

Nebraska's Tern and Plover Conservation Partnership – a model for sustainable conservation of threatened and endangered species

Mary Bomberger Brown ^{1, 9, 10}, Mark E. Burbach ², John Dinan ^{3†}, Renae J. Held ⁴,
Ron J. Johnson ⁵, Joel G. Jorgensen ³, Jeanine Lackey ⁶, Jeffery F. Marcus ⁷,
Gina S. Matkin ⁸ & Christine M. Thody ¹

¹ Tern and Plover Conservation Partnership, University of Nebraska-School of Natural Resources, Lincoln, NE 68583, USA

² School of Natural Resources, University of Nebraska, Lincoln, NE 68583, USA

³ Nongame Bird Program, Nebraska Game and Parks Commission, Lincoln, NE 68503, USA

⁴ New Mexico Environment Department, Santa Fe, NM 87507, USA

⁵ Department of Forestry and Natural Resources, Clemson University, Clemson, SC 29634, USA

⁶ United States Fish and Wildlife Service, Grand Island, NE 68801, USA

⁷ North Carolina Wildlife Resources Commission, Hoffman, NC 28347, USA

⁸ Department of Agricultural Leadership, Education and Communication, University of Nebraska, Lincoln, NE 68583, USA

⁹ Address for correspondence: mbrown9@unl.edu

¹⁰ Authors' names arranged alphabetically; all contributed substantively to the project

† deceased

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Implementing successful conservation programs is critical if we are to protect the earth's most imperiled species. These programs must respect state and federal legal concerns as well as local economic and social interests. Here we describe a sustainable partnership approach to Piping Plover and Interior Least Tern conservation in Nebraska, USA. Partners include industry groups, federal, state, and local agencies, and non-governmental organizations. The factor that unifies all partners is a desire to accomplish cooperative threatened and endangered species conservation. We believe that implementing this sort of partnership model could be useful in addressing the protection of other species of conservation concern.

“ . . . I have frequently observed an aquatic bird in the course of ascending this river . . . they lay their eggs on the sand bars without shelter or nest . . . I believe them to be a native of this country and probably a constant resident.”

Captain Meriwether Lewis, 5 August 1804

INTRODUCTION

Threatened and endangered species in general, and Piping Plovers *Charadrius melodus circumcinctus* and Interior Least Terns *Sternula antillarum athalassos* in particular, are a sensitive political and social issue in Nebraska, USA. Their need for water and riverine nesting habitat is perceived to be in conflict with industrial, agricultural, and private interests (National Research Council 2005, Peck *et al.* 2004, Shogren *et al.* 1999, Thody *et al.* 2009). The presence of these federally protected birds can affect human economic activity through interrupted production and loss of revenue (Brown & Jorgensen 2008, 2009, 2010, Shogren *et al.* 1999). This may result in significant bird-human conflicts which can negatively affect the birds' reproductive success and survival. Avoiding such conflicts is imperative for the recovery of plovers and terns not only in Nebraska but across their range (Brown & Jorgensen 2008, 2009, 2010, Lackey 1994, Thody *et al.* 2009).

PLOVER AND TERN CONSERVATION: THE PROBLEM OF CONFLICTING INTERESTS

Piping Plovers (Fig. 1) are one of six species of 'ringed' *Charadrius* plovers found in North America. Two subspecies (Atlantic-*melodus*, Inland-*circumcinctus*) and three nesting populations (Atlantic, Northern Great Lakes and Northern Great Plains) are currently recognized. The Northern Great Plains population nests in Nebraska. Piping Plovers nest generally north of 35° North latitude. They are migratory, over-wintering along the Atlantic Coast and Gulf of Mexico and are in Nebraska from April to August. Plovers lay four eggs, placing them in scrape nests lined with pebbles on expanses of barren sand (Elliott-Smith & Haig 2004, USFWS 1988, 2009).

Least Terns (Fig. 2) are the smallest of the terns (Subfamily Sterninae); three subspecies (Interior-*athalassos*, Eastern-*antillarum* and California-*browni*) are currently recognized. The Interior subspecies nests in Nebraska. The Interior popu-

lation nests along the Mississippi, Red, and Rio Grande river systems and rivers in central Texas. The nesting range extends from Texas to Montana and Colorado to Indiana (Thompson *et al.* 1997, USFWS 1990). Terns are in Nebraska from May to August. They are colonial, lay two to three eggs in scrape nests placed on expanses of barren sand, and are migratory, over-wintering along coastal areas of Central and South America (Thompson *et al.* 1997, USFWS 1990).

Historically, plovers and terns breeding in the Interior United States preferentially placed their nests on midstream river sandbars. In response to declines in the availability of this riverine habitat, both species now frequently nest in human-created habitats (Elliott-Smith & Haig 2004, Thompson *et al.* 1997). In Nebraska, these human-created habitats include sand and gravel mines, lake shore housing developments, and reservoir shorelines (Brown & Jorgensen 2008, 2009, 2010, Sidle 1993, USFWS 2009). In other parts of their ranges, plovers and terns are known to place their nests on gravel rooftops (Fisk 1975), fly-ash piles at coal-fired power plants (Dinsmore *et al.* 1993), and engineered sandbars (Catlin 2009, Hill 1993). Because of their similar nest site requirements, plovers and terns are often found nesting in close proximity. Consequently, conservation actions directed toward one species will likely benefit the other.

Interior Least Terns and Piping Plovers were listed under the U.S. Endangered Species Act (ESA) in the mid 1980s. The Northern Great Plains populations of plovers were listed as threatened and the Interior subspecies of terns were listed as endangered (USFWS 1985a, b). As a consequence of their federal listing status, plovers are listed as threatened and terns as endangered by the Nebraska Nongame and Endangered Species Conservation Act (NESCA). After protection is provided by the ESA, the goal of conservation action is the recovery and delisting of the species (Hoekstra *et al.* 2002) through the implementation of Recovery Plans by state and federal agencies and non-governmental organizations. The Recovery Plan for the Northern Great Plains Piping Plover was released in 1988 and is currently being revised (USFWS 1988, C. Aron, pers. comm.); the Recovery Plan for the Interior Least Tern was released in 1990 (USFWS 1990). Although several entities share responsibility for threatened and endangered species conservation in the state, the United States Fish and Wildlife Service (USFWS) and Nebraska Game and Parks Commission (NGPC) are the agencies responsible for enforcing the ESA and NESCA.

The U.S. Endangered Species Act mandates designation of 'critical habitat' for all threatened and endangered species. Critical habitats are areas considered essential for a listed species, and the designation is intended to add an additional level of protection. Unfortunately, the designation of critical habitat often engenders negative public sentiment towards the listed species, as was the case in Nebraska. Critical habitat was designated for the Northern Great Plains Piping Plover in 2002 (USFWS 2002). In response to a legal challenge brought by the Nebraska Habitat Conservation Coalition (cpnrd.org/nebraska_habitat_conservation_co.htm), this designation was vacated in Nebraska by the U.S. Federal District Court in 2005 and has not been reinstated. Critical habitat remains in place throughout the remainder of the plovers' breeding range (USFWS 2009).

The major rivers of Nebraska (Platte, Loup, Elkhorn, Niobrara, and Missouri) and their tributaries transport erosional debris from the Rocky Mountains and the Nebraska Sandhills. This sand and gravel is deposited in the river channel, forming the sandbars plovers and terns use for nesting. Over thousands of years, the river channels have moved across the landscape leaving behind deposits of sand and

gravel. Because of the abundance of this resource, sand and gravel mining has become an important part of Nebraska's economy. A 2007 industry study (Moore 2009) estimated that mining contributes approximately U.S. \$240,000,000 and 1,300 jobs to the state economy. Sand and gravel mining operations inadvertently create plover and tern habitat by depositing waste sand around a central pit lake (Fig. 3; Brown & Jorgensen 2008, 2009, 2010, USFWS 2009). Since most mines are located within five kilometers of a river, the waste sand at mines is easily found by plovers and terns searching for places to nest. After sand and gravel mines are taken out of production, they are usually sold to real estate developers and converted into lake shore housing developments (Brown & Jorgensen 2008, 2009, 2010, USFWS 2009); however, the waste sand remains attractive to nesting birds. While these sorts of human-created habitats can provide suitable habitat for nesting terns and plovers for a few years, they eventually become overgrown with vegetation or covered with buildings and are no longer viable nesting areas.

TOWARDS A SOLUTION: THE TERN AND PLOVER CONSERVATION PARTNERSHIP

Violations of the Endangered Species Act in the 1990s, conflict over the critical habitat designation, and increasing numbers of plovers and terns nesting on human-created habitats led to the recognition that a different approach to threatened and endangered species conservation was necessary for Nebraska. After a series of negotiations, the companies involved in the ESA violations accepted an agreement that included funding a study to find better ways of managing these two species. At the time, this was quite a forward-thinking resolution by the federal prosecutor, judge, companies, and regulatory agencies. The study (Lackey 1994) developed many of the management practices still in use today; these practices were further developed by Marcus *et al.* (2008). The study also led to the formation of the Tern and Plover Conservation Partnership (TPCP) in 1999.

The role of the TPCP is to prevent and mediate bird-human conflicts and establish communication among regulatory agencies (USFWS and NGPC) and the public (property owners and mining companies), so that issues involving plovers and terns are proactively resolved. Since 1999, there have been no violations of the ESA or NESCA by any of our partners, and the numbers of plovers and terns successfully reproducing in Nebraska have increased (Brown & Jorgensen 2008, 2009, 2010, USFWS 2009). By working with the TPCP, the sand and gravel mining and real estate development industries in Nebraska have generated additional income through continued production and avoidance of violation-related costs. For example, the mining industry estimates an increased income of U.S. \$2,000,000 (C. Roberts, pers. comm.; no comparable figures are available for the real estate development industry).

The TPCP has developed a method to facilitate the mining companies' need for access to their sand and gravel resources while ensuring tern and plover nesting success (Marcus *et al.* 2008). This involves a two-step process. First, mining companies provide the TPCP with information on their production plans during the nesting season, defining where they will and will not be removing material. Second, the TPCP implements methods to direct nesting birds away from the production areas and into the non-production areas. Before the birds arrive, the substrate in the production areas is made unattractive to the birds (e.g., raking the surface, planting a quickly growing grass, spreading gravel on the surface) and made more appealing in the non-production areas (e.g.,



Fig. 1. Adult Piping Plover *Charadrius melodus circumcinctus* (photo courtesy of Wayne Hathaway).

removing vegetation, spreading sand on the surface). Birds are not disturbed in any way during this process. If birds do nest in production areas, access to the area is restricted, as required by the Endangered Species Act. The TPCP monitors the area and, when the birds have finished nesting and left, opens the area back up to mine production. The net effect is an economic win-win situation. The mining companies and the birds are both able to continue production and maintain their revenue streams (sand and gravel for the miners and chicks for the birds) without conflict. By allowing continued production of waste sand piles at the mines, additional nesting habitat is created for the birds. The same method has



Fig. 2. Adult Interior Least Tern *Sternula antillarum athalassos* (photo courtesy of Wayne Hathaway).

been used successfully at housing developments, although it is more complicated to implement because of all the entities involved (individual property owners, utility companies, construction companies, homeowners' associations, and others). The success of this process has gained the TPCP the trust of the mining companies and real estate developers to such an extent that some are now interested in establishing nesting sanctuaries on their properties. Thus, what began as an effort to conserve plovers and terns is now a broader success. These partners wanted a voice in the conservation planning process – they wanted to be “part” of the process, not “subject” to the process. Regulatory agencies (USFWS and NGPC) are supportive of this program, because the TPCP is increasing the production of plovers and terns and decreasing the need for law enforcement actions.

In addition to directing birds to safe nesting areas, the TPCP renovates riverine sandbars to draw nesting birds away from human-created habitats. The water flowing in Nebraska's rivers is used for hydroelectric power generation, urban water supplies, and agricultural irrigation. These demands decrease the amount of water available to create new sandbars and maintain existing sandbars for nesting birds. With low river flow, sandbars quickly become overgrown with vegetation, choking the river channel and eliminating nesting



Fig. 3. Sand and gravel mine where Piping Plovers and Interior Least Terns place nests on waste sand piles (photo: Mary Bomberger Brown).

habitat. The TPCP partners with local government agencies and NGOs to remove vegetation and renovate the sandbars. This program also creates a win-win situation. Local agencies and NGOs remove invasive plant species such as phragmites *Phragmites australis*, purple loosestrife *Lythrum salicaria*, and salt cedar *Tamarix* spp. from the river channels and the birds gain suitable nesting habitat.

When the general public achieves a better understanding of threatened and endangered species issues and river ecosystems, it becomes a supportive voice for conservation (Thody *et al.* 2009). Consequently, research, volunteers, and outreach are vital components of the TPCP. Our research program helps ensure that the best science informs our conservation practices. Our volunteers help us engage local communities in conservation. Outreach to traditional (e.g. educational, natural history, and youth) and non-traditional (e.g. industry, government, and political) groups also helps gain support for our program.

From a purely environmental perspective, sand and gravel mining and construction near rivers is destructive. However, people want and need the materials that result from sand and gravel mining. Thus, there is a need for the mining industry, which will remain an important part of Nebraska's economy. People want to live in lake shore housing developments, so the real estate development industry will remain an important part of the state's economy. People also want, and the law requires, the protection of threatened and endangered species and Nebraska's natural resources. By acknowledging that the exploitation of natural resources is a reality (Palmer *et al.* 2005), the TPCP has found a method to encourage sand and gravel mines and residential communities to embrace endangered species conservation and minimize law enforcement actions, revenue loss, and conflict. This is proving to be the best approach for sustaining needed industry and two imperiled species in Nebraska. If the TPCP can implement effective threatened and endangered species conservation with the sand and gravel mining and real estate development industries in Nebraska, we are confident that this model can be successfully adapted and used in other situations.

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REFERENCES

- Brown, M.B. & Jorgensen, J.G.** 2008. 2008 Interior Least Tern and Piping Plover monitoring, research, management and outreach report for the lower Platte River, Nebraska. Joint report of the Tern and Plover Conservation Partnership and the Nebraska Game and Parks Commission, Lincoln, NE, USA.
- Brown, M.B. & Jorgensen, J.G.** 2009. 2009 Interior Least Tern and Piping Plover monitoring, research, management and outreach report for the lower Platte River, Nebraska. Joint report of the Tern and Plover Conservation Partnership and the Nebraska Game and Parks Commission, Lincoln, NE, USA.
- Brown, M.B. & Jorgensen, J.G.** 2010. 2010 Interior Least Tern and Piping Plover monitoring, research, management and outreach report for the lower Platte River, Nebraska. Joint report of the Tern and Plover Conservation Partnership and the Nebraska Game and Parks Commission, Lincoln, NE, USA.
- Catlin, D.** 2009. *Population dynamics of Piping Plovers* (Charadrius melodus) on the Missouri River. PhD dissertation. Virginia Polytechnic Institute and State University, Blacksburg, WV, USA.
- Dinsmore, S.J., Dinsmore, J.J. & Howell, D.L.** 1994. Least Terns nesting on fly-ash deposits. In: Higgins, K.F. & Brashier, M.R. (eds). *Proceedings of the Missouri River and its Tributaries: Piping Plover and Least Tern Symposium*. South Dakota State University, Brookings, SD, USA.
- Elliott-Smith, E. & Haig, S.M.** 2004. Piping Plover (*Charadrius melodus*). In: A. Poole (Ed.). *The Birds of North America*, No. 2. Philadelphia Academy of Natural Sciences, Philadelphia, PA, USA & American Ornithologists' Union, Washington DC, USA.
- Fisk, D.J.** 1975. Least Tern, beleaguered, opportunistic, and roof-nesting. *American Birds* 29: 15–16.
- Hill, L.A.** 1993. Design of constructed islands for nesting Interior Least Terns. In: Higgins, K.F. & Brashier, M.R. (eds). *Proceedings of the Missouri River and its Tributaries: Piping Plover and Least Tern Symposium*. South Dakota State University, Brookings, SD, USA.
- Hoekstra, J.M., Clark, J.A., Fagan, W.F. & Boersma, P.D.** 2002. A comprehensive review of Endangered Species Act recovery plans. *Ecol. Applicat.* 12: 630–640.
- Lackey, J.L.** 1994. *Planning strategies and recommendations for the protection of Least Terns and Piping Plovers at sand and gravel mines along the lower Platte and Loup Rivers, Nebraska*. MSc thesis. University of Nebraska, Lincoln, NE, USA.
- Marcus, J.F., Dinan, J.J., Johnson, R.J., Blankenship, E.E. & Lackey, J.L.** 2008. Directing nest site selection of Least Terns and Piping Plovers. *Waterbirds* 30: 251–258.
- McDonald, P.M. & Sidle, J.G.** 1992. Habitat changes above and below water projects on the North Platte and South Platte rivers in Nebraska. *Prairie Naturalist* 24: 149–158.
- Moore, M.G.** 2009. *The Economic Contributions of U.S. Mining in 2007*. National Mining Association, Washington DC, USA.
- National Research Council (NRC).** 2005. *Endangered and threatened species of the Platte River*. National Academic Press, Washington, DC, USA.
- Palmer, M.A., Bernhardt, E.S., Chornesky, E.A., Collins, S.L., Dobson, A.P., Duke, C.S., Gold, B.D., Jacobson, R.B., Kingsland, S.E., Kranz, R.H., Mappin, M.J., Martinez, M.L., Micheli, F.L., Morse, J.L., Pace, M.L., Pascual, M., Palumbi, S.S., Reichman, O.J., Townsend, A.R. & Turner, M.G.** 2005. *Ecological science and sustainability for the 21st century*. *Frontiers Ecol. Envir.* 3: 4–11.
- Peck, D.E., McLeod, D.M., Hewlett, J.P. & Lovvorn, J.R.** 2004. Irrigation-dependent wetlands versus instream flow enhancement: economics of water transfers from agriculture to wildlife uses. *Envir. Manag.* 34: 842–855.
- Shogren, J.F., Tschirhart, J., Anderson, T., Ando, A.W., Beissinger, S.R., Brookshire, D., Brown, Jr. G.M., Coursey, D., Innes, R., Meyer, S.M. & Polansky, S.** 1999. Why economics matters for endangered species protection. *Conserv. Biol.* 13: 1257–1261.
- Sidle, J.G.** 1993. Least Tern and Piping Plover use of sand and gravel pits along the Platte and Loup Rivers, Nebraska. In: Higgins, K.F. & Brashier, M.R. (eds). *Proceedings of the Missouri River and its Tributaries: Piping Plover and Least Tern Symposium*. South Dakota State University, Brookings, SD, USA.
- Thody, C.M., Held, R.J., Johnson, R.J., Marcus, J.F. & Brown, M.B.** 2009. Grassroots conservation: volunteers contribute to threatened and endangered species projects and foster a supportive public. *J. Extension* 47. (www.joe.org/joe/2009february/rb3.php).
- Thompson, B.C., Jackson, J.A., Burger, J., Hill, L.A., Kirsch, E.M. & Atwood, J.L.** 1997. Least Tern (*Sterna antillarum*). In: Poole, A. & Gill, F. (eds). *The Birds of North America*, No. 290. Academy of Natural Sciences, Philadelphia, PA, USA & American Ornithologists' Union, Washington, DC, USA.
- United States Fish and Wildlife Service (USFWS).** 1985a. *Least Tern*. Federal Register 50: 21 784–21 792.
- United States Fish and Wildlife Service (USFWS).** 1985b. *Piping Plover*. Federal Register 50: 50 726–50 734.
- United States Fish and Wildlife Service (USFWS).** 1988. *Great Lakes and Northern Great Plains Piping Plover Recovery Plan*. United States Fish and Wildlife Service, Twin Cities, MN, USA.
- United States Fish and Wildlife Service (USFWS).** 1990. *Recovery Plan for the Interior Population of the Least Tern* (*Sterna antillarum*). United States Fish and Wildlife Service, Twin Cities, MN, USA.
- United States Fish and Wildlife Service (USFWS).** 2002. Federal Register 67: 57 637–57 686.
- United States Fish and Wildlife Service (USFWS).** 2009. *Piping Plover* (*Charadrius melodus*) 5-year review: evaluation and summary. gov/northeast/endangered/pdf/Piping_Plover_five_year_review_and_summary.pdf