

2005

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Salt Creek Tiger Beetle (*Cicindela nevadica lincolniana*)

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ADDRESSES: The complete file for this final rule is available for inspection, by appointment, during normal business hours at the U.S. Fish and Wildlife Service, Nebraska Ecological Services Field Office, 203 West Second Street, Federal Building, Second Floor, Grand Island, NE 68801.

FOR FURTHER INFORMATION CONTACT: Mr. Steve Anschutz, Field Supervisor, at the above address (telephone (308) 382-6468, extension 12; facsimile (308) 384-8835).

SUPPLEMENTARY INFORMATION:

Background

Please see the proposed rule to list the Salt Creek tiger beetle as endangered (February 1, 2005; 70 FR 5101) for detailed information on the subspecies' taxonomy, natural history, distribution, and population status. We include a brief synopsis of that information here, along with new information that has been obtained since publication of the proposed rule.

The Salt Creek tiger beetle (*Cicindela nevadica lincolniana*) is an active, ground-dwelling, predatory insect that captures small arthropods in a "tiger-like" manner by grasping prey with its mandibles (mouthparts). Salt Creek tiger beetle larvae live in permanent burrows in the ground. They are voracious predators, fastening themselves by means of abdominal hooks to the tops of their burrows and rapidly extending outward to seize passing prey. Adult Salt Creek tiger beetle are metallic brown to dark olive-green above, with a metallic dark green underside, and measure 1.3 centimeters (cm) (0.5 inch (in.)) in total length.

Taxonomy

The Salt Creek tiger beetle is a member of the family Cicindelidae, genus *Cicindela*. Eighty-five species and more than 200 subspecies of tiger beetles in the genus *Cicindela* are known from the United States (Boyd *et al.* 1982, Freitag 1999). Originally, the Salt Creek tiger beetle was described by Casey (1916) as a separate species, *C. lincolniana*. Willis (1967) identified *C. n. lincolniana* as a subspecies of *C. nevadica*, which evolved from *C. n. knausii*. This is the currently accepted taxonomic classification. The evolution of *C. n. lincolniana* was a result of its isolation some time after the Kansan glaciation (435,000 to 300,000 years before the present), but possibly during the Yarmouth glaciation (300,000 to 265,000 years before the present). Busby (2003) recently examined populations of *C. nevadica* and confirmed that *C. n. lincolniana* is distinctive from other

populations of *C. nevadica* in the central Great Plains.

Life History

Allgeier *et al.* (2004) and Spomer *et al.* (2004a) indicated that the Salt Creek tiger beetle has a 2-year life cycle, not uncommon for tiger beetles. Spomer and Higley (2001) and Spomer *et al.* (2004a) described the life cycle of the Salt Creek tiger beetle in detail through egg, larval, and adult stages. Adults are first observed as early as the end of May or as late as mid-June, peak in late June or early July, and disappear by mid-to late July. By August, almost all adults have died in the field (Spomer *et al.* 2004a). Females lay their eggs along sloping banks of creeks in areas where the salt layer is exposed in the soil horizon, in barren salt flats of saline wetlands, or along saline stream edges that are found in close association with water, near a seep or stream. During the night, female Salt Creek tiger beetles lay about 50 eggs in burrows (Farrar 2003, Allgeier *et al.* 2004). After the egg hatches and the young larva emerges from the burrow, the larva digs a burrow and uses its head to scoop out soil. Larval burrows can occur throughout a saline streambank and on barren salt flats of saline wetlands. Based on field observations, numerous saline seeps cause variation in soil moisture and salinity in the streambanks that allow burrows to occur away from the water's edge (W. Allgeier, pers. comm. 2005).

The small larva waits at the top of its burrow and ambushes prey that passes near the burrow entrance. The larva will plug its burrow and retreat inside during periods of high water, very hot weather, or very dry conditions. As the larva grows, it molts to a larger instar (a life stage between molts), enlarging and lengthening its burrow. For the most part, a Salt Creek tiger beetle larva will remain active until cold weather, at which time it plugs its burrow and hibernates. The Salt Creek tiger beetle has three instars. It probably overwinters as a third instar, pupates in May, and emerges as an adult. Before pupation, the larva seals its burrow entrance and digs a side chamber about 5 to 8 cm (2 to 3 in.) below the soil surface. After the adult emerges from the pupa, it remains in the chamber until its cuticle hardens.

Habitat

Tiger beetle species occur in many different habitats, including riparian habitats, beaches, dunes, woodlands, grasslands, and other open areas (Pearson 1988; Knisley and Hill 1992). Individual tiger beetle species are generally highly habitat-specific because

DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018-AJ13

Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Salt Creek Tiger Beetle (*Cicindela nevadica lincolniana*)

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Final rule.

SUMMARY: We, the U.S. Fish and Wildlife Service (Service), determine endangered status for the Salt Creek tiger beetle (*Cicindela nevadica lincolniana*), pursuant to the Endangered Species Act (Act) of 1973, as amended (Act). This species is endemic to the saline wetlands of eastern Nebraska (NE) and associated streams in the northern third of Lancaster County and southern margin of Saunders County. Only three small populations of this subspecies remain, and the known adult population size in 2005 was only 153 individuals. This final rule extends Federal protection and recovery provisions of the Act to the Salt Creek tiger beetle.

DATES: This final rule is effective November 7, 2005.

of oviposition (*i.e.*, the act of laying eggs) and larval sensitivity to soil moisture, composition, and temperature (Pearson 1988, Pearson and Cassola 1992). A common component of tiger beetle habitat appears to be open sunny areas for hunting and thermoregulation (an adaptive behavior to use sunlight or shade to regulate body temperature) (Knisley *et al.* 1990, Knisley and Hill 1992).

The Salt Creek tiger beetle occurs in saline wetlands—on exposed saline mudflats and along mud banks of streams and seeps that contain salt deposits (Carter 1989, Spomer and Higley 1993, LaGrange 1997). These saline habitats occur within the floodplain of Salt Creek and its tributaries in northern Lancaster and southern Saunders Counties. The habitats, especially the saline wetlands, receive their salinity from groundwater passing through an underground rock formation containing salts deposited by an ancient sea that once covered Nebraska (LaGrange 1997). Saline wetlands of eastern Nebraska are characterized by saline soils and halophytes (plants adapted to saline conditions). They usually contain a central area that is devoid of vegetation and, when dry, exhibit salt-encrusted mudflats (barren salt flats) (LaGrange 1997). These saline wetlands are used by Salt Creek tiger beetles and numerous other saline-adapted insects.

The Salt Creek tiger beetle has very narrow habitat requirements for breeding; they occur in saline wetlands, on exposed saline mud flats and gravel bars, or along mud banks of streams and seeps that contain salt deposits and are sparsely vegetated (Carter 1989; Spomer and Higley 1993; LaGrange 1997; Nebraska Game and Parks Commission (NGPC) 1999; Spomer *et al.* 2004a). Larvae have been found only on the moist salt-encrusted banks of Little Salt Creek in northern Lancaster County (Spomer *et al.* 2004a). The density of larval burrows decreases as vegetative cover increases (S. Spomer, University of Nebraska—Lincoln (UNL), pers. comm. 2002). Spomer *et al.* (2004a) indicated that adults show little flexibility in their selection of breeding habitat.

The earliest emerging adults sometimes move from creek banks to the salt flats, presumably for early prey. However, a week or two into emergence, this behavior stops and adults are found almost exclusively in wetter areas, like creek edges or seeps along the creek (Spomer *et al.* 2004a). During peak emergence, adults often wander from their emergence sites, presumably looking for new areas to colonize or

search for prey (Spomer *et al.* 2004a). It is during this time that adults often appear on sand or gravel bars, or on less saline soils along the stream. Salt Creek tiger beetles require these open barren areas to construct larval burrows, thermoregulate, and forage, and for use as dispersal corridors (Spomer and Higley 1993; L. Higley, UNL, pers. comm. 2002; S. Spomer, UNL, pers. comm. 2002). The Salt Creek tiger beetle is adapted to brief periods of high-water inundation and highly saline conditions (Spomer and Higley 1993).

Distribution and Status Overview

The Salt Creek tiger beetle currently has one of the most restricted ranges of any insect in the United States (Spomer and Higley 1993, Spomer *et al.* 2004a); it only occurs along limited segments of Little Salt Creek and adjacent remnant salt marshes in Lancaster County, Nebraska. To assess the historical and current distributions and populations of Salt Creek tiger beetle, we have analyzed private and public insect collections, NGPC's Heritage database records, and surveys conducted over the past 15 years, as well as sought the professional opinions of UNL entomologists who have studied or are studying the Salt Creek tiger beetle. Please see the proposed rule (70 FR 5101; February 1, 2005) for additional details about the historical records we consulted, and the historical distribution of the subspecies.

Recent Distribution and Abundance

Pearson and Cassola (1992) found that tiger beetle population size can be accurately estimated through visual counting due to the relative ease of observing and counting individuals, and because of their specialized habitat requirements. Visual counts have limitations (Horn 1976), but if they are conducted in a similar manner every year, they can provide relative population estimates and a good estimate of the health and stability of the populations surveyed (Allgeier *et al.* 2003). Intensive visual surveys conducted from 1991 through 2005 found Salt Creek tiger beetles at a total of 13 sites; although beetles were not found, nor were surveys conducted, at all 13 sites in all 15 years (Spomer *et al.* 2002, 2004a, 2004b; S. Spomer, UNL, pers. comm. 2005). Please see the proposed rule (70 FR 5101) for a description of the visual survey techniques used. In addition to visual count surveys, in 2002, researchers undertook a mark/recapture study of the Little Salt Creek—Arbor Lake population. The small sample size hampered the mark/recapture study,

thereby making conclusions about population size uncertain. This study has not been continued in subsequent years due to limited resources. Results obtained from this study in 2002 are discussed in the proposed rule (70 FR 5101).

Surveys conducted over a 15-year period establish that the Salt Creek tiger beetle is an extremely rare insect, numbering only in the hundreds and confined to an extremely small range. Visual surveys conducted from 1991 to 2005 show substantial annual fluctuations of total adult tiger beetles with 229, 150, 115, 473, 637, 631, 550, 308, 271, 309, 519, 777, 745, 558, and 153 found each year, respectively, although not all sites were surveyed in all years (Spomer and Higley 1993; Spomer *et al.* 1997, 1999, 2001, 2002, 2004a, 2004b; Allgeier *et al.* 2003, S. Spomer, UNL, pers. comm. 2005). The 2005 surveys found only 153 Salt Creek tiger beetles. This ranks as the third lowest count since 1991 and the lowest in the past 12 years. Over the last two years, the total number of Salt Creek tiger beetles observed through visual surveys has declined by about 80 percent (from 745 individuals in 2003 to 153 individuals in 2005).

We determined that some of the 13 “sites” could be combined into “populations” of Salt Creek tiger beetles when the following criteria were met—(1) close proximity of sites to each other (*i.e.*, nearby, contiguous, or neighboring); (2) distances less than 805 meters (m) (2,640 feet (ft)) between sites; and (3) the presence of both suitable saline wetland (*i.e.*, barren salt flats) and stream (saline edges) habitats that form a saline wetland/stream complex. The distance in criteria 2 above (805 m (2,640 ft)) is based on the 2002 mark/recapture study by Allgeier *et al.* (2003), which established that Salt Creek tiger beetles can move among nearby suitable habitats, as well as the distance at which Salt Creek tiger beetles may be attracted to artificial sources of light.

On the basis of the above criteria, our evaluation of the 13 survey sites resulted in the delineation of 6 different populations of Salt Creek tiger beetles, half of which have been extirpated since annual surveys began in 1991 (a population is considered extirpated after 2 consecutive years of negative survey results). The six Salt Creek tiger beetle populations, including the three that have been extirpated, are described below in order of abundance based on visual surveys conducted from 1991 to 2005—(1) Little Salt Creek—Arbor Lake; (2) Little Salt Creek—Roper; (3) Upper Little Salt Creek—North; (4) Upper Little Salt Creek—South; (5) Jack Sinn

Wildlife Management Area (WMA); and (6) Capitol Beach.

The last 3 populations on the above list are considered to be extirpated. The Upper Little Salt Creek—South population was located approximately 5 km (3 mi) upstream from the Little Salt Creek—Arbor Lake population. Degraded and nonfunctioning saline wetlands exist adjacent to Little Salt Creek, and although once devoid of vegetation, saline stream edge habitats are now vegetated at this site. The Upper Little Salt Creek—South population is considered extirpated because no Salt Creek tiger beetles have been found there since 1995. The Jack Sinn WMA population was made up of one survey site located on Rock Creek in southern Saunders and northern Lancaster Counties, approximately 20 km (10 mi) northeast of the Little Salt Creek—Arbor Lake population. Salt Creek tiger beetles from sites comprising the Jack Sinn WMA population have not been found since 1998 (Spomer *et al.* 1999, 2001, 2002, 2004a, 2004b; Allgeier *et al.* 2003, S. Spomer, UNL, pers. comm. 2005). This population is considered extirpated because no Salt Creek tiger beetles have been found there since 1998. Capitol Beach was once one of the largest saline wetland tracts in eastern Nebraska, with a size of approximately 150 ha (400 ac) (Cunningham 1985). Museum records between 1900 and 1972 indicate large numbers of Salt Creek tiger beetles at this site historically. In 1984, researchers conducted visual searches for the Salt Creek tiger beetle at Capitol Beach and other sites that appeared to provide suitable habitat (Spomer and Higley 2001). They found a low number of adults at Capitol Beach and noted that the habitat had been degraded (Spomer and Higley 1993). Today, all that remains of suitable habitat at Capitol Beach is a 10- to 20-m (40- to 50-ft) wide ditch that parallels Interstate 80 for approximately 0.8 km (0.5 mi), located southwest of the Interstate 80 and Airport Interchange. No individuals have been found at Capitol Beach since 1998 (Spomer *et al.* 2002, 2004a, 2004b; Allgeier *et al.* 2003; S. Spomer, UNL, pers. comm. 2005), leading us to conclude that this population is now extirpated. Please see the proposed rule (70 FR 5101) for additional information on these 3 populations.

We briefly describe the remaining 3 extant populations, with emphasis on new information. Please see the proposed rule (70 FR 5101) for additional details on these 6 populations.

Little Salt Creek—Arbor Lake Population

The Little Salt Creek—Arbor Lake area is a large, relatively intact saline wetland complex that contains the largest population of Salt Creek tiger beetles. The Little Salt Creek—Arbor Lake population is located approximately 1.6 km (1 mi) north of the Interstate 80 and North 27th Street Interchange on the northern city limits of Lincoln, NE. It exists along the saline stream edge of Little Salt Creek and on the barren salt flats of an adjacent saline wetland. This population was monitored from 1991 to 2005, and the adult population averaged 315 individuals per year over that 15-year period (Spomer and Higley 1993; Spomer *et al.* 1997, 1999, 2001, 2002, 2004a, 2004b; Allgeier *et al.* 2003; S. Spomer, UNL, pers. comm. 2005). The 2005 survey results were the third lowest count since 1991 and the lowest in the past 12 years. Over the last two years, visual surveys of Salt Creek tiger beetles in the Little Salt Creek—Arbor Lake population declined by about 80 percent.

Little Salt Creek—Roper Population

The Little Salt Creek—Roper population is the second largest remaining population of Salt Creek tiger beetles, based on visual surveys conducted from 1994 to 2005. This population is located immediately south of the Interstate 80 and North 27th Street Interchange, approximately 1.6 km (1 mi) downstream of the Little Salt Creek—Arbor Lake population. Similar to the Little Salt Creek—Arbor Lake population, this population is associated with a saline wetland and stream complex located along Little Salt Creek. Visual surveys were conducted from 1994 to 2005, and the population counts were 54, 161, 151, 144, 45, 55, 80, 85, 258, 162, 154, and 22 respectively (Spomer *et al.* 1997, 1999, 2001, 2002, 2004a, 2004b; Allgeier *et al.* 2003, S. Spomer, UNL, pers. comm. 2005). The 2005 survey results were the lowest count since monitoring began. Over the last two years, visual surveys of Salt Creek tiger beetles in the Little Salt Creek—Roper population declined by about 86 percent.

Upper Little Salt Creek—North Population

The Upper Little Salt Creek—North population is the third and last extant (*i.e.*, existing) population of Salt Creek tiger beetles. This population is located approximately 7.2 km (4.5 mi) upstream from the Little Salt Creek—Arbor Lake population, and exists only on the

saline stream edges of Little Salt Creek. Although former saline wetlands (*i.e.*, barren salt flats) exist adjacent to this population, these wetlands are degraded (drained because of the incisement of Little Salt Creek) and no longer provide suitable habitat for the Salt Creek tiger beetle. This population encompasses four sites along Little Salt Creek that were surveyed at various times during the period 1991 to 2005. Over the course of the 15-year survey period, 2 of the survey sites that comprise this population were surveyed at least 10 times. From 1991 to 1996, the number of adult beetles found in the Upper Little Salt Creek—North population averaged 32 individuals per year (Spomer and Higley 1993; Spomer *et al.* 1997). Since then, the number of adult beetles surveyed in the population has averaged about 6 individuals per year; the total number found in 2005 was 16 adult individuals (Spomer and Higley 1993; Spomer *et al.* 1997, 1999, 2001, 2002, 2004a, 2004b; Allgeier *et al.* 2003; S. Spomer, UNL, pers. comm. 2005). Higley and Spomer (pers. comm. 2002) presumed that this population was threatened with extirpation in the near future because of the low and decreasing number of adults found during surveys.

Conclusion of Salt Creek Tiger Beetle Population Review

The Salt Creek tiger beetle, highly specialized in habitat use, has probably always had a localized distribution. Visual surveys and mark-recapture results indicate that the number of Salt Creek tiger beetles is extremely small, even when compared to other federally listed tiger beetle taxa. Population numbers are even smaller than the federally listed threatened Northeastern beach tiger beetle (*Cicindela dorsalis dorsalis*) and Puritan tiger beetle (*C. puritana*). From 1989 to 1992, the number of Northeastern beach tiger beetles found during annual surveys at 65 sites in Maryland and Virginia ranged from 9,846 to more than 17,480 beetles (USFWS 1994). Surveys of Puritan tiger beetles in Maryland in 1989, 1991, 1992, and 1993 found an average of 6,389 beetles at 15 sites annually (USFWS 1993). Both the Northeastern beach tiger beetle and Puritan tiger beetle are well-studied insects and were listed as threatened under the Act in 1989 (55 FR 32088).

Museum collections and surveys conducted from 1991 through 2005 show that the number of known populations has declined from 6 to 3 in the last 9 years. Salt Creek tiger beetles were last found in the Upper Little Salt Creek—South population in 1995, and

no individuals have been found in either the Jack Sinn WMA or the Capitol Beach populations since 1998. Based on our analysis of the best available scientific information, including private and public insect collections, NGPC's Heritage database records, surveys conducted over the past 15 years, and professional opinions of UNL entomologists who have studied or are studying the Salt Creek tiger beetle, we conclude that the number of Salt Creek tiger beetle populations is declining and that the three remaining populations are immediately threatened with extinction. This is discussed further below in the Summary of Factors Affecting the Species section of this rule.

Previous Federal Action

For more information on previous Federal actions concerning the Salt Creek tiger beetle prior to 2002, please refer to the proposed rule to list the subspecies as endangered (70 FR 5101; February 1, 2005). On October 7, 2002, as part of an agreement regarding other species, the U.S. Department of the Interior reached an out-of-court settlement with several conservation organizations and agreed to make a final determination for listing the Salt Creek tiger beetle by no later than September 30, 2005. In the May 4, 2004, Candidate Notice of Review published in the **Federal Register** (69 FR 24876), the Salt Creek tiger beetle remained as a priority 3 candidate for Federal listing. On February 1, 2005, we published a proposed rule in the **Federal Register** (70 FR 5101) to list the Salt Creek tiger beetle as endangered. This final rule complies with the court order. We have updated the proposed rule to reflect new information concerning changes in distribution, status, and threats to the subspecies since publication of the proposed rule.

Summary of Comments and Recommendations

In the proposed rule published on February 1, 2005, we requested interested parties to submit factual reports or information that might contribute to the development of a final rule. A 60-day comment period closed on April 4, 2005. We contacted appropriate Federal agencies, State agencies, county and city governments, scientists, and other interested parties to request information and comments. A newspaper notice was printed in the *Lincoln Journal Star* on February 20, 2005. There were no requests for a public hearing during the comment period. Finally, we requested peer review in compliance with our peer

review policy (59 FR 34270; July 1, 1994).

During the public comment period, we received written comments (i.e., letters, facsimiles, and electronic messages) from 64 individuals, businesses, schools, organizations, and State and local government entities; and 1 request for an extension of the comment period. In all, 56 commenters supported the protection of the Salt Creek tiger beetle through a Federal listing, while 8 commenters opposed the listing. Of the 56 commenters supporting the listing, 3 letters were signed by 32 organizations and individuals. We treated these as 3 individual comments of support. Issues and concerns raised by the commenters, and our responses to each are summarized below:

Issue 1: Some commenters believed that, due to the few remaining populations of Salt Creek tiger beetles and the extensive habitat loss, immediate protection under the Act is necessary. In addition, a number of commenters expressed the need for the Service to also designate critical habitat.

Our Response: We determined that emergency listing was not necessary for this subspecies. However, we believe listing is warranted. Additionally, we have pursued numerous steps to protect the beetle prior to listing. These actions are discussed below. Regarding the designation of critical habitat for the Salt Creek tiger beetle, we believe critical habitat is both prudent and determinable. However, because of the critically imperiled status of Salt Creek tiger beetle, limited financial and personnel resources available to work on this taxon, and the Service's belief that listing confers greater protection on a species than does critical habitat, we have assigned a higher priority to promptly publishing the final rule for Salt Creek tiger beetle than to proposing and designating critical habitat, as allowed pursuant to section 4(b)(6)(C)(i). Funds have been budgeted for identification of critical habitat and work on a proposed designation is underway. We plan to publish a proposed rule to designate critical habitat for Salt Creek tiger beetle in the near future.

Issue 2: One commenter provided a photograph of a tiger beetle along the Missouri River at Ponca State Park in Dixon County, Nebraska, and asserted that "Salt Creek tiger beetles" were common in the area.

Our Response: A tiger beetle expert at the University of Nebraska-Lincoln identified the tiger beetle in the photograph as *Cicindela formosa*, which is not the Salt Creek tiger beetle.

Issue 3: Several commenters feared the potential effects that listing the Salt Creek tiger beetle could have on their use of private lands.

Our Response: On non-Federal property, if Salt Creek tiger beetles are not present and activities on the property do not result in take, the Act's section 9 prohibitions on take would not come into play. If Salt Creek tiger beetles are present on non-Federal property, but activities on the property would not result in take, section 9 prohibitions also would not come into play. If Salt Creek tiger beetles are present on non-Federal properties and activities on the property are likely to result in take, an incidental take permit may be available under section 10(a)(1)(B). As noted elsewhere in this rule, critical habitat has not been designated for this species. Once designated, additional regulations will regulate adverse modification of occupied and unoccupied critical habitat. The Service will provide technical assistance to landowner(s) and operator(s) to help them avoid, minimize, or mitigate any adverse impacts to the Salt Creek tiger beetle and its habitat.

Proposed activities authorized, funded, or carried out by a Federal agency are subject to the consultation requirements prescribed in section 7 of the Act. Circumstances under which a proposed Federal action or Federal nexus may affect the Salt Creek tiger beetle will be handled through consultation with the involved Federal agency and applicant(s), as necessary, on a case-by-case basis, in accordance with section 7 of the Act.

Issue 4: Concerns were raised that listing the Salt Creek tiger beetle under the Act would have adverse economic and social effects on the City of Lincoln and Lancaster County by limiting residential, commercial, and industrial developments and agricultural use of lands. These commenters requested that the Service consider and analyze the possible socioeconomic impacts of the listing action.

Our Response: Under section 4(b)(1)(A) of the Act, we must base a listing decision solely on the basis of the best scientific and commercial data available. The legislative history of this provision clearly states the intent of Congress to "ensure" that listing decisions are "based solely on biological criteria and to prevent non-biological criteria from effecting such decisions" (H. Rept. 97-835). The Conference Report on the 1982 amendments to the ESA notes that economic considerations have no relevance to determinations regarding the status of species.

Economic considerations will be taken into full account when designating critical habitat, as required by the Act.

Issue 5: A few commenters noted that the Salt Creek tiger beetle is insignificant to mankind and that insects should not be protected under the Act.

Our Response: The Act recognizes the importance of all species to properly functioning ecosystems and requires us to protect species in danger of extinction and the ecosystems on which they depend. Section 3(8) of the Act defines "the term 'fish or wildlife' (as) * * * any member of the animal kingdom, including without limitation any mammal, fish, bird (including any migratory, nonmigratory, or endangered bird for which protection is also afforded by treaty or other international agreement), amphibian, reptile, mollusk, crustacean, arthropod or other invertebrate, and includes any part, product, egg, or offspring thereof, or the dead body or parts thereof." Based on the best available scientific information, we have determined that the Salt Creek tiger beetle is in danger of extinction and warrants protection as an endangered species.

Issue 6: One commenter referenced "Tiger Beetles: The Evolution, Ecology, and Diversity of Cicindelas" (Pearson and Vogler 2001) and concluded that: (1) There is nothing unique about the Salt Creek tiger beetle, including its biology; (2) there are many other species of tiger beetles; and (3) other tiger beetle species have gone extinct without any human-related causes.

Our Response: (1) As noted above, Busby (2003) examined populations of *Cicindela nevadica* in the central Great Plains and confirmed that *C. n. lincolniiana* is distinctive from other populations of *C. nevadica* in the central Great Plains. (2) We do not dispute this claim. As noted above, 85 species and more than 200 subspecies of tiger beetles in the genus *Cicindela* are known from the United States (Boyd *et al.* 1982; Freitag 1999). (3) The Service does not dispute the assertion that other species of tiger beetles have gone extinct without human related causes. However, the Act requires the Service to take action to conserve endangered and threatened species, and the ecosystems on which they depend, regardless of the cause. The Salt Creek tiger beetle faces an imminent risk of extinction.

Coincidentally, Dr. David L. Pearson, co-author of "Tiger Beetles," was asked to provide a peer review of the proposed rule. In his review, he stated, "The present proposal for the Salt Creek tiger beetle is by far the most detailed study of potentially threatened or endangered

tiger beetles I have seen. The population levels, local extinction, and robust data on surviving remnant colonies are scientifically sound and reliable. There is little doubt in my mind reading this document that the Salt Creek tiger beetle will most likely go extinct in a relatively short time if no action is taken."

Issue 7: Several commenters dispute the Service's claim that cattle grazing is a threat to the Salt Creek tiger beetle and its habitat.

Our Response: Landowners who employ sound grazing management practices, including watering sources, generally do not adversely impact Salt Creek tiger beetles. However, uncontrolled congregation of cattle in areas where Salt Creek tiger beetle larvae exist can result in the trampling of both larvae and their burrows. In addition, areas that are overgrazed are susceptible to both rain and wind erosion, which can result in sediment covering Salt Creek tiger beetle burrows. Further, erosion of sediment into Salt Creek tiger beetle habitat from overgrazed areas can change the topographic elevation of the habitat and render it unsuitable.

Issue 8: One commenter objected to the use of the term "applied annually" in the pesticides portion of Factor E in the Summary of Factors Affecting the Species section below.

Our Response: We have modified the sentence and eliminated the word "annually."

Issue 9: Several commenters expressed their view that agriculture is more environmentally friendly today than it traditionally was in the past. Some stated that they rarely use pesticides, especially insecticides. They also mentioned the use of crop rotation between soybeans, grain sorghum, and corn to help manage pest problems on a yearly basis. Additionally, they referred to the current existence of buffer strips along Little Salt Creek that serve to "handle" any contamination problems. Another commenter stated that agriculture and croplands in the watershed have little effect on Salt Creek tiger beetle survival since "insecticide use is very limited and controlled and water conservation structures continue to be installed."

Our Response: We are pleased to hear about instances where farmers minimize the use of pesticides. However, this does not fully address our concern with pesticides, especially insecticides, and their potential impacts to Salt Creek tiger beetles. As long as there are registered pesticides licensed for use on field crops (including soybeans, grain sorghum, and corn), there will be a potential for pesticide use in areas

where Salt Creek tiger beetles are found. Pesticides also are used for purposes other than controlling pests in field crops. A primary example is mosquito control, particularly due to the presence of West Nile Virus in Nebraska. Buffer strips and other water control structures provide some level of protection from this factor. Farmers who do not utilize pesticides, or who use ground applicators and buffer strips, or other considerations for the Salt Creek tiger beetle, are not likely to "take" tiger beetles, and so are not likely to be impacted by the listing.

Issue 10: One commenter referred to a water study that the Nebraska Department of Environmental Quality (NDEQ) conducted in Little Salt Creek from 1977 to 1994. The commenter stated that "the study confirmed that no pesticides of concern were found that would [affect the Salt Creek tiger beetle according to John Bender of NDEQ."

Our Response: The NDEQ study consisted of one sediment sample and one water sample, taken at one location and analyzed for a limited number of insecticides. More information regarding the Service's concerns with insecticides (including, but not limited, to those associated with agriculture) is provided in response to Issue 8 above and in the pesticides portion of Factor E in the Summary of Factors Affecting the Species section below.

Issue 11: One commenter stated that there are beetles in Africa that feed upon corn stocks. This commenter implied that the Salt Creek tiger beetle also could become a pest if allowed to increase its numbers.

Our Response: While some species of beetles are known to be agricultural pests, no evidence exists to indicate that tiger beetles and specifically, Salt Creek tiger beetles, are agricultural pests. As mentioned above in the Background section, the Salt Creek tiger beetle is a predatory insect that captures small arthropods. They are not known to eat corn stocks or other vegetation.

Issue 12: One commenter indicated that the Salt Creek tiger beetle is in danger of extinction because of the natural changes to the habitat in Little Salt Creek as opposed to human-induced changes.

Our Response: The human-induced impacts that have caused the loss and degradation of the Salt Creek tiger beetle's habitat in the Salt Creek watershed are documented under Factor A in the Summary of Factors Affecting the Species section below.

Issue 13: It was suggested that: (1) Our references cited should be listed in the proposed rule; and (2) that a number of the references cited in the proposed rule

had not been peer reviewed and should have been prior to being used in the proposed rule.

Our Response: (1) As noted in the proposed rule, a complete list of references cited is available upon request. Accordingly, we provided the commenter with a compact disk that contained the list of references cited as well as copies of all documents on the list. (2) The Act requires us to make listing determinations on the basis of the best scientific and commercial data available. Peer review is a consideration in determining what constitutes the best data available, but not the sole consideration. However, the Service is committed to ensuring reliance upon accurate, reliable, and unbiased information. To the greatest extent practicable and appropriate, information that we rely upon is internally reviewed for quality, including objectivity, utility and integrity. Additionally, in accordance with our July 1, 1994, Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities (59 FR 34270), we solicited peer reviews from seven experts in the field of entomology who have extensive experience with tiger beetles, to help ensure that our listing decision was based on scientifically sound data, assumptions, and analyses. Five of these experts provided peer reviews. The results of the peer review are discussed below in the Peer Review section of this rule.

Issue 14: It was suggested that historical data are lacking and that recent counts are suspect.

Our Response: We have no reason to believe that the information we have used to make our determination is suspect. The commenter did not provide specific examples supporting shortcomings in historic records or current sampling methods. Peer reviews of this rule support our conclusion that based on best scientific and commercial data available, the Salt Creek tiger beetle faces imminent extinction unless preventive conservation measures are employed to reverse the current trend.

Issue 15: A few commenters stated that the Salt Creek tiger beetle should not be listed until a recovery plan or action plan is developed and approved. In addition, there needs to be an "estimated probability" that the Salt Creek tiger beetle will be saved by the recovery/action plan.

Our Response: Listing the Salt Creek tiger beetle will initiate recovery planning. During the Federal recovery planning process, a recovery team develops a recovery plan that establishes a framework for the conservation of the species. A recovery

plan sets objectives and priorities, such as habitat restoration or enhancement, development of reintroduction protocols, and identification of potential release sites. It also assigns responsibilities to achieve those objectives, and estimates the associated costs of completion. Due to the countless variables involved, estimating the probability of recovery may not be possible. That said, the ultimate purpose of the recovery plan is to identify the necessary steps needed to conserve and recover the Salt Creek tiger beetle.

Issue 16: One commenter requested an additional 120-day comment period based on scientific uncertainty and economic impact of the proposed listing action.

Our Response: For the following reasons we denied an extension of the comment period: (1) economic impacts can not be considered in a final listing determination; (2) the Service does not believe there is any scientific uncertainty regarding the status of this subspecies, nor did the commenter provide any substantive information to illuminate this claim; and (3) the time constraints of an out-of-court settlement agreement required a final determination regarding the proposed listing action by September 30, 2005.

Issue 17: A few commenters said that the State and local governments were doing an adequate job of protecting the Salt Creek tiger beetle under their existing authorities and that Federal protection under the Act was unnecessary.

Our Response: We acknowledge that the City of Lincoln, Lancaster County and the State of Nebraska have been undertaking actions beneficial to the Salt Creek tiger beetle. Existing regulatory mechanisms that provide protection for the Salt Creek tiger beetle include: federally-implemented regulatory mechanisms such as the National Environmental Policy Act (NEPA) and section 404 of the Clean Water Act (CWA); State-implemented regulatory mechanisms such as the Nebraska State Water Quality Standards (as required by section 401 of the CWA) and the Nebraska Nongame and Endangered Species Conservation Act (NESCA); and local conservation planning efforts such as the 2002 City of Lincoln and Lancaster County Comprehensive Plan (Comprehensive Plan), the Little Salt Creek Valley Planning Cooperative Agreement co-sponsored by The Nature Conservancy (TNC), NGPC, and the Saline Wetland Conservation Partnership (SWCP) (a local conservation plan). However, Federal, State, and local laws,

regulations, and policies have not been sufficient to prevent past and ongoing losses of Salt Creek tiger beetle habitat. Federal listing under the Act will provide additional protections. This issue is discussed under Factor D in the Summary of Factors Affecting the Species section below.

Also of significance to this issue, the Nebraska Game and Parks Commission recently commented on the proposed rule, " * * * for the agencies to ultimately be successful in preventing the extinction of this highly endangered species, the Commission believes that it is necessary to utilize the regulatory oversight and funding resources that can be made available by (Federal) listing the Salt Creek tiger beetle as a federal endangered species."

Issue 18: The City of Lincoln requested that the Service proceed with a final decision on whether to list the Salt Creek tiger beetle to eliminate the existing uncertainty, and to allow the City to move forward with planning decisions and development proposals.

Our Response: We understand the City's desire for a decision on this matter. In this action, the Service has finalized the proposal to list the Salt Creek tiger beetle as endangered under the Act.

Issue 19: The City of Lincoln identified numerous conservation measures and actions it has taken to protect and preserve the saline wetlands of eastern Nebraska and the Salt Creek tiger beetle. The City expressed conditional support for listing the Salt Creek tiger beetle, provided that there would be adequate Federal funding to establish science-based habitat needs to guide future growth of the City and Lancaster County while protecting the tiger beetle.

Our Response: We appreciate the efforts of the City of Lincoln and Lancaster County to work with us and other government entities, organizations, and landowners to protect the Salt Creek tiger beetle and its habitat. To date, the Service has provided funds under authority of section 6 of the Act to the City and County, to help with the purchase of high-priority habitats for the Salt Creek tiger beetle. In addition, section 6 funds have been made available to the University of Nebraska-Lincoln for research studies. We also have provided technical assistance to the City/County Planning Department by providing comments and recommendations for authorized or funded projects and activities that may impact the Salt Creek tiger beetle and its habitat. We look forward to continued work with the City/County and their partners in the

future, to allow for future growth of the City/County while protecting the Salt Creek tiger beetle and saline wetlands of eastern Nebraska. Although we cannot guarantee Federal funding will be provided in the future, we will make every effort to secure it.

Peer Review

In accordance with our July 1, 1994, Interagency Cooperative Policy for Peer Review in Endangered Species Act Activities (59 FR 34270), we solicited peer reviews from experts in the field of entomology who have extensive experience with tiger beetles. The purpose of such a review is to ensure that listing decisions are based on scientifically sound data, assumptions, and analyses, including input from appropriate experts. We received comments from five expert reviewers; four of the five experts have provided the Service with peer reviews on previous listing actions involving tiger beetles. Three research professors (from Denison University, Granville, Ohio; Arizona State University, Tempe, Arizona; and Randolph-Macon College, Ashland, Virginia) provided independent peer review. These experts have had direct experience with rare and federally listed tiger beetles throughout the United States and the world. In addition, two Salt Creek tiger beetle experts—a research technologist in entomology (with an M.S. degree) in the Entomology Department of the University of Nebraska-Lincoln, and a UNL entomology graduate student (who subsequently received an M.S. for his work on the Salt Creek tiger beetle)—reviewed the rule, particularly in regard to our interpretation of data on the status, trends, habitat requirements, and other biological requisites of the Salt Creek tiger beetle. The UNL research technologist has more direct field research experience on the Salt Creek tiger beetle than anyone, and the graduate student has conducted important research on the life history, habitat requirement, and captive rearing potential of the beetle. Both have published peer-reviewed scientific articles on the Salt Creek tiger beetle. Their review of the rule has helped ensure the scientific soundness of our interpretations and analyses.

All five experts strongly supported listing of the Salt Creek tiger beetle as endangered, based on the best available scientific information. Two experts provided corrections on minor factual issues, interpretation of the data, and citations. One reviewer identified that the proposed rule lacked information regarding a molecular phylogeny study that could be used to indicate the

relationship within *Cicindela nevadica* and between other species of tiger beetles. However, his comments indicated that the lack of this information does not diminish the information presented in the proposed rule and the need to list the Salt Creek tiger beetle. The expert further stated that molecular phylogenetic studies of the Salt Creek tiger beetle could prove that this tiger beetle is a separate species, thus strengthening the argument for protection. All of the experts' information has been incorporated into this final rule where appropriate.

We also received comments from entomologists across the United States who have conducted research on tiger beetles, including the federally threatened Northeastern beach tiger beetle and Puritan tiger beetle. These reviewers also supported the listing of the Salt Creek tiger beetle under the Act, based on the information in the proposed rule.

In summary, no information was received from scientific experts to indicate that the Salt Creek tiger beetle is more widespread or less threatened than we had previously determined in the proposed rule. All peer reviewers support the endangered listing.

Summary of Factors Affecting the Species

Section 4 of the Act (16 U.S.C. 1533) and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth procedures for determining a species or subspecies to be endangered or threatened due to one or more of the five factors described in section 4(a)(1) of the Act. These factors and their application to the Salt Creek tiger beetle are as follows:

A. Present or Threatened Destruction, Modification, or Curtailment of Habitat or Range

Background

As discussed in the proposed rule (70 FR 5101; February 1, 2005), the greatest threat to the Salt Creek tiger beetle is habitat destruction (Ratcliffe and Spomer 2002). Like many insects, the Salt Creek tiger beetle's close association with specific habitats—salt barrens and stream edges—leaves it particularly vulnerable to habitat destruction and alteration through direct and indirect means (Pyle *et al.* 1981). The saline wetlands of eastern Nebraska, associated saline streams, and freshwater wetlands used by the Salt Creek tiger beetle as dispersal habitat have undergone extensive degradation

and alteration for commercial, residential, transportation, and agricultural development since the late 1800s, and are the most restricted and imperiled natural habitat type in the State (Gersib and Steinauer 1991).

In order to understand the complexity and immediacy of threats to the Salt Creek tiger beetle, it is necessary to understand when and how the destruction and degradation of the beetle's saline wetland and associated stream habitats took place. This is discussed at length in the proposed rule (70 FR 5101), and we refer the reader to that proposal for additional details beyond what is summarized here. The saline wetlands and associated streams of eastern Nebraska began to be ditched, drained, and filled beginning in the 1800s, (Murphy 1992; Russ *et al.* 2003). From the 1930s to the 1950s, saline wetlands continued to be destroyed for the development of Lincoln (Farrar and Gersib 1991), and in the 1960s, the construction of Interstate 80 resulted in additional filling, dredging, diking, draining, and diversion in the heart of the remaining Salt Creek tiger beetle habitat (Farrar and Gersib 1991). Commercial and residential developments, along with road construction, have resulted in the loss or degradation of the vast majority of barren salt flat and saline stream edge habitat for the Salt Creek tiger beetle.

The three remaining Salt Creek tiger beetle populations are being surrounded by commercial and residential development (Ratcliffe and Spomer 2002). Although the construction of buildings, homes, roads, schools, and parking lots is not occurring directly on salt flats and saline stream edges, these projects are occurring adjacent to these habitats. Such projects have resulted in the creation of impervious surfaces (e.g., access roads, parking lots) that do not allow precipitation to seep into the ground. Instead, these surfaces create frequent, high-volume freshwater runoff flows that enter the saline wetlands and associated streams, diluting their salinity and altering hydrology. In addition, runoff originating from other nearby, but not necessarily adjacent, residential and commercial developments and associated roads flows through constructed drainages, storm sewers, and tributaries, and contributes to an increase of freshwater inflow into saline wetlands and their associated streams.

Reduced salinity concentrations and increased sedimentation on barren salt flats and along saline stream edges have allowed the invasion of vegetation such as *Typha angustifolia* (cattail) and *Phalaris arundinacea* (reed canary

grass) into habitats used by the Salt Creek tiger beetle. These plants, ordinarily unable to tolerate high salinity, are aggressive invaders that convert sunny, barren salt flats into habitat that is dominated by an herbaceous overstory. Additionally, sedimentation from runoff at construction sites allow for fine silts to deposit on flats allowing for increased vegetation encroachment. The resulting vegetated habitat is unsuitable for use by the Salt Creek tiger beetle. The overstory shades out open, sunny areas required by the Salt Creek tiger beetle to thermoregulate, forage, and oviposit (M. Fritz, NGPC, pers. comm. 2001). Increased vegetative encroachment is the primary factor attributed to the extirpation of several populations of other *Cicindela* species (Knisley and Hill 1992).

Reduced salinity concentrations have resulted in other direct impacts. Based on field and laboratory studies using *Cicindela circumpecta* and *C. togata*, two tiger beetle species that are co-inhabitants with the Salt Creek tiger beetle on salt flats, Hoback et al. (2000) found that salt is required for ovipositing. Allgeier et al. (2004) concluded that a species-specific preference for salt and soil moisture regimes is important to habitat partitioning and reduction in competition between the Salt Creek tiger beetle and other tiger beetles. Hoback et al. (2000) also discovered that changes in salinity and hydrology may alter the abundance of prey and cause the loss of suitable larval habitat for saline wetland-dependent species of tiger beetles, including the Salt Creek tiger beetle. Once the hydrologic regimes of these saline wetlands and associated streams used by the Salt Creek tiger beetle are altered by salinity changes (often leading to vegetation encroachment), stream incisement (which lowers the water table), or other impacts such as bank stabilization, restoration and recovery of the habitats can be difficult (Langendoen et al. 2000) and expensive (see, for example, <http://www.environmentaltrust.org/work/awards.htm>).

Past and Present Habitat Quality and Quantity

A number of studies have attempted to quantify the amount and rate of habitat loss for the saline wetlands of eastern Nebraska. All of these studies confirm the extensive loss of saline wetlands, but vary in terms of their estimates for the total acres lost due to differences in data and methods of analysis. These various studies are discussed at length in the proposed rule

(70 FR 5101). In 1993 and 1994, a team of biologists from various Federal and State agencies completed an intensive assessment, inventory, and categorization of the saline wetlands of eastern Nebraska. This assessment identified 98 sites that could be categorized as Category 1 saline wetlands comprising approximately 1,346 ha (3,327 ac) (Gilbert and Stutheit 1994). Category 1 saline wetlands provide saline wetland functions of high value or have the potential to provide high value following restoration or enhancement (Gilbert and Stutheit 1994). LaGrange (2003) further examined the Gilbert and Stutheit (1994) analysis, and divided Category 1 saline wetlands into three sub-classes: (1) not highly degraded and still functioning—totaling 85 ha (210 ac) (6 percent); (2) degraded, but still functioning as a saline wetland, and capable of restoration to full function—totaling 1,249 ha (3,087 ac) (93 percent); and (3) degraded and not functioning as a saline wetland, but restorable to full function—totaling 12 ha (30 ac) (1 percent).

Although it is important to discuss the overall loss of saline wetlands, the impact of that loss on the Salt Creek tiger beetle can only be fully assessed by considering the loss of barren salt flat and saline stream edge habitats that occur within the confines of Category 1 saline wetlands. We expanded on the analyses completed by LaGrange (2003) and Gilbert and Stutheit (1994) to complete such an assessment. Using a Geographic Information System (GIS), we did a habitat assessment of the remaining barren salt flat and saline stream edge habitats present within the remaining Category 1 saline wetlands. Using National Hydrography Dataset information (available online at <http://nhd.usgs.gov>) and all known locations of Salt Creek tiger beetles, we delineated saline stream edge habitat (J. Runge, USFWS, pers. comm. 2003). Next, we delineated barren salt flat habitat through the use of a feature-extraction process that would select areas containing similar spectral signatures of known barren salt flats. Finally, we evaluated our GIS analysis qualitatively by ground-truthing select polygons within the barren salt flat GIS layer.

Results from our assessment indicate that the total remaining areas of barren salt flat and saline stream edge habitat that exist within the saline wetlands of the Little Salt Creek and Rock Creek watersheds plus the remnant Salt Basin (*i.e.*, Capitol Beach) are approximately 15, 33, and 1 ha (38, 81, and 3 ac), respectively, for an overall total of 49 ha (122 ac). In consideration of the analysis

completed by LaGrange (2003), we then conducted a spatial analysis to determine the amount of habitat currently available for the Salt Creek tiger beetle that is not highly degraded. The analysis separated coded barren salt flats into Category 1 subclasses identified by LaGrange (2003). Our analysis revealed that only approximately 6 ha (15 ac) out of the total 49 ha (122 ac) of coded salt barrens are not highly degraded. It is these remaining 6 ha (15 ac) of not highly degraded barren salt flats and saline stream edges that provide habitat for the Salt Creek tiger beetle.

As the quality of saline habitat continues to decline through reduction in size, encroachment of herbaceous species, and modification to hydrology, so too does the likelihood that the Salt Creek tiger beetle can survive and avoid extinction. Most of the habitat delineated in our analysis is composed of extremely small habitat complexes (*i.e.*, less than 0.04 ha (0.09 ac)) that are unlikely to provide all of the necessary life history requirements that the Salt Creek tiger beetle needs to survive. Further, these small habitats are in clusters resembling mosaics, separated by herbaceous overstory. This spatial dispersion precludes the use of these small areas by the Salt Creek tiger beetle. In addition, the loss of saline and freshwater wetlands further reduces the connectivity between populations. The loss of travel corridors eliminates genetic interchange and the ability to repopulate after catastrophic events (Murphy et al. 1990; Fahrig and Merriam 1994; Ruggerio et al. 1994; Noss et al. 2002). Spomer et al. (2004) reported that no Salt Creek tiger beetles were found in these small habitats in the 13 years that surveys were conducted. Carter (1989), NGPC (1999), Ratcliffe and Spomer (2002), Spomer and Higley (1993 and 2001), Spomer et al. (1997), and Allgeier et al. (2003) all concluded that the declining number of populations of Salt Creek tiger beetles is due to the loss of suitable saline wetland and stream habitat.

Urban Development and Road Construction

Commercial and residential urban development and road construction are the greatest threats to the saline wetlands of eastern Nebraska and the plant and animal species that depend upon these habitats (Gilbert and Stutheit 1994; Ratcliffe and Spomer 2002). Urban expansion of the City of Lincoln (Lincoln) and Lancaster County, fueled by growth in the human population of both the City and County, has contributed to the decline of the saline

wetlands of eastern Nebraska and associated streams, and the potential extinction of endemic taxa that use these areas, such as the Salt Creek tiger beetle. This growth and expansion was discussed in detail in the proposed rule (70 FR 5101), and that rule should be consulted for more specifics. The accelerated population growth rate of the region has become particularly evident in the last year, as illustrated by urban and infrastructure developments (discussed below) that threaten the continued existence of the Salt Creek tiger beetle and its limited remaining habitat.

All three extant populations of Salt Creek tiger beetles may be threatened with extirpation as a result of expansion of urban development and road construction in Lincoln and Lancaster County. A review of 1989 and 2002 aerial photographs revealed that over 50 percent of the area surrounding the Little Salt Creek—Roper population (a 1,300-ha (3,200-ac) area bounded by Interstate 80 to the North, Salt Creek to the South, North 27th Street to the West, and Highway 77 to the East) has been developed within the last 5 years. The 2005 population survey results for this population were the lowest since monitoring began in 1991, with significant declines observed in each of the last three years. We reviewed the Comprehensive Plan and found that an additional 30 to 40 percent of the area surrounding the Little Salt Creek—Roper population has been planned for residential and commercial development over the next 25 years. However, given the current rate of growth and development surrounding this population, this additional area will likely be developed more quickly. In some cases, the local municipal development permits for the expansion have already been acquired (including some floodplain permits from Lincoln) (R. Harms, pers. obs. 2002 and 2003).

Development is currently underway in areas adjacent to the remaining segments of habitat for all three Salt Creek tiger beetle populations. These developments have already changed the drainage patterns in some areas, resulting in the introduction of excess freshwater, sediment, and contaminated urban runoff to saline habitats occupied by the Salt Creek tiger beetle. There also are planned highway projects which could adversely impact the species due to increases in freshwater runoff, vegetative encroachment, risks of toxic spills, and alteration of drainage patterns.

Increased vehicle traffic due to road improvements can increase the amount of contaminated runoff flowing into

Little Salt Creek from vehicles and roadway surfaces. Highway runoff contains a variety of chemical constituents, many of which can be harmful to the environment when washed from roads by rain and snowmelt into adjacent surface waters, groundwater, and ecosystems (Bricker 1999). Contaminated runoff can impact the Salt Creek tiger beetle through toxic effects to the beetle, its prey base, and its habitat. For the expansion of Interstate 80, the Federal Highway Administration (FHWA) and Nebraska Department of Roads have identified measures that reduce concentrations of hazardous and toxic contaminants in highway runoff, and a contingency plan for accidental spills that would threaten two populations of Salt Creek tiger beetles (FHWA 2003). However, other planned non-Federal road and street projects that will be constructed after the Interstate 80 expansion do not currently address impacts to Salt Creek tiger beetle populations from road runoff.

Agriculture

Agricultural practices in the area also may threaten the limited Salt Creek tiger beetle habitat, especially for the Upper Little Salt Creek—North and Little Salt Creek—Arbor Lake populations. Livestock over-grazing can destroy or substantially degrade habitats for adult and larval forms of the Salt Creek tiger beetle through trampling, which can destroy Salt Creek tiger beetle larvae burrows and the larvae that inhabit them (Spomer and Higley 2001). Cattle grazing also can compact soil and modify soil hydrology, gradually drying out a site and making it unsuitable for adults and larvae (which prefer moist, muddy sites with encrusted salt on soil surfaces). Further, erosion of sediment into Salt Creek tiger beetle habitat from overgrazed areas can change the topographic elevation of the habitat and render it unsuitable. The Upper Little Salt Creek—North population occurs along a segment of Little Salt Creek that flows through a pasture, and one of these population survey sites may have been negatively impacted by cattle grazing (Spomer and Higley 2001; Spomer et al. 2004a). After cattle grazing was halted at this site in 2004, the habitat improved and observed population numbers increased (Spomer et al. 1997, 1999, 2001, 2002, 2004a, 2004b; Allgeier et al. 2003; S. Spomer, UNL, pers. comm. 2005).

Cultivation also poses a threat to the largest remaining population of Salt Creek tiger beetles, the Little Salt Creek—Arbor Lake population. Cultivation can increase sediment

erosion that can cover larval burrows as well as change soil salinity and encourage vegetative encroachment. Such areas may no longer be suitable for ovipositing, larval, or foraging habitat. When an area of larval habitat becomes degraded and then disappears, so does the species that it supports (Dunn 1998). The data now support this assertion. After one such site adjacent to a cultivated field was plowed in the fall/winter of 2002/2003, the habitat became increasingly vegetated, and observed counts declined from 45 in the summer of 2002 to zero in 2005 (Spomer et al. 2002, 2004a, 2004b; Allgeier et al. 2003; S. Spomer, UNL, pers. comm. 2005; Robert Harms, USFWS, pers. comm. 2005). Such cultivation may also result in the introduction of pesticides into adjacent saline wetlands unless a vegetative buffer is in place. Historic and anticipated impacts related to flooding are discussed later in Factor E of the Summary of Factors Affecting the Species section of this rule.

Stream Channelization, Bank Stabilization, and Incisement

In Nebraska, many river and stream systems, including Salt Creek and its tributaries, have undergone extensive channelization for flood control to protect both agricultural and urban developments. Channelization of Salt Creek from Lincoln to Ashland, Nebraska, was done a section at a time from 1917 to 1942 by the Army Corps of Engineers (COE) (Farrar and Gersib 1991; Murphy 1992). In the 1950s, the COE and USDA further modified the area when they developed and implemented a flood control plan that involved the construction of levees, reservoirs, and additional channelization of Salt Creek (Murphy 1992). Farrar and Gersib (1991) found that the greatest alteration of saline wetlands in the Little Salt Creek and Rock Creek drainages resulted from the channelization of Salt Creek. Channelization of Salt Creek encouraged tributary streams (Little Salt Creek, Oak Creek, Rock Creek, and Middle Creek) to head-cut, carving deeper into their beds to adjust to the change in stream bed gradients. Straightening stream channels leads to a state of instability, often causing stream entrenchment and corresponding changes in morphology and stability (Rosgen 1996). The lowering of tributary streambeds in the Salt Creek drainage resulted in the degradation and loss of saline wetlands by draining and lowering the water table and diluting salt concentrations with fresh water, which led to vegetative encroachment (Wingfield et al. 1992).

In 1992, the largest population of Salt Creek tiger beetles, the Little Salt Creek—Arbor Lake population, was significantly impacted by a stream channelization and bank stabilization project along Little Salt Creek (Spomer and Higley 1993; Farrar 2003). In an attempt to control erosion and bank sloughing and to prepare for the widening of North 27th Street, a portion of Little Salt Creek was straightened, and its banks were armored with rock riprap. These actions destroyed about one-half of the remaining prime habitat for the Salt Creek tiger beetle along Little Salt Creek (Spomer and Higley 1993; Farrar 2003). Based on surveys conducted in 1991 and 1992, the Little Salt Creek—Arbor Lake population exhibited a corresponding 55 percent decline (from 171 to 94) after the project was completed (Spomer and Higley 1993). In this circumstance, stabilization of about half of the bank resulted in the loss of over half of the population of Salt Creek tiger beetles. It is unclear why the population at the site was able to recover following such an event, but it is possible that favorable weather conditions, suitable habitat within the tiger beetle's travel distance, or other unknown factors could have contributed to their survival.

The lower portion of Little Salt Creek, where the two largest remaining populations of Salt Creek tiger beetles exist, has become deeply incised by human activities, resulting in the creation of vertical stream banks measuring approximately 6 to 9 m (20 to 30 ft) in height (J. Cochnar and R. Harms, USFWS, pers. obs. 2002). Bank sloughing is covering saline stream edges and reducing the amount of suitable habitat for the two populations. The Little Salt Creek—Arbor Lake and Little Salt Creek—Roper populations of the Salt Creek tiger beetle may have been able to survive because they exist in areas where there is still a functioning saline wetland and saline stream complex. However, if these two areas evolve into stable, vegetated, incised stream systems and the wetland habitats continue to receive freshwater runoff from surrounding urban development, the existing suitable habitats for the Salt Creek tiger beetle will likely be altered and no longer support these two populations. This could almost certainly result in the extinction of the Salt Creek tiger beetle, given that the remaining third population is so small.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Tiger beetles (genus *Cicindela*) are one of the most sought-after genera of beetles by amateur collectors because of their unique metallic colors and patterns as well as their fascinating habits (NGPC 1999; 66 FR 50340). Interest in the genus *Cicindela* is reflected in a journal entitled "Cicindela," which has been published quarterly since 1969 and is exclusively devoted to the genus. Even limited collection pressure on small populations of taxa such as the Salt Creek tiger beetle can have adverse impacts on a species' viability because of the loss of genetic variability it causes (Spomer and Higley 1993). At present, we do not know if the collection of adult Salt Creek tiger beetles is a factor contributing to its decline.

Regarding potential scientific overutilization, the Service and NGPC are funding studies on the Salt Creek tiger beetle to improve our understanding of its biology and habitat requirements with the ultimate goal of supporting captive rearing and transplantation. We believe this research will ultimately contribute to the conservation of the subspecies. Transplanting larvae of other species of rare tiger beetles has been conducted elsewhere by removing larvae from one site and introducing them to another unoccupied site. For example, successful larvae translocations of the federally listed Northeastern beach tiger beetle have been conducted at sites where populations were previously extirpated (Knisley *et al.* 2005). A preliminary recovery plan draft for the subspecies (Spomer *et al.* 2004) suggests that Salt Creek tiger beetles will need to be introduced into suitable, unoccupied habitats through the rearing and translocation of captive larvae. Captive-rearing of Salt Creek tiger beetle larvae for introduction into suitable saline habitats is underway through Service- and NGPC-funded studies at UNL (Allgeier *et al.* 2003). A small number of adult Salt Creek tiger beetles were captured and removed from their habitat, and subsequently placed in a laboratory setting. The removal of a small number of adults will slightly reduce a population in the short term, but if successful, such a program will preserve and enhance the genetic variability of the subspecies, as well as facilitate its recovery.

C. Disease or Predation

No information is available to determine if the Salt Creek tiger beetle

is susceptible to diseases that could threaten its survival. However, the Salt Creek tiger beetle is affected by several predacious and parasitic species that are commonly observed in its habitat. Spiders (Salticidae and Lycosidae), predatory bugs (Reduviidae), beetles (Histeridae and Cantharidae), birds, shrews (Soricidae), raccoons (*Procyon lotor*), lizards (*Lacertilia* sp.), toads (Bufonidae), robber flies (Asilidae), ants (Formicidae), wasps (Chalcididae and Tiphiidae), bee flies (Bombyliidae), and dragonflies (*Anisoptera* sp.) all prey on the Salt Creek tiger beetle (Lavigne 1972; Nagano 1982; Pearson 1988). A robber fly was observed preying on an adult Salt Creek tiger beetle it had caught in flight and pulled to the ground (Spomer and Higley 2001). Ants can overwhelm, kill, and devour larvae confined to their burrows (Spomer and Higley 2001). Larger species of tiger beetles (*Cicindela circumpecta*) have been known to prey on smaller-sized tiger beetles (*C. togata*), especially those species that occupy similar habitats (Hoback *et al.* 2001). Both *C. togata* and *C. circumpecta* are found in the same habitats as the Salt Creek tiger beetle and both may prey upon it (Spomer and Higley 2001; Spomer *et al.* 2004a). Parasitic wasps can sting the larvae, resulting in paralysis, and then lay eggs which hatch and feed on the larvae (Spomer and Higley 2001). Bee flies hover over larval burrows and flip eggs into the entrances (S. Spomer, pers. comm. 2002). After the eggs hatch, the bee fly maggots attach themselves to the Salt Creek tiger beetle larvae and feed on them.

Predators and parasites play important roles in the natural dynamics of populations and ecosystems. Predators and parasitoids of the Salt Creek tiger beetle evolved in conjunction with the beetle and do not normally pose a severe threat to the survival of the population. However, predation and parasitism of adults and larvae may account for significant mortality of the Salt Creek tiger beetle because of the small size of the remaining populations, limited distribution, reduced habitat, and close proximity of the two largest populations (L. Higley, pers. comm. 2002). Hoback *et al.* (2001) indicated that reduced saline habitats, coupled with a limited prey source, may result in greater predation by *Cicindela circumpecta* and *C. togata* on the Salt Creek tiger beetle. At this time, it is unknown whether predation and parasitism on the Salt Creek tiger beetle are a threat to its survival.

D. Inadequacy of Existing Regulatory Mechanisms

Overview

Federal, State, and local laws, regulations, and policies have not been sufficient to prevent past and ongoing losses of Salt Creek tiger beetle habitat. Existing regulatory mechanisms that provide minimal, but not adequate, protection for the Salt Creek tiger beetle include: federally-implemented regulatory mechanisms such as the NEPA and section 404 of the CWA; State-implemented regulatory mechanisms such as the Nebraska State Water Quality Standards (as required by section 401 of the CWA) and NESCA; and local conservation planning efforts such as the Comprehensive Plan, the Little Salt Creek Valley Planning Cooperative Agreement co-sponsored by TNC, NGPC, and SWCP (a local conservation plan).

Federally Implemented Regulatory Mechanisms

While NEPA and CWA are important environmental protection statutes, neither provides specific protection to non-listed species. The NEPA is a procedural statute that requires full consideration and disclosure of the environmental impacts of a project. It does not require protection of a particular species or its habitat, nor does it require the selection of a particular course of action.

Under section 404 of the CWA, the COE does not regulate wetland drainage activities that do not result in a discharge of dredged or fill material into waters of the United States nor sediment inputs originating from upland sources. The effects of these activities could have substantial adverse impacts on saline wetlands and associated streams used by larval and adult forms of the Salt Creek tiger beetle. Additionally, the COE Regulatory Program in Nebraska has limited regulatory authority over the types of road and urban development projects that have already destroyed or further degraded over 90 percent of the historical saline wetlands of eastern Nebraska (Murphy 1992), which have led to a corresponding loss of Salt Creek tiger beetle habitat, including barren salt flats, saline stream edges, and seeps.

The proposed rule (70 FR 5101; February 1, 2005) provided two examples of permitted activities and prescribed mitigation authorized by the COE under section 404 of the CWA, and the reader is referred to that rule for a detailed description of the examples. Our conclusion line is that, aside from the Arbor Lake area acquisition, the preservation and restoration of Category

1 saline wetlands as mitigation measures for permitted activities have provided minimal habitat benefits to the Salt Creek tiger beetle to date.

A Supreme Court ruling in 2001 limited Federal authority under the CWA to regulate certain isolated wetlands (*Solid Waste Agency of Northern Cook County vs. U.S. Army Corps of Engineers*, 531 U.S. 159) (SWANCC). The proposed listing rule (70 FR 5101) discusses the SWANCC ruling in depth, as well as the consequences thereof for COE and Environmental Protection Agency (EPA) jurisdiction over wetlands. We refer the reader to that rule for additional details. In Nebraska, the COE does not regulate any wetland that is determined to be isolated unless it can be proven that there is some kind of commercial use (e.g., a public boat ramp on the wetland) aside from migratory bird use or a surface connection (COE 2001).

Stream channelization and certain bank stabilization projects are regulated by the COE under section 404 of the CWA, but this regulatory mechanism has proven ineffective in preventing impacts to stream habitats used by the Salt Creek tiger beetle. As described above in Factor A, about half of the remaining habitat for the largest population of the Salt Creek tiger beetle was lost along Little Salt Creek after the completion of a COE-permitted stream bank stabilization and channelization project in 1992 (Spomer and Higley 1993; Farrar 2003).

Many of the saline wetlands that provide habitat for the Salt Creek tiger beetle are associated with the floodplain of adjacent streams. Stream channelization and bank stabilization projects conducted for flood control have caused channel incision and have necessitated additional bank stabilization projects further downstream or in feeder tributaries. Since the Salt Creek tiger beetle was listed as endangered by the State of Nebraska in 2000, the COE has considered the beetle in its evaluation of permits (M. Rabbe, COE, pers. comm. 2001). However, the COE evaluation has resulted in only limited benefits to the Salt Creek tiger beetle because construction activities in upland areas surrounding aquatic habitats are not within the COE's jurisdiction. Many projects qualify for a general permit (i.e., Nationwide Permit 13 (bank stabilization)) that does not need to be individually reviewed by the COE. Further, some landowners attempt to avoid obtaining a Department of the Army permit and the associated Federal oversight, for example, by creating windrow piles of concrete riprap along

the high bank of the stream in anticipation that, once the streambank erodes far enough landward, the riprap will fall in on its own and stabilize the bank. In such cases, the COE cannot exercise regulatory jurisdiction over windrowed riprap until there is a discharge below the ordinary high water mark, and even then, only if that discharge threatens the navigability of a stream or is prohibited for use as a fill material (COE Regulatory Guidance Letter MRO 96-11, June 17, 1997). Both regulated and unregulated bank stabilization activities have occurred on Little Salt Creek and have adversely affected Salt Creek tiger beetle habitat.

State Implemented Regulatory Mechanisms

Under section 401 of the CWA, the NDEQ issues a Water Quality Certification whenever a Department of the Army permit is authorized by the COE; this Certification is also necessary to meet Nebraska State Water Quality Standards. The NE Water Quality Standards recognize all wetlands in the State as "waters of the State," including isolated wetlands that are no longer under Federal jurisdiction as a result of *SWANCC vs. U.S. Army Corps of Engineers*. However, the State does not have a permit program for authorizing activities in wetlands, and NDEQ can only take action (i.e., an enforcement action) after an impact to a non-Federal isolated wetland occurs. After-the-fact enforcement actions under the Water Quality Standards are unlikely to offset adverse impacts that have already occurred to the Salt Creek tiger beetle in isolated saline wetlands, given their highly specific habitat requirements and low population numbers. Finally, the Water Quality Standards are not aligned with quantitative biological criteria, and thus projects may still have negative impacts on saline wetlands of eastern NE and associated streams that provide habitats needed to meet life requirements of both larval and adult Salt Creek tiger beetles.

On March 17, 2000, the Salt Creek tiger beetle was listed as endangered under the NESCA by NGPC. The NESCA: (1) Prohibits the "take" of State listed species ("take" is defined as a means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in such conduct); (2) authorizes State agencies to carry out programs for the conservation of State listed endangered and threatened species; (3) requires State agencies to take such actions necessary to ensure that actions authorized, funded, or carried out by the State do not jeopardize the continued existence of

such State listed endangered or threatened species or result in the destruction or modification of habitat for such species; and (4) requires all State agencies to consult with NGPC to ensure that jeopardy is avoided. However, NESCA does not authorize NGPC to review Federal actions or to consult with Federal agencies for projects or activities that may affect State listed species such as the Salt Creek tiger beetle. In addition, although NESCA allows NGPC to identify critical habitat for State-listed species, regulations that would allow such designations to be implemented were never developed.

Local Conservation Planning

In a joint effort to plan long-term development projects for Lincoln and Lancaster County, city and county officials approved a Comprehensive Plan. The approved Comprehensive Plan proposes that development not occur along the portions of Little Salt Creek north of Lincoln's city limits. As part of the Comprehensive Plan, Lincoln has placed a 150-m (500-ft) wide buffer around Little Salt Creek and its adjacent saline wetlands until a determination can be made through research on whether the buffer is needed to protect the Salt Creek tiger beetle. The buffer does not apply for development projects within the City limits, including areas around the Little Salt Creek—Arbor Lake and Little Salt Creek—Roper populations. The Comprehensive Plan is a helpful guide for the growth and development of Lincoln and Lancaster County but it provides no legal assurances and is not an enforceable regulatory mechanism.

In 2000, TNC and NGPC organized the Little Salt Creek Valley Planning Cooperative agreement. The purpose of this cooperative agreement was to organize stakeholders, mainly private landowners, in the Little Salt Creek watershed into a coalition to preserve and protect eastern Nebraska saline wetlands and associated watershed streams in the northern third of Lancaster County. After 18 months of unsuccessful negotiations, this conservation effort was dissolved.

In 2003, Lincoln, Lancaster County, the Lower Platte South Natural Resources District, TNC, and NGPC formed the SWCP. The SWCP (2003) developed a plan that focuses on the conservation of saline wetlands in Lancaster and Saunders Counties. Although not specifically focused on the protection and management of the Salt Creek tiger beetle, the SWCP's efforts will benefit the species. One of the strategies of the SWCP's plan is to

protect saline wetlands using existing Federal, State, and local laws. Another strategy is to use existing grant programs to acquire saline wetlands either through simple fee title or conservation easements. To date, the SWCP has acquired five parcels of land containing saline wetlands. Due to the high value of land, and shortage of Federal, State, and local government agency funds, protection of Salt Creek tiger beetle habitat through acquisition is expected to be limited.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Overview

Local extinctions caused by habitat deterioration and stochastic weather events are not uncommon for species and subspecies, such as the Salt Creek tiger beetle, whose life histories are characterized by short generation time, small body size, high rates of population increase, and high habitat specificity (Murphy *et al.* 1990; Ruggerio *et al.* 1994). The remaining populations of the Salt Creek tiger beetle are highly susceptible to extinction as a result of naturally-occurring, stochastic, environmental, or demographic events because they occur at only three known locations, in small numbers, and in relatively close proximity to each other. Such events could include: (1) Heavy rain storms and severe flooding that drown and scour larvae away, dilute salinity, and result in sediment deposition; (2) accidental spillage of hazardous materials due to nearby, up-slope traffic accidents; or (3) runoff containing a recently applied insecticide flowing into habitats occupied by the Salt Creek tiger beetle along Little Salt Creek. Murphy *et al.* (1990) and Gilpin (1987) recognized a direct association between increased extinction rates of a species and reduced habitat areas, distances between populations, and small population size. The negative effects of habitat fragmentation and loss on the total number of individuals within a population include the Allee effect (the positive relationship between population density and the reproduction and survival of individuals) (Allee 1931, Keitt *et al.* 2001), the loss of genetic diversity (Lacy 1987), and increased mortality from catastrophic events (Murphy *et al.* 1990).

Available information, including 2005 Salt Creek tiger beetle population surveys and a review of U.S. Geological Survey topographic maps showing the location of populations, indicates that 89 percent of the remaining Salt Creek

tiger beetles are located within a 1.2-km (0.7-mi) radius of the Interstate 80 and North 27th Street, and, therefore are in an area of ongoing residential and commercial development. Based on the best available scientific information, we believe that further degradation or loss of suitable habitats and the resulting increased distance between areas of suitable habitat will further reduce the likelihood that Salt Creek tiger beetles will be able to move and recolonize other sites and establish additional populations. If so, as existing occupied habitats become smaller and smaller, existing populations of Salt Creek tiger beetles may be extirpated.

Floods and Droughts

The extirpation of a local population of Salt Creek tiger beetles has already occurred due to a natural flood event. Although tiger beetle larvae are able to withstand submersion for prolonged periods (possibly up to 2 weeks) (Hoback *et al.* 1998; L. Higley, pers. comm. 2001), flooding results in soil erosion of larval burrow sites and washes larvae downstream. Flooding also results in the deposition of sediments from adjacent agricultural lands into larval and adult habitats. In the mid-1980s, floodwaters carried large loads of sediment from adjacent croplands and deposited then into the saline wetlands associated with Rock Creek in northern Lancaster and southern Saunders Counties (Spomer *et al.* 2004a; M. Fritz, pers. comm. 2003). This flood covered barren salt flats used by Salt Creek tiger beetles in the Jack Sinn WMA population. The mid-1980s flood resulted in the loss of Salt Creek tiger beetle larvae because of the depth of sediment deposited. The larvae were unable to remove the 8 to 10 cm (3 to 4 in.) of sediment deposited onto their burrows because they extract excess soil material out and away from their burrow, not inward (Spomer *et al.* 2004a). The mid-1980s flood also changed the vegetation of the area. After the flood, a thick herbaceous overstory composed of reed canarygrass and cattail infested the area, making it unsuitable for the Salt Creek tiger beetle. In 1993, back-to-back 50-year rain events inundated the entire area, including the saline wetlands and habitat of the Jack Sinn WMA population (USDA 1996). Surveys of the Jack Sinn WMA population have found only two individuals since 1993, and no individuals since 1998. As previously mentioned, the Jack Sinn WMA population is considered to be extirpated.

Extirpation of either the Little Salt Creek—Arbor Lake population or Little

Salt Creek—Roper population, or both, is highly likely to occur if the Little Salt Creek drainage experiences an event similar to the 1993 flood in the Rock Creek drainage. Flooding, even after a normal rainfall, is likely to occur at a higher frequency and volume due to the increased storm water runoff from developments and channelization of tributaries.

Drought also may have impacted prey populations, leading to higher mortality rates of the Salt Creek tiger beetle (Spomer and Higley 2001; Ratcliffe and Spomer 2002). Dry conditions result in the loss of moist saline seep habitat used as larval, ovipositing, and foraging habitat by the Salt Creek tiger beetle. Drought also can change the abundance and diversity of prey items used by adult and larval Salt Creek tiger beetles (Allgeier *et al.* Nebraska, 2002 was the third driest year on record (115 years) (Nebraska's Climate Assessment and Response Committee 2003), and June 2002 was the driest month on record (UNL 2003). June is the month when the Salt Creek tiger beetle is most active. Leon Higley (pers. comm. 2003), an expert on the Salt Creek tiger beetle, predicts that if the drought that Nebraska has experienced over the past couple of years continues, the number of individuals remaining in the Salt Creek tiger beetle populations will decline due to the lack of prey available to the beetle and its larvae.

Pesticides

Corn, soybean, and sorghum fields dominate the Little Salt Creek watershed, and are potential sources of pesticide exposure to Salt Creek tiger beetles and their habitat. Insecticides that enter occupied habitats of the Salt Creek tiger beetle through runoff have the potential to directly impact the tiger beetle or indirectly impact through modification of prey availability. There have been no studies to evaluate pesticide exposure and adverse effects to Salt Creek tiger beetles. However, research on ground beetles (*Carabidae*) suggests pesticide exposure may place the Salt Creek tiger beetle at risk as a result of decreased survival and reproduction. This research was discussed in detail in the proposed rule (70 FR 5101; February 1, 2005), and is summarized briefly here. In one study, dietary and topical exposure of ground beetles (*Harpalus pennsylvanicus*) to a carbamate insecticide (bediocrab) and a chloro-nicotinyl insecticide (imidacloprid) resulted in lethal and sublethal effects (Kunkel *et al.* 2001). Bendiocrab and imidacloprid are used to control insects in corn (Extoxnet 1996). Other carbamate pesticides

recommended for use in corn, soybean, and sorghum production in Nebraska include carbofuran, methomyl, thiodicarb, trimethacarb, and carbaryl (Wright *et al.* 1994; Hunt 2003). In a field experiment in England designed to study the effects of pesticides on nontarget invertebrates, researchers found that chlorpyrifos and fonofos (both organophosphate pesticides) affected the activity of ground beetles, and this effect seemed the result of direct toxicity rather than a depleted prey base (Luff *et al.* 1990). Organophosphate and pyrethroid pesticides are used on corn, soybean, and sorghum crops in Nebraska include chlorpyrifos, malathion, methyl parathion, dimethoate, ethoprop, fonofos, phorate, terbufos, tefluthrin, tralomethrin, permethrin, esfenvalerate, cyfluthrin, zeta-cypermethrin, and lambda-cyhalothrin (Wright *et al.* 1994; Hunt 2003).

Salt Creek tiger beetles also may be susceptible and exposed to pesticides applied to control mosquitoes, grasshoppers, and pests in residential yards and gardens. Nagano (1982) reported an entire population of tiger beetles (*Cicindela haemorrhagica* and *C. pusilla*) in Washington State being eradicated by pesticides, while the disappearance of the tiger beetle *C. marginata* in New Hampshire was believed to be the result of insecticide spraying to control salt marsh mosquitoes (Dunn 1978, as cited by Nagano 1982). Insecticides applied to lawns and landscaping in residential and commercial developments near Little Salt Creek have the potential to enter the creek and impact the Salt Creek tiger beetle and its prey base. A local government has proposed for the last 2 years to apply pesticide for the control of mosquitoes along Little Salt Creek where the Little Salt Creek-Roper population exists. To date, given the concerns expressed by NGPC, pesticides have not been applied. However, we also note that some commenters on the proposed rule stated that they rarely use pesticides, especially insecticides. Additionally, they referred to the current existence of buffer strips along Little Salt Creek that may serve to limit any contamination problems from ground application of pesticides (but this will not limit aerially-applied pesticides).

Artificial Lights

Artificial lights along streets and highways, particularly mercury vapor lamps, may contribute to population losses of the Salt Creek tiger beetle because such lights have been implicated in population losses of

nocturnal insects elsewhere (Pyle *et al.* 1981). Adult tiger beetles of many species are attracted to lights at night, resulting in unnecessary and detrimental nocturnal dispersal (Pearson 1988). Larochelle (1977) documented 122 species and subspecies of *Cicindelidae* found at night light sources. Tiger beetle species attracted to light sources at night included *C. togata*, *C. fulgida*, and *C. circumpecta* (Willis 1970). The subspecies, *C. n. knausii*, the closest relative to the Salt Creek tiger beetle, also is attracted to artificial light sources at night (Willis 1970). Pearson (1988) reported that several specimens of *C. trifasciata* have been collected at night lights on off-shore oil platforms in the Gulf of Mexico.

Allgeier *et al.* (2003) found that female Salt Creek tiger beetles oviposit at night and that outdoor light sources may reduce reproduction. Fewer eggs may be deposited if artificial light sources draw females away from their breeding habitat (Allgeier *et al.* 2003). Allgeier *et al.* (2003) found that Salt Creek tiger beetles were attracted to artificial light in the following order of preference: (1) Black light; (2) mercury vapor; (3) incandescent; (4) fluorescent; and (5) sodium vapor. They recommended an 805-m (2,640-ft) or (0.8-km (0.5-mi)) buffer zone to protect all existing Salt Creek tiger beetle populations from possible outdoor light attractant sources.

Movement away from habitat to lighted areas, such as areas surrounding major transportation routes (*e.g.*, Interstate 80) and associated developed areas, may increase energy expenditure, reduce reproductive success, and ultimately impact the survival of the Salt Creek tiger beetles in the two largest beetle populations, the Little Salt Creek—Roper and Little Salt Creek—Arbor Lake populations (Allgeier *et al.* 2004). Distances between outdoor light sources (within commercial and residential developments) and the Little Salt Creek—Roper and Little Salt Creek—Arbor Lake populations are less than the 800-m (3,000-ft) buffer recommended by Allgeier *et al.* (2003).

Electric insect light traps are possibly a greater threat to the Salt Creek tiger beetle than lights illuminating urban streets, houses, parking lots, etc. These light traps use ultraviolet light to attract flying insects toward an electrified metal grid where they are destroyed (Frick and Tallamy 1996). Another type of trap that uses black light, a form of ultraviolet light, has a sticky paper backing where the insects are caught and die. Electric insect light traps have been used extensively since the mid-1900s for research and surveillance in

disease prevention, and control of indoor and outdoor insects in homes as well as in agricultural and industrial operations (Urban and Broce 1999). Frick and Tallamy (1996) found 13,789 insects that were electrocuted by electric insect light traps at 6 sample sites. Of these, 6,670 insects (48 percent) were nontarget and nonharmful aquatic insects from nearby rivers and streams, and 1,868 of these insects (14 percent) were predators and parasites of the targeted, harmful insects. Black-light or ultraviolet based insect traps could become an ever increasing threat as residential and commercial development continues to encroach upon the two largest populations of Salt Creek tiger beetles.

Conclusion of Status Evaluation

In making this final rule determination, we carefully assessed the best scientific and commercial information available regarding past, present, and future threats to the Salt Creek tiger beetle. The immediate threats to the Salt Creek tiger beetle are associated with the extremely small, fluctuating populations, the number of which has declined by 50 percent since surveys began in 1991, and habitat degradation, destruction, and fragmentation. The Salt Creek tiger beetle is currently restricted to three populations on approximately 6 ha (15 ac) of not highly degraded barren salt flats and saline stream edge habitats contained within the eastern Nebraska saline wetlands and associated saline streams (*i.e.*, Little Salt Creek). Eighty-nine percent of all remaining Salt Creek tiger beetles are located approximately 1.6 km (1 mi) apart, making them especially susceptible to extirpation from a single catastrophic event. They also are located within a 1.2-km (0.7-mi) radius of the Interstate 80 and North 27th Street Interchange and the associated growth and development that is underway. Finally, the 2005 surveys found only 153 Salt Creek tiger beetles. Although observed tiger beetle populations have fluctuated over the period of visual surveys (1991–2005), the 2005 results are the third lowest count since 1991, and the lowest in the past 12 years. Since 2002, the total number of Salt Creek tiger beetles observed through visual surveys has declined by about 80 percent (*i.e.*, from 777 individuals in 2002 to 153 individuals in 2005). Despite the annual variation in numbers counted, Salt Creek tiger beetle populations are at or below minimum viable population sizes (*i.e.*, 500 to 1,000 individuals) and actual population sizes for other listed

tiger beetle species (*e.g.*, Northeastern beach and Puritan tiger beetles).

As discussed in Factor A of the Summary of Factors Affecting the Species section of this rule, a number of urban and agricultural development projects threaten the Salt Creek tiger beetle with extinction. Ongoing residential and commercial developments may threaten all remaining populations of the Salt Creek tiger beetle with extirpation. These developments can cause changes to hydrologic regimes, resulting in freshwater inflows and sediment runoff, which in turn reduces salinity concentrations and encourages vegetation invasion into previously unvegetated saline habitats. Proposed projects, such as road expansions, also pose threats to the two largest remaining populations of the Salt Creek tiger beetle.

Other immediate threats to the habitat of the Salt Creek tiger beetle are sediment erosion from adjacent agricultural fields and urban development construction sites; livestock grazing (trampling of larvae burrows); changes in saline stream morphology; and drainage of saline wetlands due to the incisement of associated streams.

As discussed under Factor D, existing regulatory mechanisms have not proven to be adequate to deter habitat loss and population reductions of the Salt Creek tiger beetle, and this inadequacy serves as a contributing factor to the subspecies' endangered status.

The Salt Creek tiger beetle also is vulnerable to chance environmental or demographic events (*e.g.*, flood, drought, disease, and pesticides). As discussed in Factor E, extirpation of the Jack Sinn WMA population of Salt Creek tiger beetles occurred after such an event. The combination of the close proximity of the two largest populations, and restricted, specialized, and diminishing aquatic habitats, makes the Salt Creek tiger beetle highly susceptible to extinction across its entire range from any one chance environmental event.

The fate of the Salt Creek tiger beetle likely depends upon the establishment of additional populations in suitable habitats at other locations through a captive rearing program so that random demographic events or environmental catastrophes are less likely to cause the extinction of the beetle. As the number of Salt Creek tiger beetle populations has declined to just three, and these are subject to numerous immediate, ongoing, and future threats as described above, we have determined that the Salt Creek tiger beetle is in danger of

extinction throughout all of its range (section 3(6) of the Act) and, therefore, meets the Act's definition of endangered.

Critical Habitat

Critical habitat is defined in section 3 of the Act as—(i) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species, and (II) that may require special management considerations or protection, and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the Act, upon a determination by the Secretary of the Interior that such areas are essential for the conservation of the species. “Conservation” means the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, the Secretary of the Interior designate critical habitat at the time the species is determined to be endangered or threatened. The Service believes critical habitat for the Salt Creek tiger beetle is both prudent and determinable. However, because of the critically imperiled status of Salt Creek tiger beetle, limited financial and personnel resources available to work on this taxon, and the Service's belief that listing confers greater protection on a species than does critical habitat, we have assigned a higher priority to promptly publishing the final listing rule for Salt Creek tiger beetle than to proposing and designating critical habitat, as allowed pursuant to section 4(b)(6)(C)(i). Funds have been budgeted for identification of critical habitat, and work on a proposed designation is underway. We plan to publish a proposed rule to designate critical habitat for Salt Creek tiger beetle in the near future.

Available Conservation Measures

In anticipation of the Service's listing the Salt Creek tiger beetle under the Act, the NGPC notified us in a letter, dated February 28, 2003, that it was planning to develop a Regional Habitat Conservation Plan (HCP) pursuant to section 10(a)(1)(B) of the Act for the Salt Creek tiger beetle. Letters of support to NGPC from the City of Lincoln, Lancaster County Board of

Commissioners, Lower Platte South Natural Resources District, Nebraska Department of Roads, UNL, and TNC were included as part of the HCP proposal. The NGPC identified the need for the Regional HCP to provide long-term protection of the Salt Creek tiger beetle and its habitats in the eastern Nebraska saline wetlands and associated streams and provide regulatory certainty for the citizens of Lancaster and Saunders Counties.

Section 7(a) of the Act requires Federal agencies to evaluate their actions with respect to any species that is proposed or listed as endangered or threatened and with respect to its critical habitat, if designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) requires Federal agencies to confer informally with us on any action that is likely to jeopardize the continued existence of a proposed species or result in destruction or adverse modification of proposed critical habitat. If a species is subsequently listed, section 7(a)(2) of the Act requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of such a species or to destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with us.

Federal agency actions that may affect the Salt Creek tiger beetle and may require consultation with the Service include, but are not limited to, those within the jurisdiction of the Service, COE, EPA, FHWA, Department of Housing and Urban Development (HUD), Federal Housing Administration (FHA), Federal Aviation Administration (FAA), Natural Resources Conservation Service (NRCS), and Farm Service Agency (FSA).

Federal agencies expected to have regulatory involvement with the Salt Creek tiger beetle or its habitat include the COE and EPA, due to their permit and enforcement authority under section 404 of the CWA. In addition, EPA will be involved through provisions of section 402 of the CWA. The FHWA has authority and funding responsibilities for highway construction projects that could have impacts on habitat both formerly and presently occupied by the Salt Creek tiger beetle. HUD and the FHA may provide grants for urban development, in particular the installation of utilities. Planned locations of such utility installation and associated development

will likely be affected by listing of the Salt Creek tiger beetle. The FAA has jurisdiction over the Lincoln Municipal Airport, an area formerly occupied by the Salt Creek tiger beetle that may still provide suitable habitat near Capitol Beach in northern Lincoln. The NRCS and FSA administer numerous programs under The Farm Security and Rural Investment Act of 2004 (2004 Farm Bill). Although the majority of 2004 Farm Bill programs should have beneficial effects for the Salt Creek tiger beetle, certain conservation practices alter the hydrological regime of eastern Nebraska saline wetlands and associated stream habitats, and require a determination of potential effects on the Salt Creek tiger beetle.

The Act sets forth a series of general prohibitions and exceptions that apply to all endangered wildlife species. The prohibitions make it illegal for any person subject to the jurisdiction of the United States to take, import or export, transport in interstate or foreign commerce in the course of commercial activity, or sell or offer for sale in interstate or foreign commerce any endangered species. Under section 3(19) of the Act, the term "take" includes harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Pursuant to 50 CFR 17.3, the Service further defines "harass" as actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. In addition, under this regulation, the Service defines "harm" to include significant habitat modification or destruction that results in the death or injury to listed species by significantly impairing behavior patterns such as breeding, feeding, or sheltering. It also is illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Certain exceptions apply to agents of the Service and State conservation agencies. Permits may be issued to carry out otherwise prohibited activities involving listed species. Such permits are available for scientific purposes pursuant to section 10(a)(1)(A) of the Act, to enhance the propagation or survival of the Salt Creek tiger beetle, or for incidental take in connection with otherwise lawful activities pursuant to section 10(a)(1)(B) of the Act.

As published in the **Federal Register** on July 1, 1994, (59 FR 34271), it is the Service's policy to identify, to the maximum extent practical at the time a species is listed, those activities that would or would not constitute a

violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effect of listing on proposed and ongoing activities within a species' range, and to assist the public in identifying measures needed to protect the species. For the Salt Creek tiger beetle, activities that we believe are unlikely to result in a violation of section 9, provided these activities are carried out in accordance with any existing regulations and permit requirements, include:

(1) Possession, delivery, or movement, including interstate transport and import into or export from the United States, of dead Salt Creek tiger beetles that were collected prior to the date of publication of the proposed rule in the **Federal Register** (February 1, 2005);

(2) Any action authorized, funded, or carried out by a Federal agency that may affect the Salt Creek tiger beetle, when the action is conducted in accordance with the consultation requirements for listed species pursuant to section 7 of the Act;

(3) Any action carried out for scientific research or to enhance the propagation or survival of the Salt Creek tiger beetle that is conducted in accordance with the conditions of a section 10(a)(1)(A) permit; and

(4) Any incidental take of the Salt Creek tiger beetle resulting from an otherwise lawful activity conducted in accordance with the conditions of an incidental take permit issued under section 10(a)(1)(B) of the Act.

Activities involving the Salt Creek tiger beetle (including all of its metamorphic or life stages) that the Service believes likely would be considered a violation of section 9 include, but are not limited to:

(1) Harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, or collecting, or attempting any of these activities, of the Salt Creek tiger beetle without a permit, except in accordance with applicable Federal and State fish and wildlife conservation laws and regulations;

(2) Possessing, selling, delivering, carrying, transporting, or shipping illegally taken Salt Creek tiger beetles or any body part thereof;

(3) Interstate and foreign commerce (commerce across State and international boundaries) and import/export (as discussed earlier in this section) without appropriate permits;

(4) Use of pesticides/herbicides that results in take of the Salt Creek tiger beetle;

(5) Release of biological control agents that take any life stage of this taxon;

(6) Discharges or dumping of toxic chemicals, silts, or other pollutants into,

Dated: September 29, 2005.

Matt Hogan,

*Acting Director, U.S. Fish and Wildlife
Service.*

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