deeded to the Ogallala Optimists Club with the agreement the pond would be named Humphreys Pond. Since that time, the Optimists have been responsible for maintenance and upkeep of this one-acre pond.

Challenges ...

The Optimists got involved with the pond because they noticed area youth were using it for recreation and fishing. After 10 years of failed attempts to establish a fishery it was obvious the pond needed some improvement. The primary problems facing the pond were shallow depths and nuisance vegetation in and around the pond. Shallow depths were attributed to sedimentation from stormwater drainage, which included development areas north of the pond, as well as stormwater drainage entering the pond from the ditch along Union Pacific Railroad tracks that run alongside the pond. Due to the sandy nature of the soils, the pond had ongoing problems with bank erosion.

Solutions ...

The construction phase of the Humphreys Pond restoration project began in summer 2008 with removal of all trees and shrubs. Next, excavation began. Silt taken from the lake was deposited on the pond's south bank and on the large park area to its east to build up those areas to help with containment and accessibility. The pond was dredged to an average depth of 10 to 12 feet, doubling

the previous depth. One of the more important components of the project was the construction of a wetland area on the perimeter of the lake to filter stormwater.

Results ...

In 2009 the project was completed and the pond was stocked with bluegill, largemouth bass and channel catfish. Additional stockings of rainbow trout have been enjoyed by the public. The pond is now used extensively and several schools have adopted this site as an outdoor classroom. After the CLEAR project was completed, a Community Enhancement Program grant was obtained to plant native trees and shrubs. Local Boy Scouts provided three picnic tables and two small barbecues, and a local Girl Scout troop constructed a butterfly garden. Total project cost was $267,082. Of this, CLEAR funds provided $224,425 and the City of Ogallala provided $42,657. Consultant services were provided by Tagge Engineering.

AUBLE LAKE

Community ...

Local entrepreneurs Galen and Jay Auble developed Auble Lake in 1962. Nine years later they sold six acres of land, including the pond, to the City of Ord. The pond has a surface area of about three acres and was originally five feet deep with sloping banks for wading. Park facilities include football and baseball fields; a swimming pool; campgrounds; covered picnic shelters; tennis, basketball and sand volleyball courts; playground equipment; and restrooms with showers. Ord executed a comprehensive plan to improve the park and recreation facilities through a grassroots effort led by local students. The rehabilitation of Auble Lake became the plan's cornerstone.

Challenges ...

Before renovation, Auble Lake's maximum depth was four feet. Partly because of this, the pond had poor water clarity, substantial algae growth and high nutrient concentrations. The overall poor water quality stunted aquatic vegetation and kept the pond from supporting fish populations. In addition to water quality problems, it was seeping approximately 4.5 million gallons of water per year into nearby Dane Creek, requiring significant recharge from city wells.

Solutions ...

In 2001, lake restoration funds were received through the CLEAR program. The plan for the pond focused on bed reconstruction, shoreline repair, bottom sealing, outlet replacement, and enhancement and education. About 19,000 cubic yards of sediment were removed from the

pond, increasing average depth by eight to 10 feet. The pond bed was sculpted into an irregular shape to enhance conditions for aquatic life, and a submerged island was constructed five feet deep and layered with pea gravel for fish spawning. Shorelines were reshaped and sloped to support vegetation and stabilized with matting and rock. The pond's bottom and shore were lined to reduce seepage. A water level control system was installed to monitor and adjust elevation of the pond, along with a gate valve and discharge pipe for draining overflows into Dane Creek. A management and education plan was developed for the pond, which will be used as a guide for Ord High School students.

Results ...

The project brought significant water quality improvements. Turbidity decreased by 95 percent, phosphorus by 86 percent and nitrogen by 74 percent. The turbidity decrease allowed for aquatic plants to grow that will provide habitat, uptake nutrients and help stabilize shorelines. The pond was restocked with largemouth bass, bluegill and channel catfish. Approximate cost of the 18-month project was $319,000; $270,000 from CLEAR and $49,000 from the City of Ord. Other project partners include Ord Junior/Senior High School, Ord Elementary School, Ord Jaycees, Lower Loup Natural Resources District, Loup Basin Resource Conservation and Development District, and Jacobson Helgoth Consultants.

CLEAR project leader Elbert Traylor of the Nebraska Department of Environmental Quality speaks at dedication activities for the restored lake.

OXFORD PARK POND

Community ...

A 1933 petition to the Oxford village board requested an area south of town be developed into a public park. That petition, with 125 signatures, was offered by "The Oxford Wednesday Club." In July 1934, Ordinance 67 passed, creating Oxford Park. In early 1938 a street improvement project requiring an immense amount of gravel was underway and the village decided to create a quarry in the newly established park to provide it. The original excavation was 345 feet across and up to 26 feet deep; that excavation later became known as the Oxford Park Pond.

Challenges ...

The park sees extensive public use. People congregate in the area to enjoy a multitude of outdoor activities, including fishing. The baseball/softball field supports many games throughout the season, including soccer games. Picnicking areas see lots of use all year and green space supports activities such as walking, horseshoes and many others. Oxford Park has a picnic shelter, disc golf course, playground, RV Park with electricity and water, restrooms, concession stand and portable toilets.

Oxford Park Pond had water quality problems from shoreline erosion, algae and flood water intrusion. Erosion and intrusion of Republican River flood waters led to sediment accumulation and nutrient loading, which caused problems with shallow depths, turbidity, algae blooms and loss of aquatic habitat.

Solutions ...

In 2009 the village got assistance through the Community Lake Enhancement And Restoration (CLEAR) Program. Pond and drainage area improvements that have been completed include construction of a berm to protect the pond from flood waters; excavation to remove nutrient loaded sediment and increase depth; bank grooming and shaping to stabilize banks and provide angler access; construction of a rock jetty for fish habitat and shoreline stabilization; construction of a handicap ramp and fishing pier for expanded public access; and pond edge seeding/mulching to stabilize the shoreline and provide fish habitat. Additional improvements by the City included replacement of scrub trees with multiple tree species to diversify the local ecosystem, construction of a gravel roadway to increase accessibility and construction of an improved boat ramp to accommodate fish stocking.

Results ...

The project was completed in summer 2011 for approximately $307,000. Water quality data has yet to be collected, but improvements are visible. Water clarity has increased to more than 30 inches. Improvements will provide an excellent outdoor classroom for students in addition to providing quality outdoor experiences for all park and pond users. Engineering services were provided by Olsson Associates.

HALLECK PARK

Community ...

Halleck Park in Papillion is a 102-acre park with a small lake in the east-central part of the city. It has been a part of Papillion for more than 30 years, beginning as a small fishing lake in the 1970s in the eastern portion of the park. The lake was periodically stocked with game fish and its surrounding area saw extensive public use. Halleck Park facilities now include picnic shelters with grills and electrical outlets, play equipment, metropolitan area trail systems, horseshoe and tennis courts, lighted athletic fields, concessions and limited camping.

Challenges ...

Shoreline erosion and algae growth began affecting Halleck Park Lake's water quality. Sediment accumulation made the lake shallow, resulting in turbid water and poor conditions for aquatic life. Geese and ducks contributed to the problems by adding nutrients that lead to excessive algae growth.

Solutions ...

The City of Papillion developed a park and recreation plan in 2003. Through extensive community input it was determined that the renovation of the lake, arboretum and picnicking facilities were the most popular public recommendations. In April 2006, Halleck Park Lake was excavated to create two areas covering approximately 25 percent of the lake to a depth of 12 feet. The remaining portion of the lake was excavated to about eight feet and the lake's overall surface area was expanded.

Bentonite, commonly used to seal abandoned water wells, was mixed into the soil, helping to seal the lake bottom and minimize seepage. Multiple fishing points with a variety of shoreline features were created along the lake to reduce erosion. Rock edging, hard edge lake walls and sections vegetated with plants such as Broadleaf Arrowhead, Green Stem Bulrush and Blue Flag Iris helped prevent erosion and create habitat. To help decrease algae growth, nutrient loaded sediment was removed from the lake, placed in a green space east of the lake and vegetated. Also as part of this project, an additional section of trail and boat ramp was installed to aid in fish stocking and aquatic surveys. Six educational sign pedestals were installed around the lake, with content including current fishing regulations and identification of bird species commonly found in the park.

Results ...

The Halleck Park Lake Restoration and Enhancement project expanded the existing shallow lake into an aesthetically pleasing lake capable of supporting a number of different fish species. The project resulted in drastic water quality improvements, including an 80 percent decrease in phosphorus, 58 percent decrease in nitrogen and 96 percent decrease in turbidity. Total project cost was approximately $861,206 with $300,000 being provided through the CLEAR program and $561,206 matching funds from the City of Papillion. Engineering Services were provided by Thompson, Dreessen and Dorner, Inc.

PAWNEE CITY POND

Community ...

Pawnee City's Pond has been a recreational resource for local citizens for more than 50 years. The two-acre, well-fed pond is within walking distance of town and is valued for fishing, picnicking and other recreation. It is bordered to the southwest by Turkey Creek, and it is thought that it originated as a borrow pit for highway bridge approaches over the creek.

Challenges ...

In 2001, the maximum depth of the pond was only four to six feet, which is inadequate to maintain high enough water quality to support fish. Most of the sediment in the pond originated from the shorelines that were steep and unvegetated. The park also needed equipment and facilities including handicap accessibility, camper pads, electrical hook-ups, grills, benches and a restroom.

Solutions ...

In 2001, Pawnee City received pond restoration funding through the CLEAR program. The project's initial phase required digging a trench to Turkey Creek to drain the pond. Once drained, about 15,000 cubic yards of sediment were removed, resulting in an average depth increase of eight feet. Once excess sediment was removed, the banks were reshaped and vegetated, shorelines were stabilized with rock, handicap-accessi-

ble fishing accommodations were added, and the pond was restocked with fish.

Results ...

Rough dimensions of the pond increased from 200 feet by 400 feet to 250 feet by 450 feet after dredging and reshaping the banks. Fourteen aquatic habitat structures were added to the pond's bottom. It was stocked with largemouth bass, crappie, bluegill and channel catfish, which are restocked annually. There is a new handicap-accessible fishing pier, picnic shelter, access road and six new camping pads. Each pad has electrical hookups, fire rings and picnic tables. This project significantly improved water clarity, which increased from 16 inches to over 60 inches. When the project was finished, Pawnee City held a "Name the Pond" contest. The winner reflects a combination of the nature of the natural resource and the city it serves: The Pawnderosa. The total cost of the project was approximately $101,750. Of this amount the CLEAR program provided $87,875 and the city provided $12,875.

Elbert Traylor (left) of the Nebraska Department of Environmental Quality presents Pawnee City officials with a project start-up check.

PLATTSMOUTH CITY LAKE

Community ...

Plattsmouth City Lake is about a half mile northeast of the junction of highways 75/34 and 66. The lake was built by the U.S. Department of Agriculture's Natural Resources Conservation Service for flood control in 1959. It was designed to cover about four surface acres and have a maximum depth of approximately 12 feet. Land use within the pond's 204-acre watershed is mainly agricultural with transportation corridors, light industry, woodlands and residences. There is a one-acre wetland upstream of the lake serving as a filter for stormwater and as habitat for a variety of animal and plant species. The lake and dam areas are owned by the City of Plattsmouth, with public access for fishing and recreation.

Challenges ...

Use of the lake and surrounding area declined over the years due to limited site access and poor water quality. Water quality impairments were mainly due to reduced lake depths from sedimentation. These accumulated sediments are believed to derive mainly from land disturbances related to area construction in the 1960s and 1970s.

Solutions ...

In 1999, Plattsmouth and the Lower Platte South Natural Resources District received funding from the Nebraska Department of Environmental Quality's Community Lakes Restoration Assistance (CLaRA) program to renovate the lake. The first phase of the renovation was to drain the lake to remove about 26,000 cubic yards

of sediment from the lake bottom. The next step was stabilizing shorelines to prevent future erosion. Approximately 200 linear feet was stabilized using rock riprap and the remainder of the shoreline was seeded, mulched or protected with erosion control blankets. The city also developed a trail around the site, improved lake access and added a handicap-accessible fishing dock.

Results ...

The project resulted in better water quality. Conditions are now more suitable for fish and other aquatic life, in addition to being more aesthetically pleasing. This has increased public use significantly. After renovation the lake was stocked with largemouth bass, bluegill and channel catfish. The total cost of the project was approximately $158,500. Of this amount, $90,000 was provided by the Nebraska Department of Environmental Quality/U.S. Environmental Protection Agency. The community, Lower Platte South NRD, and Nebraska Game and Parks Commission contributed $68,500.

INDIAN CREEK FISHING POND

Community ...

Indian Creek Fishing Pond is located one mile south of Red Cloud on the north side of the Republican River. The river's historic "Flood of 1935" created the pond when a barn was lodged in some trees and fast moving water scoured out the land around the barn. The pond was three to four feet deep, spanned 1.2 acres, and had an excellent groundwater flow, which provided fresh water recharge from the north.

Challenges ...

Previously privately owned, Indian Creek Pond is now solely owned by the Nebraska Game and Parks Commission, which also provides regular upkeep and fish stocking. While the pond has been open to the public for uses such as fishing, it had very little use due to the poor fishery. In addition, the primary problem with the fishery was pond depth. Recreation for youth is limited in the rural community. The closest fishing area to Red Cloud is Guide Rock, eight miles away. The City of Red Cloud thought Indian Creek Pond, located only three-fourths of a mile from the city, could fulfill these recreational needs.

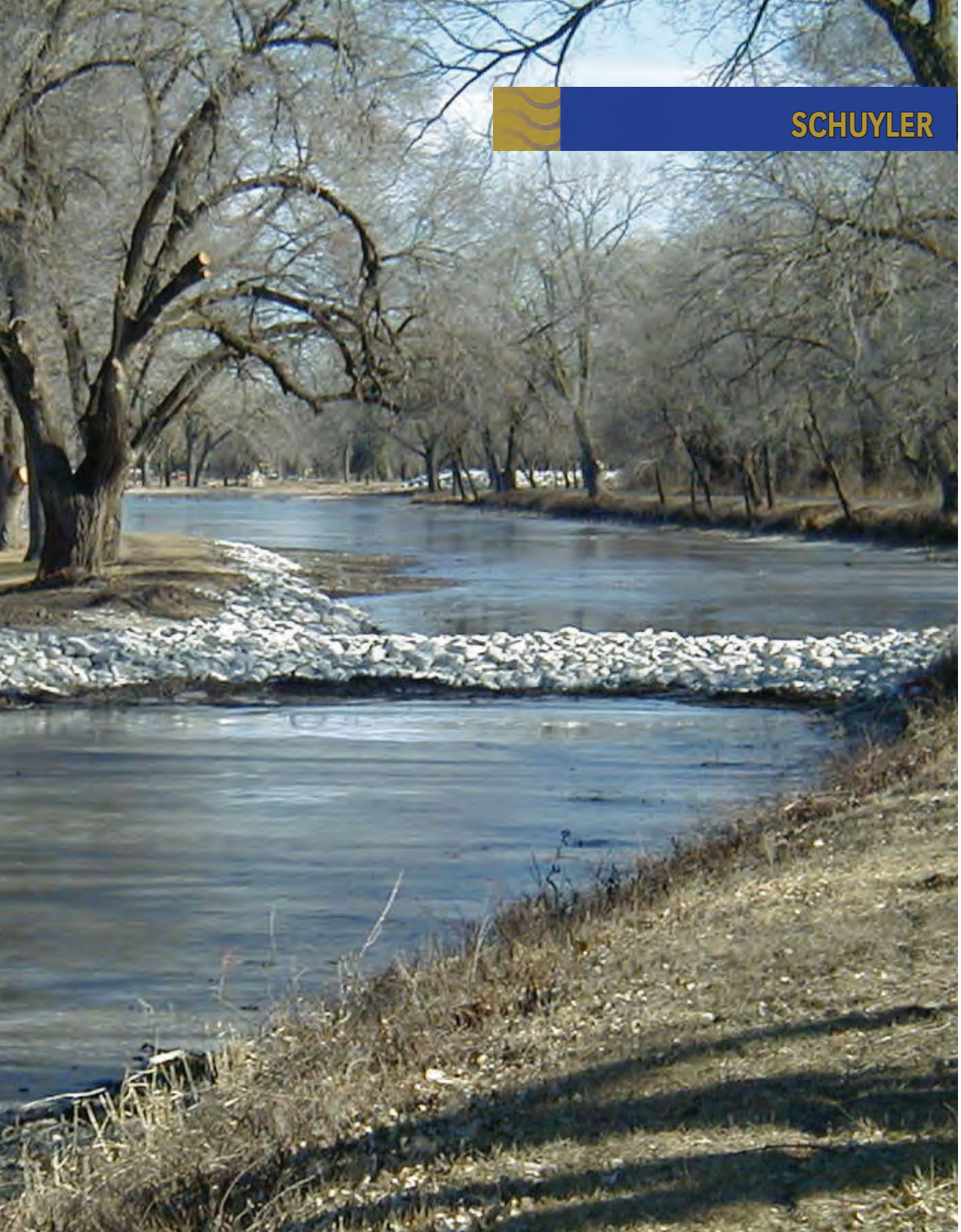
Solutions ...

The Natural Resources Conservation Service provided engineering expertise to prepare a survey grid of the pond area. The Trailblazer Resource Conservation & Development District developed bid specifications, put the project out for bid and oversaw contracted construction. Unwanted trees and shrubs on the pond perimeter were removed before excavation, while several larger trees

were left for shade. At Nebraska Game and Parks Commission request, Indian Creek Pond was excavated so that it was at least 10 feet deep over one-fourth of the surface area. Making the pond deeper increases inflow of fresh groundwater into the pond and helps make it fish supporting. Irregular shoreline contours and leaving the bottom of the pond rough enhance fish habitat.

Results ...

Once depth was restored, the Nebraska Game and Parks Commission stocked the pond with bluegill, largemouth bass and channel catfish. Lake and wetland excavation was completed according to Nebraska Game and Parks Commission recommendations, which allow Indian Creek Fishing Pond to sustain these fish. This one-year project was completed at a cost of $27,340, with $15,000 coming from the Nebraska Department of Environmental Quality/U.S. Environmental Protection Agency and $12,340 provided by Red Cloud.



SOUTH PARK LAKE

Community ...

Schuyler's 91-acre South Park area includes a golf course, swimming pool, picnic and playground areas, softball and baseball diamonds, and a campground. The 13.6-acre lake is directly south of Schuyler's historic Oak Ball Room. The lake had its beginnings as a federal Work Projects Administration (WPA) project in the 1930s as a dredged borrow pit. A bathhouse and clubhouse were built at the park in 1937.

Challenges ...

For more than 20 years, stream overflow that once fed the lake no longer reached it, requiring a city well to periodically supplement lake water. Overflow in times of heavy precipitation meant discharges to Lost Creek. Over the years, lake water quality had continued to degrade, evident by the odor and color of the lake and occasional fish kills.

Solutions ...

With help from CLEAR, Schuyler set about returning the lake to its former glory. The focus of the lake restoration project targeted water quality, identifying the lack of water circulation, lack of fishery habitat and shallow depths as primary problems. The city also worked with local schools to promote educational activities centered on the lake. Water quality was improved by installing a new 800-gallon-per-minute well near the west end of the lake. Also, rock riprap was placed on part of the lake bank for stabilization, rock reefs and fishing jetties were installed, and aeration was installed in the lake to

improve dissolved oxygen concentrations. Riprap waterfalls were created in a narrow portion of the lake to help with aeration and bank stabilization. After the project was complete, phosphorus levels dropped dramatically, as did algae densities. Nitrogen levels were still high, due to high groundwater concentrations of nitrogen in well water used to feed the lake. The project was completed in 2006.

Results ...

Total cost of the eight-month project was approximately $143,280. Of that amount, funding via CLEAR totaled $115,280 and $28,000 in cash and in-kind services came from the community. Schuyler Public Schools co-sponsored the project. Engineering services were provided by JEO Consultants.

SOUTH SIOUX CITY

CRYSTAL COVE LAKE

Community ...

South Sioux City's Crystal Cove Lake is a 30-acre sandpit lake similar to many along the Platte and Missouri Rivers in Nebraska. It exhibited relatively good water clarity, had steep slopes from shallow to deeper water and was heavily used for recreation and fishing. It did, however, become choked with rooted aquatic plants that annually occur at high enough levels to limit recreation and stunt sport fish populations. Because of this, Crystal Cove became a candidate for bottom barrier treatments to reduce aquatic plant growth.

Challenges ...

South Sioux City set six main goals for the Crystal Cove project, all of which were achieved over the course of the project: 1. Demonstrate proper use of bottom barriers and their benefits. 2. Use the project as an educational focal point for lake users, property owners and managers on the most recent lake management approaches, including bottom barrier use. 3. Raise public awareness on bottom barriers. 4. Erect a sign at the lake identifying it as a demonstration/education project and provide basic information on bottom barriers. 5. Produce a bottom barrier use fact sheet outlining methodologies and anticipated benefits. 6. Produce an illustrated lake management guide including sections on current pond management techniques using bottom barriers.

Solutions ...

Crystal Cove was treated with bottom barriers in April 2002. Because of differing bottom topography,

shallow water areas and shallow-to-deep transition areas were selected for treatment. Each area received varying lengths of barrier material randomly arranged in parallel rows. Members of a local dive and rescue club helped stake or weigh down barrier strips where wading was impractical. Monthly water quality sampling was done to compare to pre-treatment conditions. Over the long term, barrier strips were left in place for visual monitoring of their effectiveness.

Results ...

Burlap and TAC-150, used in the barrier strip experiments, both proved to be effective at controlling aquatic vegetation. All of the random strips, no matter the material used, were 100 percent successful at controlling vegetation growth. One big difference was in the longevity of the materials themselves. One year after the test strips were placed on the bottom of the lake, the TAC-150 manufactured material remained in excellent shape, whereas the burlap, being a natural material, had begun to decompose. The total cost of this project was $2,626. Of this amount, CLEAR provided $1,026 while South Sioux City and the Siouxland Dive and Rescue Team provided $1,600.

CLARK'S POND

Community ...

Originally known as Glen Lake, Clark's Pond in Sutton was already there when the area was settled in 1870. In 1948, the lake and surrounding area was granted to the city and renamed. A condition of the grant called for the pond to be used as a free, public recreational facility, and it has since been widely used for picnicking, fishing and ice-skating. The pond's watershed is approximately 187 acres, consisting mainly of farmland. Precipitation is the pond's only water source.

Challenges ...

In 2000, the maximum depth of Clark's Pond was three feet. Upstream erosion and poorly stabilized shorelines were decreasing pond depth by more than seven inches per year. This left the pond too shallow to support fish, and made the pond more susceptible to algae blooms and poor water clarity.

Solutions ...

In 2001, funding to restore the pond was received from CLEAR. The project's initial construction phase included a sediment basin built upstream of Clark's Pond. This sediment "trap" intercepts much of the sediment and nutrients before they reach the pond and helps control downstream flooding of the city's storm sewer system. A quarter-acre wetland was constructed north of the pond for further sediment and nutrient removal. The project's second phase involved restoring the pond itself. It was drained and approximately 5,000 cubic yards of

sediment were removed, increasing maximum depths to over 12 feet for 25 percent of its surface area. Vinyl sheet piling was used along half of the shoreline for stabilization and to obtain 12-foot depths. Shoreline on the west side of the pond was expanded about 10 feet, increasing the pond's surface area about 10 percent.

Results ...

This project resulted in significant improvements in water quality. Total phosphorus and total nitrogen were decreased by 89 percent and 56 percent respectively. This led to a 53 percent reduction in the amount of algae in the pond, which increased water clarity from only 2 inches to 20 inches. The sediment basin that was created is expected to reduce sediment loading from approximately 800 tons per year to 200 tons per year. Having this diversion will increase the life expectancy of the pond by as much as 28 years. The local schools are now using this area as an outdoor classroom. The total cost of the 19-month project was approximately $408,000. Of this amount, $210,000 was provided through CLEAR, $145,000 was provided by the city, and $52,000 by the Upper Big Blue Natural Resources District.

CITY RECREATIONAL LAKE

Community ...

Tecumseh's City Recreational Lake on the west end of the Johnson County Fairgrounds has a long history as a nice place to fish, picnic and enjoy the outdoors. The current lease on the lake, between the city and Johnson County, dates to 1957.

Challenges ...

Despite being the kind of community lake where you could almost always see someone there, no matter the season, its depth was insufficient to support a quality fishery. Maximum depths of five feet limited lake use and created aesthetic problems.

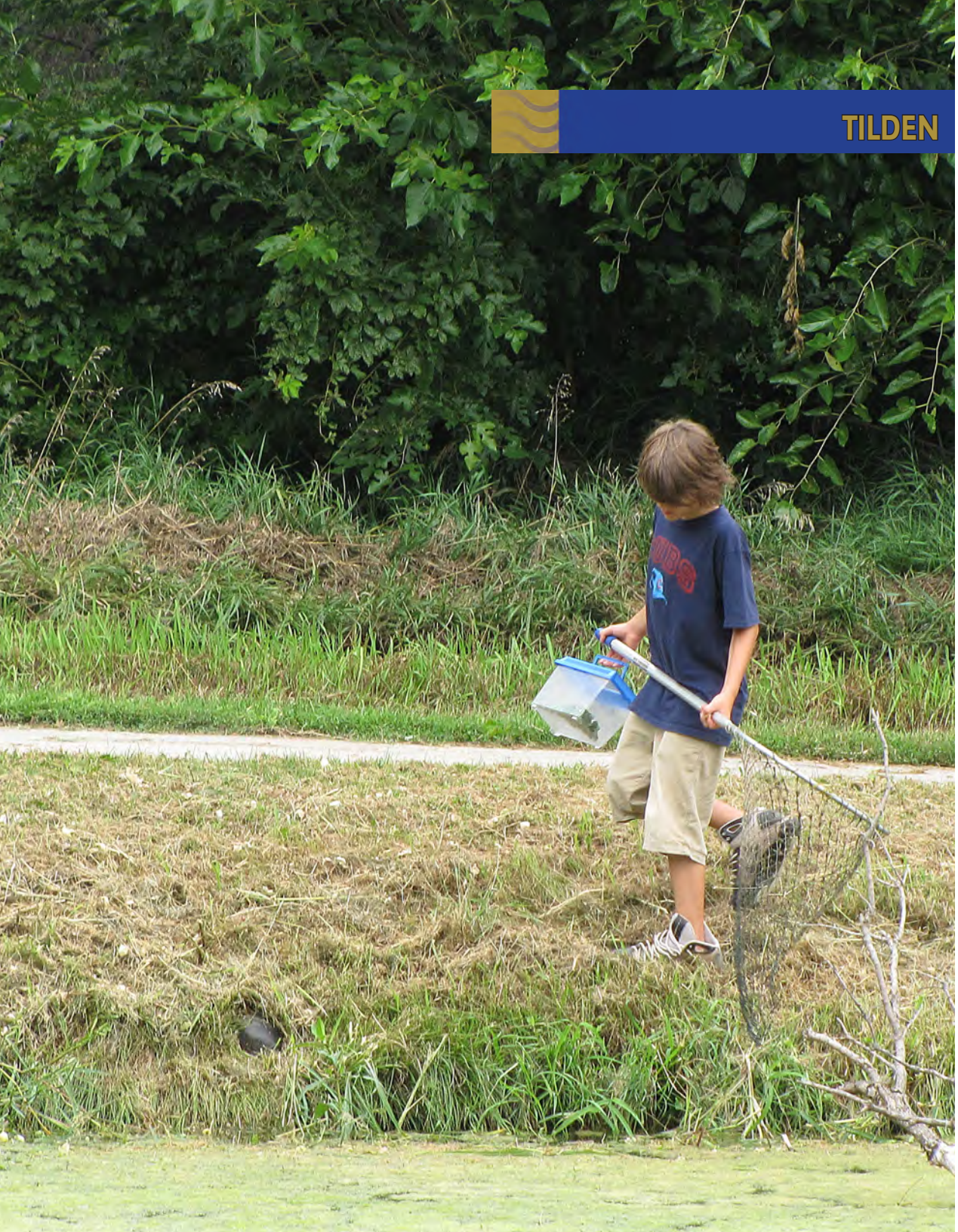
Solutions ...

In 2007, the Tecumseh lake was approved for assistance under the CLEAR program. The initial project increased maximum lake depths to 12 feet. An immediate result was that water quality improved and there was new space for fish to grow. Other project results were improved bank stabilization and a dramatic improvement in appearance of the lake and shoreline. Project components included removing a peninsula on the west side of the lake by excavating 3,500 cubic yards of soil, building a containment dike for dredged material, and dredging 13,600 cubic yards of silt from the lake floor. Additional grading and re-shaping of the parking lot was completed. When the initial project was finished, the city tried to fill the lake but was unable to keep water depths sufficient for fishing without having to continuously fill it.

Water was pumped into the lake from the city's municipal system at $12,000 per summer, which the city's budget couldn't sustain. When the lake drained naturally, it was discovered that animals burrowing into it had damaged the lake's dike. That began a second phase of the CLEAR project in 2009, to address drainage problems. Project elements included stabilizing the west bank and dike using dirt and silt that had been removed from the perimeter of the fishing pier; removing a large tree from the west bank/dike; removing sediment from around the perimeter of the fishing pier to a depth of five to six feet; and refilling the lake.

Results ...

The lake still has some drainage issues even though city employees have worked to eliminate underwater animal dens or tunnels, as well as roots from a large tree on top of the dike. Two pipes under the south and east sides of the lake also have been capped, but it continues to have some leakage and permeability problems. The lake was refilled in July 2010, but because of ongoing leakage, plans to stock sport fish in the fall of 2010 were postponed. Cost of the completed work was $247,157. Of this, $203,290 was provided through CLEAR while the community provided $43,867.



HORSESHOE BEND MEMORIAL PARK LAKE

Community ...

Tilden's Horseshoe Bend Memorial Park has been part of the community since the early 1900s. In those days, area ponds were used as sources of ice by local residents. Original icehouse gates and pulleys used to remove ice cut from the ponds are still there, giving the park added local historical and cultural significance. Since those early days, park improvements have included a baseball diamond and trails connecting to the Cowboy Trail. In addition, 80 new trees and shrubs have been planted, and the city and volunteers built a picnic shelter adjacent to the lake.

Challenges ...

The lake wasn't deep enough to support suitable fish habitat or recreational use. The lack of depth was mainly due to water seepage through the bottom of the lake. Shorelines also were unstable, causing erosion and steep banks. Finally, there was a lack of dissolved oxygen in the water, which was another obstacle to sustaining fish populations.

Solutions ...

In 2001, the City of Tilden received funding from CLEAR to renovate the lake. Several projects were completed to make it a suitable fishery and return it to prominence as the park's focal point. First, a well was drilled nearby to serve as a water source for the lake. Trees along the banks were removed and existing banks

were restructured to decrease slope and improve water access. Bentonite was used along the water line to help seal the lake basin, and a liner covered in river rock was installed on the lake floor to prevent water seepage. More bentonite was added after the liner was installed for added protection. An aeration pump was installed in the lake to maintain oxygen levels and help keep the lake open in the winter.

Results ...

When the improvements were finished, the lake was refilled from fire hydrants and irrigation wells. Seepage was reduced by 90 percent and the new well maintained water levels. Lower phosphorus and nitrogen concentrations and better water clarity were other project benefits. The spring after the project was finished, the lake was stocked with largemouth bass, bluegill and channel catfish. The cost of this one-year project was approximately $38,000. CLEAR provided approximately $30,000 and the community $8,000.

UNL Extension Educator Tadd Barrow (left), representing CLEAR, presents a project start-up check to Tilden officials.

WEEPING WATER PARK LAKES

Community ...

Near downtown Weeping Water are two water bodies called Weeping Water Park Lakes. East and West ponds are each about 2.5 acres in size and about four and 10 feet deep, respectively. Both were originally limestone quarries that were developed into recreational ponds in the 1960s. Historically, they were used as natural filters and containment for city drinking water. The park is a community centerpiece, and annual events such as Limestone Days, Country Pickin' Festival and more are held there. Park facilities include campsites, picnic tables, covered shelters, restrooms, grills and playground equipment.

Challenges ...

Over the years, water quality degraded to the point it hindered use of the ponds. Water clarity was only 1.1 feet and algae blooms were frequent. East pond was only three to four feet deep, not enough to support aquatic habitat and fish. West pond had a maximum depth of 10 feet, but much of it was only 2.5 feet deep. Steep, uniform shorelines limited aquatic habitat diversity and made lake access difficult.

Solutions ...

In 2004, funding to restore the lakes was received through the CLEAR program. Restoration began by removing 33,000 cubic yards of sediment from both ponds. Depth of each increased from four to eight feet, with deep pools between 10 and 15 feet. Pond beds were sculpted into irregular shapes with shoals, submerged islands and undulations. A deep-water channel was

dredged connecting the two. Iron pilings were removed from West pond, and an abandoned water supply intake was removed from East pond. Both were re-shaped and jetties, protrusions and other irregularities were added to enhance aquatic habitat and provide better access. Shorelines were sloped and graded to maximize vegetation, and were protected from erosion with biodegradable fabric. Rock was added to high activity areas and around jetties. Rock piles, anchored trees and gravel were put on pond bottoms for habitat and fish spawning. An aeration system was installed to maintain dissolved oxygen and control algae. A water control system was added, as well as a gate valve and discharge pipe for draining overflows to Weeping Water Creek. To help keep sediment and nutrients from entering the ponds, a sediment trap/wetland was built upstream from the park.

Results ...

The former rectangular lakes have been reshaped and deepened to more natural and suitable aquatic habitat. Shoreline grading has provided better access to the water's edge for fishing, and the shorelines have been protected against erosion. A management and education plan was developed for the ponds for local students doing water quality sampling, pond bed surveys and monitoring plant growth. The 18-month project cost $329,000. CLEAR provided $278,000 with $51,000 coming from the city. Partners were City of Weeping Water, Lower Platte South NRD, Day Foundation, Weeping Water Junior/Senior High School, Weeping Water Elementary School and Jacobson Helgoth Consultants.

NELIGH PARK LAKE

Community ...

Neligh Park Lake is in western West Point. It was formed from a tributary to the Elkhorn River and lies in Neligh Park, which hosts baseball diamonds, camping and picnic areas, Cuming County Fairgrounds and Cuming County Historical Society displays. The 3.5-acre pond has been well used by residents for fishing, ice-skating, swimming, annual youth and senior fishing tournaments, and annual canoe races by the Cuming County Ag Society.

Challenges ...

Sediment flowing into the pond from stormwater drainage through the park and from developing urban areas over many years decreased pond depth to about four feet. Overflow from the nearby Elkhorn River would backflow through outlet pipes constructed in the flood control levee, inundating the park with water, sediment and debris. As pond depths decreased, fish became virtually non-existent. In addition to being shallow, the pond was high in nutrients, lacked aquatic vegetation and exhibited poor clarity. All this adversely impacted aquatic life and overall aesthetics of the entire park.

Solutions ...

Over the last 10 years, West Point implemented measures to address water quality impacts on the pond. These included installing flap gates on floodwater overflow pipes, and stormwater drainage projects to reduce watershed surface area. In 2002, funds to restore the lake were received through the CLEAR program. The

primary project component was the removal of 50,000 cubic yards of sediment, increasing maximum depths from four feet to at least 12 feet over 30 percent of the pond. Other project components included replacing inlet and outlet structures, shoreline restoration and stabilization, vegetation barriers and handicap access. After project completion the pond was stocked with largemouth bass, bluegill and channel catfish.

Results ...

In addition to enhancing pond aesthetics, the project resulted in significant water quality improvements. The largest was in water clarity, which increased from six inches to over 36 inches. Reductions in nutrient concentrations were also achieved — phosphorus decreased 87 percent and nitrogen dropped 82 percent. Reductions in nutrient concentrations led to a 78 percent decrease in algae biomass. Improvements to water clarity has allowed for aquatic vegetation, which provides habitat, nutrient uptake and shoreline stabilization. The one-year project was completed at a cost of $390,632 with CLEAR providing $286,693; the city, $93,409; and the Nebraska Game and Parks Commission, $5,265. Engineering services were provided by Gilmore and Associates.

WOLBACH

COTTONWOOD PARK LAKE

Community ...

Volunteers built Wolbach's Cottonwood Park Lake in the mid-1970s. It has a surface area of about three acres, with an island on the north end. The lake is fed by underground springs, with overflow draining through a series of culverts into nearby Spring Creek. Park facilities include a playground, rodeo arena, sand volleyball court and picnic area. The lake was a popular picnic area and fishery with bullhead, carp and sunfish being abundant. Since 1991, Wolbach students have used the lake as a living laboratory for science classes. Students collect water quality data and organize annual cleanups as a community project.

Challenges ...

Over the years, silt accumulated in the lake. Vegetation such as duckweed and algae became abundant. It was dredged in 1995 using grant funds from the Nebraska Environmental Trust. An aeration system was also installed and equipment was purchased to help local students monitor water quality. However, dredging only excavated the lake to three to six foot depths, not enough to sustain fish.

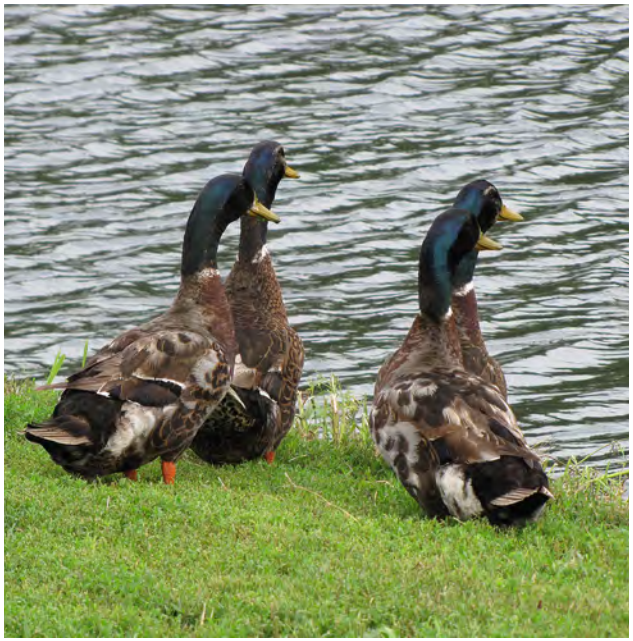
Solutions ...

In 2001, Wolbach received lake renovation funds through CLEAR. The renovation project's main component was excavating the lake to remove sediment, providing improved fish habitat and improving lake aesthetics through reduced aquatic vegetation growth and algae blooms. Before dredging, the aeration system was

removed and cleaned. Existing fish were removed and as much water as possible was drained. Sediment was removed to the point that at least 25 percent of the lake had depths of 10-15 feet. Once dredging was finished and the lake was refilled, it was restocked with largemouth bass, bluegill and channel catfish. The aeration system was reinstalled and shoreline was seeded and landscaped to prevent erosion.

Results ...

Renovating the lake was an example of community involvement and participation; for example, over 30 people volunteered to drive dump trucks to remove dredged soils, which were then used to build a shoreline walking path. Park improvements included a bridge built by high school students for access to the island, electrical hookups for campers, improved playgrounds, picnic shelters and a softball diamond. The cost of this one-year project was approximately $63,000. CLEAR provided $43,000 and the community $20,000. Project partners included Wolbach Public Schools and the Lower Loup Natural Resources District.



As the Village Clerk/Treasurer and a resident of Oxford since 1968, I can't tell you how ***proud it makes me*** to see such a project such as the **CLEAR Park Pond** Project for the George R. Mitchell Park become a reality. Oxford is a small town in southwest Nebraska with a population of 779. We are constantly trying to pull our citizens together to make decisions that will have a ***positive effect on our community***. I believe our decision to move forward with the CLEAR project was one that will make our town more **attractive and appealing** for those families that we are trying to entice to make Oxford their home. For a rural community such as Oxford, the services we provide are almost more important than anything else we have to offer. For what we lack in commercial/industrial business, we more than make up with our **public amenities** such as the swimming pool, library, tennis court, golf course, baseball stadium, and of course, our PARKS. The improvement to our park pond will most definitely ***be an attraction*** to Oxford for many years to come.

Dawn Quinn
Village of Oxford

Our **pond restoration project** has been a *tremendous improvement* for the Village of Big Springs. We now have a **safe area** where many can share in the ***joy of fishing, picnicking and walking***. The area is in *constant use* now by young and old alike – and we thank Nebraska Department of Environmental Quality for their help in **making this project a reality!**

Susan McGreer
Village of Big Springs

"As an elementary school science teacher, it has been so neat to have access to an ***outdoor classroom like Humphreys Pond***. We've studied the **creatures that live** in Humphreys Pond, and students have learned what a ***healthy aquatic ecosystem*** looks like. I've also participated in water safety instruction at Humphreys Pond, which is another great utilization of the pond. **What a neat project!**"

Mary Jensen
5th Grade Teacher, Ogallala Elementary School

"The finalized project has been **completely embraced** by the ***Ogallala community***, and it is now being ***utilized to an extent beyond what I had hoped for***. The fish and other aquatic life are thriving. We've seen a return of waterfowl and other wildlife to the pond. **Children are flocking to the pond for wholesome activities**, and parents and grandparents are ***spending hours and hours*** with their young people there. Groups ranging from the Ogallala Optimist Club, to the Girl Scouts, to the Middle School Nature Club, to the Nebraska Game and Parks are ***finding all sorts of uses for the property***. Several local schools have adopted components of the pond into their curriculum. The successful completion of this renovation project really couldn't have been more impactful."

Andrew Krab, Adams Bank and Trust

Nebraska Department of Environmental Quality
http://deq.ne.gov/

Nebraska Game and Parks Commission
http://outdoornebraska.ne.gov/

Nebraska Environmental Trust
http://www.environmentaltrust.org/

University of Nebraska–Lincoln Extension
http://www.extension.unl.edu/

U.S. Environmental Protection Agency
http://www.epa.gov/

University of Nebraska Lincoln

The Nebraska Environmental Trust

Nebraska Department of Environmental Quality

United States Environmental Protection Agency

Nebraska Game and Parks Commission

Community Lakes Enhancement And Restoration CLEAR

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