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"Making Lincoln a Better Place to Live"



MAYOR CHRIS BEUTLER

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## MEMORANDUM

DATE: March 3, 2009

TO: Lancaster County Board of Commissioners, Lincoln City Council, Lower Platte South Natural Resources District Board of Directors, The Nebraska Game and Parks Commission, and The Nature Conservancy

FROM: Tom Malstrom   
Natural Resources Coordinator  
Parks and Recreation Department  
Saline Wetlands Conservation Partnership

RE: Saline Wetlands Conservation Partnership – 2008 Progress Report

On behalf of the Saline Wetlands Conservation Partnership (SWCP) I want to make you aware of the activities, which occurred in 2008. The SWCP was initiated in 2003 and continues to progress. The City of Lincoln has been awarded three Nebraska Environmental Trust (NET) grants for the eastern saline wetlands. The first two grants were received in 2002 and 2005. The 2005 grant will be completed this year. In April 2008, the City of Lincoln received a \$1,200,000 grant over a three year period; \$800,000 awarded in 2008 and \$400,000 awarded in 2009. These grants have been used for land acquisition and restoration purposes and provide matching funds for other grant opportunities.

In March 2008, the Saline Wetlands Conservation Partnership received the Nebraska Partnership for All-Bird Conservation (NPABC) Outstanding Bird Conservation Award at the 38<sup>th</sup> Annual Rivers and Wildlife Celebration. The event is co-hosted by Audubon's Rowe Sanctuary, Audubon Nebraska and the NPABC. The award was in recognition of the willingness of every partner involved to go above and beyond in the conservation of Nebraska's most rare and threatened natural community: the eastern saline wetlands.

The Partnership continues to utilize the "Implementation Plan for the Conservation of Nebraska's Eastern Saline Wetlands, 2003" for guidance in efforts to conserve the saline wetlands and has also been involved in the Conservation Action Planning process. Since its inception the partnership has purchased nearly 717 acres of saline wetlands and other associated upland habitat, initiated educational activities, participated in saline wetland restoration projects, and provides for operation and maintenance of these areas. Following, is a summary of the 2008 activities.

## 2008 LAND ACQUISITION

**Dial-Salt Creek LP Tract** – South of Interstate 80 along Little Salt Creek

Size: 7.45 acres  
Purchase price and date: \$48,500 on December 31, 2008  
Funding sources: Federal Section 6 (\$153,525)  
Owner: City of Lincoln

**Notes** – The property contains Category 1 saline wetlands and is proposed as critical habitat for the endangered Salt Creek tiger beetle. It is located between the King Wetlands owned by the City of Lincoln and a conservation easement held by the Lower Platte South Natural Resources District (LPSNRD).

## WETLAND RESTORATION

- Whitehead Wetlands - Construction was completed in 2008. The total cost for the project was nearly \$65,000. The project included the rehabilitation/replacement of an existing drop structure adjacent to Little Salt Creek and incorporating a water control structure to provide management capabilities that would support the existing wetland system. The project included sediment removal along 28<sup>th</sup> Street and raising the existing berm to improve access. The LPSNRD provided funding for the project.
- Schleich Wetlands – Construction was completed in 2008. The total cost for the restoration project was nearly \$41,000. The project included the rehabilitation of an existing drop structure adjacent to Little Salt Creek. The LPSNRD funded the engineering and the City of Lincoln funded construction with Federal Section 319 funds.
- Arbor Lake Complex - A wetland restoration conceptual design is being developed. The Flatwater Group, Inc. was hired in April 2008 to complete the wetland restoration planning and design project. A core and technical/planning team consisting of several agency representatives are working with the consultants on the conceptual design. Once the conceptual design is completed a final design will be developed. It is anticipated restoration work will begin in 2010. This project is being funded with Federal Section 319 funds and the 2008 NET Grant, all received by the City of Lincoln.

## WETLAND MANAGEMENT

- Two seasonal employees were hired by the City of Lincoln in 2008 to perform management on the saline wetland areas. Members of the Partnership established management activities to be addressed within the eastern saline wetlands complex. These employees primarily worked on noxious weed and woody vegetation removal, fencing installation, and public access structure maintenance. Funding for these positions is provided with 2001 State Wildlife Grant funds the Nebraska Game and Parks Commission (NGPC) received from the U.S. Fish and Wildlife Service (USFWS). The Coordinator provided supervision of the employees.

## EDUCATION

- North Star High School – Coordinator established annual program with the Environmental Studies class on saline wetlands in 2005. The coordinator in cooperation with the environmental studies instructor at North Star sponsors field trips for a selected group of students to the saline wetlands. These field trips include presentations to the students by personnel of the LPSNRD, UNL, and the NGPC. Topics covered regarding the saline wetlands included vegetation, hydrology, entomology, restoration and mitigation, management, well monitoring and sampling, wildlife, and the relationship of urbanized development with natural areas. In 2008, a total of six (6) field trips were held in the spring and nine (9) in the fall.
- Coordinator educational presentations - The Coordinator continues to present “saline wetland jeopardy” to fifth grade students attending the Earth Wellness Festival and also presented information on saline and freshwater wetlands to Maxey Elementary students. Other presentations were given to local groups and conservation agencies.
- Coordinator participates in Elementary School Nature Nights and field trips to saline wetlands sponsored by the LPSNRD
- Updated the saline wetlands information on the City web site.

## SALINE WETLAND RESEARCH

Three UNL student thesis research studies were conducted in 2008. A summary of the studies follows. Additional field work on data analysis is planned.

- Coke, G.R. 2008. Groundwater Dynamics within the Saline Wetland Alluvium of the Little Salt Creek Valley. M.S. Thesis, University of Nebraska. – Lincoln, Nebr. 77 pp.

A hydro-geologic investigation was conducted from the summer of 2007 to the spring of 2008 for the purpose of characterizing the dynamics of the shallow groundwater flow. At Frank Shoemaker Marsh and other locations this included coring alluvial sediments to determine sediment lithology and stratigraphy, shallow observation wells were installed to determine seasonal water level variations and groundwater flow direction, estimated the hydraulic conductivity of the sediments to facilitate the calculation of groundwater flow beneath the wetlands, and monitored salinity variations within the sediments and sediment pore water to make a preliminary assessment of saline transport within the alluvium. Groundwater levels collected by transducers within the wetland observation wells showed different responses from precipitation events and stream discharge. These responses suggest a direct connection between stream discharge and groundwater in the shallow alluvium adjacent the channel. Data from the wells shows a temperature shift between wells located far from the channel and wells located adjacent to the channel. This temperature shift away from seasonal atmospheric temperature changes suggests water movement within the alluvium. The water table maps created at the Whitehead site show the water table gets steeper closer to the stream channel.

- Gilbert, J. 2008. Groundwater Mixing Dynamics in the Saline Wetlands of the Little Salt Creek Watershed, Lancaster County, Nebraska. M.S. Thesis, University of Nebraska. – Lincoln, Nebr. 148 pp.

The study focused on describing how the mixing of fresh modern meteoric water with deeper saline groundwater affects the distribution of salinity in shallow wetland groundwater. Stratigraphy was interpreted from borehole logs and piezometers provided head data and groundwater samples for chemical analysis at three sites along Little Salt Creek. The stratigraphic delineation of sediments in the alluvial valley identified significant clay layers at the top of the Dakota Formation and in the lower alluvium. The hydraulic head data from this study indicated that, while the presence of the Dakota Clay affects hydraulic gradients to some degree, clays in the alluvium are likely a more significant control on near-surface groundwater flow. Most groundwaters sampled were of the Na-Cl type but varied in TDS and chloride concentration, with chloride concentrations increasing with depth and distance down the watershed. Variations in chloride and Oxygen-18 values were used to estimate the portion of modern meteoric water sampled at each piezometer using a basic two end-member mixing model. Results showed that the Whitehead Wetland and Frank Shoemaker Marsh sites had significant meteoric fractions in shallow groundwater while the Little Salt Creek WMA site was relatively unaffected by meteoric waters.

- McNeil, D. 2008. Soil Salinity and Vegetation Distribution at Frank Shoemaker Marsh. Undergraduate Thesis, University of Nebraska. – Lincoln, Nebr. 39 pp.

The study identified if soil salinity concentrations have changed spatially and/or temporally across Basin 2 (located in southwest corner of property) over the last four years, if and how vegetation distribution of several key plant species has changed spatially and/or temporally across Basin 2 over the last four years, and whether soil salinity fluxes positively or negatively correlate to changes in vegetation distribution. Analyzing the plots studied, along with statistical information generated from the data collected, led to the following conclusions, that spatially, there is a general trend for soil salinity concentrations with higher Electrical Conductivity (EC) values to be found throughout the center of the basin, while lower EC values were found around the outer edges, average EC values varied over all four years, affecting the occurrence of the four plant species, and that spatial patterns of plant distribution remained fairly constant with the more salinity tolerant saltwort and sea blight showing higher tolerances for regions of higher salinity than marsh elder or cattail.

In 2007, the NGPC received funding from the U.S. Fish and Wildlife Service to collect biological and hydrological data. A summary of the Salt Creek tiger beetle and Hydrologic research conducted in 2008 is on the following two pages. This information will be used for the development of a Habitat Conservation Plan for the Salt Creek tiger beetle and the Eastern Saline Wetlands of Nebraska.

## **Salt Creek Tiger Beetle Research (SCTB)**

The following research information was provided by:

Steve Spomer  
Research Technologist II, Entomology  
University of Nebraska-Lincoln

### **Life History**

- Life history and long-term monitoring – Single 2<sup>nd</sup> instars of a known age were put in 16” clear plastic tubes which had been filled with topsoil. Twelve of the tubes had been sunk into the banks of Little Salt Creek in existing SCTB habitat in Sept. 2007, and another 12 were added in May 2008. Flooding in June 2008 took out or moved a number of these tubes. Approximately 16 tubes remained as of August 2008. Monitoring will continue
- Behavior/competition studies – Tests are ongoing to determine competition effects between SCTB and *C. circumpecta* larvae
- Prey base experiment – A preliminary study was completed. Results are not yet analyzed
- Salinity experiments – The experiments were started in 2007 to determine the range of salinity required by SCTB and other salt marsh tiger beetle species to oviposit. In 2008, *C. circumpecta*, *C. togata*, and *C. fulgida* were tested. Success at determining the salinity range for a particular species to oviposit was varied.

### **Light Pollution**

- A mercury vapor light was placed on a sandbar at night in Little Salt Creek in late June to attract adult SCTB. Because of the flooding impact on the population of SCTB on Little Salt Creek, no SCTB were found

### **Insecticide Poisoning**

- SCTB were not available in 2008, so instead, 1<sup>st</sup> instars of *C. circumpecta* were tested for susceptibility to two commonly used insecticides, bifenthrin (used on turf insects, etc.) and imidacloprid (agric. use for aphids, etc.). Results of the experiments have not yet been analyzed. Glyphosate, a commonly-used herbicide, will be tested in the future

### **Salt Marsh Insect Inventory**

- Salt marsh localities (predominately Arbor Lake WMA, but also other sites) were inventoried starting in early May 2008 for insects, using nets, pitfall traps, MV lights, and a Malaise trap. Many species were collected which had not previously been found. These will be identified to genus if possible and added to the database

## Hydrological Research

The following research information provided by:

F. Edwin Harvey, PhD, PG  
Associate Director, School of Natural Resources  
Director, Justin Smith Morrill Scholars Program  
Professor of Hydrologic Sciences  
School of Natural Resources  
University of Nebraska-Lincoln

- January 2008: Measured temperature and electrical conductivity of Little Salt Creek from mouth through Arbor Lake site; discovered springs and seeps
- February 2008: drilled shallow well in middle of Whitehead site (WH-7A); performed slug/bail tests on shallow wells
- May-August 2008: Drilled remaining 2 shallow (~30 ft) wells (one at Shoemaker, one at Raymond Road (Little Salt Creek WMA site); drilled 1 deep (~180 ft) and 3 intermediate-depth (~70-90 ft) wells at Shoemaker, drilled 5 intermediate depth (~40-120 ft) wells at Whitehead (WH-5B,6B,2B,3B,&4B), and drilled 3 intermediate-depth (~70-90 ft) wells at Raymond Road site
  - *A total of 15 new wells installed in 2008*
- June 2008: made electrical resistivity imaging (ERI) measurements along 2 lines across the Whitehead wetland site
- July 2008: made preliminary measurements to characterize Little Salt Creek's "subaqueous artesian springs" (flow, temperature, conductivity)
- September-October 2008: Sampled 25 of the 27 wells installed as part of this project (i.e., wells at the Whitehead site, Shoemaker site, and Raymond Road (Little Salt Creek WMA) site) as well as one spring in the Little Salt Creek channel near Arbor Lake. Groundwater samples were analyzed for major ions, stable isotopes deuterium and oxygen-18, and tritium.
- September 2008: Some results from saline wetlands groundwater research were presented at the 2008 annual conference of the Geological Society of America in Houston, TX.
- Work done continually throughout the year: weekly measurements of temperature and electrical conductivity along Little Salt Creek, Rock Creek, and portion of Salt Creek; maintaining two installations of soil sensors near tiger beetle habitat; installing and maintaining pressure transducers that measure water level and temperature in monitoring wells

## **ENDANGERED SPECIES**

The Salt Creek tiger beetle (*Cicindela nevadica lincolniiana* Casey) was listed on the Federal endangered species list in October 2005. Also listed as a State endangered species, it is endemic to the eastern saline wetlands in Lancaster and southern Saunders counties. Saltwort (*Salicornia rubra*) is a state listed endangered species. In Nebraska, the eastern saline wetlands are the location where they are found.

On December 12, 2007 the U.S. Fish and Wildlife Service listed the Proposed Rule in the Federal Register regarding the Designation of Critical Habitat for the Salt Creek tiger beetle. A Public Hearing on this designation was held on July 1, 2008. The rule has yet to be made final.

- Representatives of the partnership organizations and the coordinator have been involved with the Habitat Conservation Planning efforts initiated in 2006 in response to the Salt Creek tiger beetle's Federal endangered species listing. The U.S. Fish and Wildlife Service is the sponsoring agency. The targeted completion date for the plan is 2010.
- When requested, the coordinator and partnership representatives provide information to the U.S. Fish and Wildlife Service on activities related to the endangered species act.
- Efforts of the SWCP are to protect, restore, and manage the rare and unique saline wetland habitat and not just endangered species.

## **FUNDING RESOURCES**

- 2005 Nebraska Environmental Trust Grant – The grant amount was \$800,000 over a three year period. A total of \$438,432.77 was utilized for wetland restoration at Frank Shoemaker Marsh and \$228,351.16 was used for land acquisition. A total of \$133,216 remains to be expended.
- Federal Section 319 Grant (2002 and 2005) – The City of Lincoln received a total of \$1,000,000 for the eastern saline wetland complex. All funds were expended and used on the acquisition of property, wetland restoration, and engineering services. A Final Report was completed and submitted on September 3, 2008.
- Federal Section 319 Grant (2007) – The coordinator on behalf of the City of Lincoln submitted a grant in 2005 for Federal Section 319 funds in the amount of \$500,000 for the eastern saline wetland complex. In November of 2007, the City was awarded \$250,000. The intention of the grant is for the Arbor Lake Wetland Restoration Project. A total of \$22,500 was expended in 2008 for restoration services related to the Restoration Project. It is anticipated the remaining \$250,000 will be awarded in 2009.
- 2008 Nebraska Environmental Trust Grant – The grant amount is \$1,200,000 over a three year period. These funds are for the acquisition and restoration of saline wetlands.
- Federal Section 6 – In 2008, the NGPC through the U.S. Fish and Wildlife Service was awarded \$385,911 for the acquisition of property containing saline wetlands.

## SUMMARY OF OTHER COORDINATOR ACTIVITIES

- Coordinated tour of Frank Shoemaker Marsh and presented information to the Information and Education Committee of the Nebraska Association of Natural Resources.
- Attended pesticide training and certification class sponsored by the UNL extension.
- Attended EPA Wetland Conference.
- Miscellaneous activities related to endangered species including Critical Habitat Public Hearing and tiger beetle presentation by Barry Knisely.
- Participated in contractor meetings sponsored by the Nebraska Department of Roads regarding the Interstate 80 widening project.
- Presented information to the Nebraska Wildlife Federation Board of Directors.
- Assisted with and presented information on the Partnership at the NGPC District Birding Day held at Frank Shoemaker Marsh.
- Coordinated and participated in tour of saline wetland locations with staff from the Nebraska Environmental Trust.
- Initiated in 2007, the Coordinator and Partnership has been working on a Conservation Action Plan for the eastern saline wetlands. This project is sponsored by the representatives of The Nature Conservancy.
- Noxious weed and woody vegetation control at publicly owned saline wetland sites.
- Project Manager for the Arbor Lake Complex wetland restoration project.
- Coordinated a tour of all saline sites in the Little Salt Creek watershed with Partnership representatives and land managers.
- Member and participant of the Educational Workgroup of the Nebraska Partnership for All-Bird Conservation.
- Participant of the City of Lincoln's Little Salt Creek Watershed Master Plan efforts and Habitat Conservation Plan committee sponsored by the U.S. Fish and Wildlife Service.
- Completed and submitted the Federal Section 319 Grant Project Implementation Plan for the Arbor Lake Wetland Restoration Project.
- Grant administration, including development and submittal of final report for Federal Section 319 grant.

## SALINE WETLAND PROPERTIES

- **Frank Shoemaker Marsh** – 27<sup>th</sup> Street and Bluff Road  
Size: 160 acres  
Purchase price and date: \$472,000 on June 12, 2003  
Funding sources: 2001 State Wildlife Grant through the  
USFWS (\$222,000)  
2002 NET grant (\$250,000)  
Owner: City of Lincoln

**2008 activity summary** – Noxious weed removal continued. Seasonal employees installed extensions to the south wing walls of bridge to minimize erosion and constructed fence along the south property line from Little Salt Creek to 27<sup>th</sup> street. Post-restoration monitoring includes observations of wetland vegetation and management of the hydrology through the five water control structures in place. Monitoring wells have been installed by UNL. In 2008 one shallow well (15-30 feet), three intermediate wells (60-90 feet), and one deep well (~180 feet) were drilled. The total number of wells in place includes three shallow wells, three intermediate depth wells, and one deep well.

- **City of Lincoln King Wetland Property** – South of Arbor Road and East of 27<sup>th</sup> Street  
Size: 61.2 acres  
Purchase price and date: \$204,700 in January 2004  
Funding sources: Federal Section 6 (\$153,525)  
2002 NET grant (\$51,175)  
Owner: City of Lincoln

**2008 activity summary** – Noxious weed removal continued along with removal of salt cedars located along the north bank of Little Salt Creek. The third year growth of the high diversity native seeded on the upland area (20 acres) is progressing well. Monitoring wells have been installed by UNL. In 2008 two intermediate wells (60-90 feet) were drilled. The total number of wells in place includes two shallow wells (15-30 feet) and two intermediate depth wells.

- **Warner Saline Wetlands** - 98<sup>th</sup> Street and Interstate 80  
Size: 140 acres  
Purchase price and date: \$298,580 on December 7, 2004  
Funding sources: Federal Section 319 (\$179,148)  
LPSNRD (\$43,043.20)  
SWCP (\$76,388.80)  
Owner: LPSNRD

**2008 activity summary** – Woody vegetation removal continues with Honey locust and cedars. The Nebraska Department of Roads purchased approximately 4 acres of the salt meadow located on the south side of Interstate 80 and along the west side of 98<sup>th</sup> Street for the Interstate expansion project. Revenue from this transaction will be used for future Partnership activities.

- **Little Salt Creek Wildlife Management Area** – 1<sup>st</sup> Street and Raymond Road  
 Total Size: 256.5 acres  
 Purchase price and date: \$476,000 in June 2004 (original 156 acres)  
 Funding sources: Federal Section 6 (\$276,000)  
 2004 NET grant through NGPC (\$200,000)  
 Owner: NGPC

**Noble Tract Extension** - Along Little Salt Creek, between Mill Road and the southern boundary of the original Little Salt Creek Wildlife Management Area. (100.5 acres)

**2008 activity summary** – New perimeter fencing installation completed, primitive parking lot developed, and prescribed grazing was conducted. Cedar removal and noxious weed control continues. Monitoring wells have been installed by UNL. In 2008 one shallow well (15-30 feet) and three intermediate wells (60-90 feet) were drilled. The total number of wells includes three shallow wells and three intermediate depth wells. A prescribed burn and construction of perimeter fencing are planned for the southern portion (Noble Tract) of the property in 2009.

- **Arbor Lake Complex** – North of Arbor Road and east of 27<sup>th</sup> Street.  
 Total Size: 132.5 acres  
 Owner: City of Lincoln

**Arbor Lake Extension Purchase (Anderson Property, 69.2 acres)**

Purchase price and date: \$361,710.67 on September 1, 2004  
 Funding source: 2002 NET grant through City of Lincoln

**2008 activity summary** – Continued efforts to control noxious weeds and woody vegetation. The City of Lincoln Public Works Department repaired the south embankment. UNL conducted insect inventories throughout the summer along the salt flat areas. The Lincoln Electrical System completed the North Tier III transmission line along the east and south boundaries of the property. The old line, which transected the property from the Northeast to the Southwest, was removed. Approximately 10 acres were cropped by an adjacent landowner; this included areas under the transmission line, which were disturbed during construction. This cropping was done to prepare the degraded upland area for reseeding to high diversity prairie. The Arbor Lake Wetland Restoration project was initiated. It is anticipated construction will commence in 2010.

- **Schell Wetlands** – NW 12<sup>th</sup> Street and Branched Oak Road  
 Size: 123 acres  
 Purchase price and date: \$472,188 on July 31, 2007  
 Funding sources: Lower Platte South NRD (\$187,960.35)  
 2005 NET grant (\$227,227.95)  
 Partnership Funds (\$57,000)  
 Owner: Lower Platte South NRD

**2008 activity summary** – Continued efforts to control noxious weeds and woody vegetation. Signage was placed at the property to adhere to state hunting laws. Approximately 60 acres were planted with high diversity mesic and upland prairie mix.

- **Seacrest Range** (43 acres) – Located west of Folsom Street along both the north and south sides of Capitol Parkway West. The area is owned by the City of Lincoln. Efforts continued to remove cedar trees and Honey locust and to control noxious weeds on the site. Sewer line project is planned along the south boundary of the property.
- **Lincoln Saline Wetlands Nature Center** (92.7 acres) – It is located near Capitol Beach in Lincoln. This area is owned by the LPSNRD. Management activities in 2008 were noxious weed control and removal of Russian olive, Honey locust, and cedar trees.
- **Schleich Wetlands** (50.2 acres) – It is located southwest of Little Salt Creek near where it empties into Salt Creek and east of the Northbridge housing development in Lincoln. This area is owned by the LPSNRD. Management activities in 2008 were noxious weed and woody vegetation control. Several salt cedars remain to be removed along the banks of Little Salt Creek. Drop-structure repair was completed.
- **Whitehead Wetlands** (98.8 acres) – It is located east of 27<sup>th</sup> street and a short distance south of Interstate 80. This area is owned by the LPSNRD. Management activities in 2008 were noxious weed and phragmites control. The rehabilitation/replacement of the previous drop structure adjacent to Little Salt Creek and sediment removal and berm repair along 28<sup>th</sup> Street associated with this were completed. Monitoring wells have been installed by UNL. In 2008 three intermediate wells (60-90 feet) were drilled. The total number of wells in place includes five shallow wells (15-30 feet), four intermediate depth wells, and one deep well (~180 feet).
- **Little Salt Fork Marsh Preserve** (174.2 acres) – It is located northwest of 1<sup>st</sup> and Raymond Road and owned by The Nature Conservancy. Management activities in 2008 were noxious weed control, woody vegetation removal, and parking lot and sign maintenance. Initial discussions have taken place regarding the adjustment of water levels to expose salt/mud flats.
- **Jack Sinn Wildlife Management Area** (1,352.3 acres) – Located south of Ceresco in Saunders and Lancaster counties. This area is owned by the NGPC. Perimeter fencing construction continues. Management activities in 2008 were noxious weed control, woody vegetation removal, and prescribed grazing.

This program has been very successful and continues to accomplish many of the goals of the Implementation Plan for the Conservation of the Eastern Saline Wetlands. We hope you would agree. Your continued support for the conservation of these natural areas is appreciated. Attached is an aerial map identifying the saline wetland management areas. If you have any questions, please contact me at 476-2729 or [tmalmstrom@lpsnrd.org](mailto:tmalmstrom@lpsnrd.org).

