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GEORGE R. CUNNINGHAM
2041 NORTH 66TH STREET OMAHA, NEBRASKA 68104
(402) 561-9422 DACESH@AOL.COM

RARE FISH SURVEYS IN SELECTED STREAMS OF EASTERN SOUTH DAKOTA 1999 SURVEY

Prepared by: George R. Cunningham
2041 N. 66th St
Omaha, NE 68104
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INTRODUCTION

A survey and habitat description of rare fish in eastern South Dakota (SD) was initiated under contract for the South Dakota Department of Game, Fish and Parks (SDGFP) as part of their small grants program. Species of concern included the federally endangered *Notropis topeka* (Topeka shiner), the State threatened, *Phoxinus eos* (northern redbelly dace), and *Percopsis omiscomycus* (trout-perch), as well as the rare *Percina maculata* (blackside darter). Sampling was conducted on several state-owned properties as well as at numerous locations along road crossings in Deuel and Grant Counties.

Only two comprehensive surveys have ever been conducted in the Minnesota River drainage of South Dakota (Bailey and Allum, 1962; Dieterman, 1995), however, surveys have been conducted in Minnesota within this basin (Underhill, 1957; MNNHP). cursory surveys within South Dakota for this basin include Felix (1967), McCoy and Hales (1974), and Kallemeyn (1975).

METHODS

Study Area

The Coteau des Prairies (Coteau) of eastern South Dakota is a unique physiographic region that measures an average of 50 miles wide and 200 miles long. The James River Basin borders the Coteau on the west and on the east the Coteau is bordered by the Minnesota River Basin. The wedge-shaped landform consists of deep glacial sediments overlaying bedrock. These glacial deposits measure an average of 120 m deep and in some places exceed 200 m. During the Wisconsinian glaciation, ice flowing southward was split into two lobes: the Des Moines Lobe, which advanced to the southeast and the James Lobe, which advanced to the southwest (Gries, 1996).

The Coteau rises as high as 900 feet above the Minnesota River valley and 400 feet above the James River valley. The landform is a rough and poorly drained landscape

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full of small lakes, potholes and sloughs with the general shape a broad trough with the edges of the landform higher than the center. The Big Sioux River system drains the lower central part of the Coteau southward into the Missouri River. On the east side of the Coteau, in the far northeastern corner of South Dakota, the Minnesota River basin commences; this drainage system includes the Whetstone, Yellow Bank, and Lac qui Parle River watersheds.

In addition to surveying in the Minnesota River basin, five (5) streams were surveyed in the Big Sioux River drainage, one (1) in Deuel County and four (4) in Lincoln and Union Counties. Although, we have sampled these counties in the recent past as part of *N.topeka* surveys for SDGFP (1997-1999), state lands were rarely a priority sampling area. Between these two (2) river basins (Minnesota and Big Sioux), a total of 19 streams were sampled in August and September 1999 (Table 1).

Specimen Collection

Seines (wall and bag seines) were used to capture fish species during the course of this survey. Seines were constructed of knotless 6.3 mm nylon mesh with the following dimensions: 1) wall seine length was 2.44 m with a height of 1.25 m; 2) bag seine length was 3.66 m with a height of 1.25 m and a center capture bag 1.04 m³.

Fish specimens were fixed in a 10% formalin solution for initial preservation. Specimens were stored in the formalin solution for a minimum of four weeks, rinsed and set in a large volume of distilled water for 24 hr, then transferred to a 70% ethanol solution for final preservation and storage.

Stream Habitat Data

A general description of the stream site was recorded, including adjacent land use. At each site the legal description (township, range, section) was recorded. Substrate composition was visually inspected and classified as detritus, silt, sand, gravel, rubble, or boulder.

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Survey Methodology

Seining was employed to determine stream fish composition. Stream lengths were surveyed in the direction of stream flow (upstream to downstream), and a variety of habitats (i.e. riffles, pools, channel runs) were swept through at the time of sampling event. Since sampling usually encompassed at least a one hundred meter distance, thus most, if not all, habitat types were sampled more than once at each survey site.

RESULTS AND DISCUSSION

A total of 25 sites were sampled (Table 1). Thirty (30) species of fish were collected as a result of this survey (Appendix A). Maps plotting each survey site are found in Appendix B. The discussion in this report centers on the state listed and rare fish species. *Phoxinus eos* was identified from 2 streams: in Monighan Creek at The Nature Conservancy's Crystal Springs Preserve and in Gary Creek (labeled the West Fork of Lac qui Parle River in Minnesota), just upstream from the Gary Creek Wildlife Area (Table 2A). *Percina maculata* was identified from five (5) locations in Deuel and Grant Counties, within the Minnesota River basin (Table 2B). The federally endangered *Notropis topeka* was identified from one (1) location in Deuel County (Big Sioux River basin) during this study (Hidewood Creek, Table 2C). *Percopsis omiscomyus* was never collected during the course of the study. In addition, two (2) other rare fish in South Dakota were collected, *Nocomis biguttatus* (hornyhead chub) and *Notropis rubellus* (rosyface shiner), both of these species were only found in the Minnesota River basin (Table 2D&E).

INDIVIDUAL SPECIES ACCOUTS

Phoxinus eos sites

The two sites where *P. eos* were collected are both located in Deuel County. These are cold-water streams formed by numerous spring seeps along their length. The

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TABLE 1. SURVEY SITES.

<u>SITE NUMBER</u>	<u>STREAM NAME</u>	<u>COUNTY</u>	<u>LEGAL</u>	<u>DRAINAGE</u>
ESD99-1	TNC Crystal Springs Preserve	Deuel	T115N R48W S3	Minnesota
ESD99-2	Cobb Creek	Deuel	T115N R47W S30	Minnesota
ESD99-3	Gary Creek on State Land	Deuel	T115N R47W S9	Minnesota
ESD99-4	Gary Creek	Deuel	T115N R47W S7	Minnesota
ESD99-5	Monighan Creek, State Game Production Area	Deuel	T116N R47W S33	Minnesota
ESD99-6	Unknown Stream	Deuel	T117N R47W S32/S33	Minnesota
ESD99-7	North Fork Yellow Bank	Grant	T120N R47W S16/S17	Minnesota
ESD99-8	North Fork Yellow Bank	Grant	T120N R48W S26	Minnesota
ESD99-9	Middle Fork of South Fork Yellow Bank	Grant	T119N R47W S21	Minnesota
ESD99-10	South Fork Yellow Bank	Grant	T118N R48W S10/S11	Minnesota
ESD99-11	South Fork Yellow Bank	Grant	T118N R49W S25	Minnesota
ESD99-12	South Fork Yellow Bank	Grant	T118N R49W S32/33	Minnesota
ESD99-13	Unnamed stream	Grant	T118N R49W S7/S8	Minnesota
ESD99-14	Branch of North Fork Whetstone R.	Grant	T121N R47W S29/S30	Minnesota
ESD99-15	South Fork Whetstone River	Grant	T121N R47W S32	Minnesota
ESD99-16	Lost Creek	Deuel	T117N R47W S16/S17	Minnesota
ESD99-17	Crow Timber Creek	Deuel	T117N R47W S19/20	Minnesota
ESD99-18	Crow Creek	Deuel	T116N R47W S8/9	Minnesota
ESD99-19	Caine Creek	Deuel	T117N R49W S24/27	Minnesota
ESD99-20	Cobb Creek	Deuel	T114N R48W S2	Minnesota
ESD/SDTS99-1	Newton Hills State Park tributary	Lincoln	T97N R49W S12	Big Sioux
ESD/SDTS99-2	Ninemile State Game Production Area (Ninemile Creek)	Lincoln	T100N R49W S35	Big Sioux
ESD/SDTS99-3	Hidewood Creek	Deuel	T114N R50W S15/S16	Big Sioux
ESD/SDTS99-4	East Brule Creek	Union	T95N R49W S4/S9	Big Sioux
ESD/SDTS99-5	Brule Creek in Union County State Park	Union	T94N R50W S32	Big Sioux

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TABLE 2. DOCUMENTED SITES FOR STATE LISTED AND RARE SPECIES.

A. *Phoxinus eos* (northern redbelly dace)

ESD99-1	Crystal Springs Preserve	Deuel	T115N R48W S3	Minnesota
ESD99-4	Gary Creek	Deuel	T115N R47W S7	Minnesota

B. *Percina maculata* (blackside darter)

ESD99-7	North Fork Yellow Bank	Grant	T120N R47W S16/S17	Minnesota
ESD99-8	North Fork Yellow Bank	Grant	T120N R48W S26	Minnesota
ESD99-10	South Fork Yellow Bank	Grant	T118N R48W S10/S11	Minnesota
ESD99-15	South Fork Whetstone River	Grant	T121N R47W S32	Minnesota
ESD99-20	Cobb Creek	Deuel	T114N R48W S2	Minnesota

C. *Notropis topeka* (Topeka shiner)

ESD/SDTS99-3	Hidewood Creek	Deuel	T114N R50W S15/S16	Big Sioux
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D. *Nocomis biguttatus* (hornyhead chub)

ESD99-5	Monighan Creek, State Game Production area	Deuel	T116N R47W S33	Minnesota
ESD99-7	North Fork Yellow Bank	Grant	T120N R47W S16/S17	Minnesota
ESD99-8	North Fork Yellow Bank	Grant	T120N R48W S26	Minnesota
ESD99-10	South Fork Yellow Bank	Grant	T118N R48W S10/S11	Minnesota
ESD99-11	South Fork Yellow Bank	Grant	T118N R49W S25	Minnesota
ESD99-14	Branch of North Fork Whetstone River	Grant	T121N R47W S29/S30	Minnesota
ESD99-15	South Fork Whetstone River	Grant	T121N R47W S32	Minnesota
ESD99-16	Lost Creek	Deuel	T117N R47W S16/S17	Minnesota
ESD99-17	Crow Timber Creek	Deuel	T117N R47W S19/S20	Minnesota
ESD99-19	Caine Creek	Deuel	T117N R49W S24/S27	Minnesota
ESD99-20	Cobb Creek	Deuel	T114N R48W S2	Minnesota

E. *Notropis rubellus* (rosyface shiner)

ESD99-7	North Fork Yellow Bank	Grant	T120N R47W S16/S17	Minnesota
ESD99-8	North Fork Yellow Bank	Grant	T120N R48W S26	Minnesota
ESD99-10	South Fork Yellow Bank	Grant	T118N R48W S10/S11	Minnesota

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Crystal Springs Preserve site had a silt/sand substrate scattered with some boulders; instream vegetation was present at this site as well. Gary Creek was sampled at 2 sites, one located above SDGFP property and the other within the state property, with *P. eos* being found at the site upstream from the state property. Both sites where *P. eos* was collected flow through land that is in permanent cover (i.e. hay meadow, native prairie). The site sampled within the SDGFP management area contained non-native rainbow trout, which is most likely the reason *P. eos*, was not found at this site. *P. eos* has been collected from the Yellow Bank River system in SD in the past (McCoy and Hales, 1974), but was not collected in this system during our survey, nor was it collected by Dieterman (1996). Given the rarity of *P. eos* in SD, and its possible disappearance from the Yellow Bank River system, SDGFP should consider eliminating trout stocking activities in Gary Creek.

Percina maculata sites

P. maculata was identified from 5 sites during this study: North Fork Yellow Bank (2 locations); the South Fork Yellow Bank; and the South Fork Whetstone (all in Grant County); and Cobb Creek (also described as Florida Creek) in Deuel County. These streams are all within the Minnesota River watershed. These sites flow primarily through grassland with cropland in the upland areas away from the streams. Streambed composition contained a mix of silt and sand, but all contained gravel and three contained boulders. This darter species prefers habitat with gravel/rubble/boulder substrate and cool to cold water. Current land use patterns at these sites are adding some silt to the streams.

Notropis topeka site

This species was identified at one (1) site: Hidewood Creek, a tributary of the Big Sioux River in Deuel County. This stream was approximately 5 meters wide with a boulder-gravel-silt streambed substrate. There was evidence of beaver activity at this site. The predominate land use was row crop agriculture, with the area immediate adjacent to the stream in pasture. As a result of this survey, Hidewood Creek is the northern most extant site for *N. Topeka*. Previous to this record, North Elm Creek along

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the North Dakota border was the most northern locality for this species, however, survey work conducted by us for the SDGFP, as well as work by South Dakota State University, found no *N. topeka* at that location. *N. topeka* was not found at Union County State Park, Ninemile State Game Production Area, nor at Newton Hills State Park stream sites, which are tributaries of the Big Sioux River. The Split Rock River at Palisades State Park was too difficult to survey due to the large boulders, which made effective sampling unfeasible.

Nocomis biguttatus sites

This species was found at a number of sites within the Minnesota River drainage in SD (Table 2D). This species has been collected previously in this drainage (Underhill, 1957; Bailey, 1962; McCoy and Hales, 1974; Kallemeyn, 1975; Dieterman, 1996), but our collections in Lost, Crow Timber, and Caine Creeks represent the first collections of *N. biguttatus* from these streams. Taken together, this species is a relatively common inhabitant of these cool/cold water streams of the Minnesota River drainage in SD. Its habitat preference is for cool, clear water with rocky substrates.

Notropis rubellus sites

The only stream system this species appears to inhabit is the Yellow Bank River. Bailey (1962) collected this species in the Whetstone River, yet our efforts and those of Dieterman (1996) did not record *N. rubellus* from the Whetstone River. Kallemeyn (1975) recorded *Notropis atherinoides* from the upper reach of the South Fork of the Yellow Bank River, yet no other surveys conducted in the Yellow Bank River system in SD have recorded this species. Kallemeyn may have misidentified some *N. rubellus* as *N. atherinoides*. As with *P. maculata* and *N. biguttatus*, *N. rubellus* prefers cool, clear rocky substrate streams. Indeed, this cool/cold water species assemblage indicates that the Yellow Bank River system and Whetstone River are cold water systems.

CONSERVATION REMARKS

The streams flowing into the Minnesota River drainage from South Dakota, within and adjacent to the Coteau des Prairies, are cool/cold water systems inhabited by a

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regionally unique fish assemblage. Although *P. eos* has been collected west of the Missouri River in SD (Cunningham et al., 1996), and *P. maculata* has been collected in the Big Sioux River (Dieterman, 1995) and two of its tributaries (Cunningham, 1998 & 1999), their presence, particularly as part of an assemblage with *N. biguttatus* and *N. rubellus* reveals a unique grouping of fishes for SD. Conservation efforts for SD within this regional Minnesota River watershed should center on the Yellow Bank River system, the Whetstone River, plus Cobb Creek and Monighan Creeks.

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APPENDIX A
SPECIES LISTS

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SPECIES COLLECTION LIST

MINNESOTA RIVER DRAINAGE

ESD99-1 TNC Crystal Springs Preserve (Monighan Creek),
Deuel County, T115N, R48W, S3. Spring seeps, DO = 6.9mg/l, silt
substrate by the dam. Date: 28 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Etheostoma exile</i>	Iowa darter
<i>Pimephales promelas</i>	fathead minnow
<i>Phoxinus eos</i>	northern redbelly dace
<i>Catostomus commersoni</i>	white sucker
<i>Notemigonus crysoleucas</i>	golden shiner
<i>Ameiurus melas</i>	black bullhead
<i>Luxilus cornutus</i>	common shiner
<i>Hybognathus hankinsoni</i>	brassy minnow

ESD99-2 Cobb Creek, Deuel County, T115N, R47W, S30.
Sandy, silt with some small gravel. Bank vegetated with native species
such as rosinweed, false indigo, sandbar willow. Fingernail clams were
also noted in the stream. Date: 28 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Etheostoma nigrum</i>	johnny darter
<i>Luxilus cornutus</i>	common shiner
<i>Semotilus atromaculatus</i>	creek chub
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Luxilus cornutus</i>	common shiner
<i>Etheostoma exile</i>	Iowa darter
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Campostoma anomalum</i>	central stoneroller

ESD99-3 Gary Creek on SDGFP Land, Deuel County, T115N, R47W, S9.
Cold water stream with boulders. Forested banks. Date: 28 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Etheostoma exile</i>	Iowa darter
<i>Oncorhynchus mykiss</i>	rainbow trout
<i>Pimephales promelas</i>	fathead minnow

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ESD99-4 Gary Creek, Deuel County, T115N, R47W, S7.

Pool at culvert, quiet water, somewhat turbid. Flows through hay meadow. Date: 28 August 1999

Scientific Name

Pimephales promelas
Hybognathus hankinsoni
Phoxinus eos
Culaea inconstans
Rhinichthys atratulus

Common Name

fathead minnow
brassy minnow
northern redbelly dace
brook stickleback
blacknose dace

ESD99-5 Monighan Creek, State GPA. Deuel County, T116N, R47W, S33.

Boulder and gravel stream bed. Deep cut (20'), wooded banks.
Date: 28 August 1999

Scientific Name

Pimephales promelas
Hybognathus hankinsoni
Semotilus atromaculatus
Luxilus cornutus
Culaea inconstans
Campostoma anomalum
Catostomus commersoni
Notropis dorsalis
Etheostoma nigrum
Rhinichthys atratulus
Perca flavescens
Lepomis cyanellus
Nocomis biguttatus

Common Name

fathead minnow
brassy minnow
creek chub
common shiner
brook stickleback
central stoneroller
white sucker
bigmouth shiner
johnny darter
blacknose dace
yellow perch
green sunfish
hornyhead chub

ESD99-6 Unknown Stream, Deuel County, T117N, R47W, S32/S33.

Fair amount of row crop farming in the area, but with pasture along the stream bank. Dark colored water. Green algae noted.
Date: 28 August 1999

Scientific Name

Esox lucius
Catostomus commersoni
Ameiurus melas

Common Name

northern pike
white sucker
black bullhead

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ESD99-7 North Fork Yellow Bank, Grant County, T120N, R47W, S16/S17.

Stream bed contains large boulders. Cropland and mining in the area.

Banks are wooded. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Esox lucius</i>	northern pike
<i>Catostomus commersoni</i>	white sucker
<i>Ameiurus melas</i>	black bullhead
<i>Moxostoma macrolepidotum</i>	shorthead redhorse
<i>Semotilus atromaculatus</i>	creek chub
<i>Campostoma anomalum</i>	central stoneroller
<i>Etheostoma nigrum</i>	johnny darter
<i>Percina maculata</i>	blackside darter
<i>Notropis rubellus</i>	rosyface shiner
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Notropis stramineus</i>	sand shiner
<i>Luxilus cornutus</i>	common shiner
<i>Pimephales notatus</i>	bluntnose minnow

ESD99-8 North Fork Yellow Bank, Grant County, T120N, R48W, S26.

Sand, gravel and silt with scattered boulders. Average depth is 0.60m

Evidence of flooding – tree limbs, debris. Dairy barn nearby, some pasture but predominately cropland in the area. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Esox lucius</i>	northern pike
<i>Catostomus commersoni</i>	white sucker
<i>Ameiurus melas</i>	black bullhead
<i>Semotilus atromaculatus</i>	creek chub
<i>Etheostoma nigrum</i>	johnny darter
<i>Noturus gyrinus</i>	tadpole madtom
<i>Notropis rubellus</i>	rosyface shiner
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Pimephales notatus</i>	bluntnose minnow
<i>Moxostoma macrolepidotum</i>	shorthead redhorse
<i>Percina maculata</i>	blackside darter
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Luxilus cornutus</i>	common shiner
<i>Pimephales promelas</i>	fathead minnow
<i>Campostoma anomalum</i>	central stoneroller
<i>Notropis stramineus</i>	sand shiner

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ESD99-9 Middle Fork of South Fork Yellow Bank, Grant County, T119N, R47W, S21.
Located along the Minnesota border. Small stream, 1-2m wide, .3m deep
with mucky bottom with some gravel and sand. Few scattered trees along
the bank. Evidence of cattle traffic. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Pimephales promelas</i>	fathead minnow

ESD99-10 South Fork Yellow Bank, Grant County, T118N, R48W, S10/S11
Small stream 2m wide with wooded banks. Surrounding land use is
predominately cropland with some hay ground. Silt-sand-gravel
streambed. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Percina maculatus</i>	blackside darter
<i>Semotilus atromaculatus</i>	creek chub
<i>Etheostoma nigrum</i>	johnny darter
<i>Luxilus cornutus</i>	common shiner
<i>Campostoma anomalum</i>	central stoneroller
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Notropis rubellus</i>	rosyface shiner
<i>Pimephales promelas</i>	fathead minnow
<i>Pimephales notatus</i>	bluntnose minnow
<i>Notropis dorsalis</i>	bigmouth shiner

ESD99-11 South Fork Yellow Bank, Grant County, T118N, R49W, S25.
Rock riffles and boulders with pools. Pasture with burr oak and basswood
in the area. Sandy soils. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Pimephales promelas</i>	fathead minnow
<i>Semotilus atromaculatus</i>	creek chub
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Campostoma anomalum</i>	central stoneroller
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Luxilus cornutus</i>	common shiner
<i>Catostomus commersoni</i>	white sucker
<i>Ameiurus melas</i>	black bullhead
<i>Perca flavescens</i>	yellow perch
<i>Etheostoma nigrum</i>	johnny darter

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ESD99-12 South Fork Yellow Bank, Grant County, T118N, R49W, S32/33.

Small stream, 1 m wide, .3 m deep flows through pasture. Gravel-sand-silt bottom. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Pimephales promelas</i>	fathead minnow
<i>Semotilus atromaculatus</i>	creek chub
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Luxilus cornutus</i>	common shiner
<i>Catostomus commersoni</i>	white sucker
<i>Etheostoma exile</i>	Iowa darter
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Etheostoma nigrum</i>	johnny darter

ESD99-13 Unnamed stream, Grant County, T118N, R49W, S7/8.

Small stream, 1 m wide with undercut banks, flows through pasture with scattered trees. Pool 1m deep. Gravel, boulder stream bed.

Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Pimephales promelas</i>	fathead minnow
<i>Semotilus atromaculatus</i>	creek chub
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Campostoma anomalum</i>	central stoneroller
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Luxilus cornutus</i>	common shiner
<i>Catostomus commersoni</i>	white sucker
<i>Ameiurus melas</i>	black bullhead
<i>Etheostoma nigrum</i>	johnny darter
<i>Culaea inconstans</i>	brook stickleback

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ESD99-14 Tributary to the North Folk Whetstone River, Grant County,
T121N, R47W, S29/S30. Stream, 5 m wide and .5 m deep, flows through
hay meadow and pasture. *Lemna* covers the water surface.
Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Pimephales promelas</i>	fathead minnow
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Luxilus cornutus</i>	common shiner
<i>Semotilus atromaculatus</i>	creek chub
<i>Etheostoma nigrum</i>	johnny darter
<i>Pimephales notatus</i>	bluntnose minnow
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Catostomus commersoni</i>	white sucker
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Campostoma anomalum</i>	central stoneroller

ESD99-15 South Fork Whetsone River, T121N, R47W, S32.
Stream 2 m wide, 0.5 m deep with gravel, sandy stream bed. Banks are
wooded with boxelder & elm. A number of fish have parasites.
Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Notropis stramineus</i>	sand shiner
<i>Etheostoma nigrum</i>	johnny darter
<i>Campostoma anomalum</i>	central stoneroller
<i>Percina maculata</i>	blackside darter
<i>Pimephales notatus</i>	bluntnose minnow
<i>Catostomus commersoni</i>	white sucker
<i>Semotilus atromaculatus</i>	creek chub
<i>Pimephales promelas</i>	fathead minnow
<i>Luxilus cornutus</i>	common shiner
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Rhinichthys atratulus</i>	blacknose dace

ECO~CENTRICS

ESD99-16 Lost Creek, Deuel County, T117N, R47W, S16/S17.

Land use is a mix of pasture and row crop farming. House nearby. Silt, gravel streambed. Fingernail clams noted. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Perca flavescens</i>	yellow perch
<i>Lepomis macrochirus</i>	bluegill
<i>Campostoma anomalum</i>	central stoneroller
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Luxilus cornutus</i>	common shiner
<i>Pimephales promelas</i>	fathead minnow
<i>Catostomus commersoni</i>	white sucker
<i>Ameiurus melas</i>	black bullhead
<i>Luxilus cornutus</i>	common shiner
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Pimephales notatus</i>	bluntnose minnow
<i>Lepomis humilus</i>	orangespotted sunfish
<i>Rhinichthys atratulus</i>	blacknose dace

ESD99-17. Crow Timber Creek, Deuel County, T117N, R47W, S19/20.

Small stream 1-2 m wide. Land use is predominately row crop with pasture along the stream bank. Gravel-silt stream bed. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Lepomis macrochirus</i>	bluegill
<i>Semotilus atromaculatus</i>	creek chub
<i>Campostoma anomalum</i>	central stoneroller
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Etheostoma nigrum</i>	johnny darter
<i>Pimephales notatus</i>	bluntnose minnow
<i>Luxilus cornutus</i>	common shiner
<i>Pimephales promelas</i>	fathead minnow
<i>Nocomis biguttatus</i>	hornyhead chub

ECO~CENTRICS

ESD99-18. Crow Creek, Deuel County, T116N, R47W, S8/9.

Land use is predominately row crop with pasture along the stream bank. Scattered trees such as cottonwood, green ash and peachleaf willow along bank. Boulder-gravel-silt stream bed. House nearby.

Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Semotilus atromaculatus</i>	creek chub
<i>Campostoma anomalum</i>	central stoneroller
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Etheostoma nigrum</i>	johnny darter
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Luxilus cornutus</i>	common shiner
<i>Catostomus commersoni</i>	white sucker
<i>Lepomis cyanellus</i>	green sunfish

ESD99-19. Caine Creek, Deuel County, T117N, R49W, S24/27.

Land use is predominately row crop with pasture along the stream bank. Beaver dam on upstream side of culvert. Marshy with boulder-silt stream bed. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Etheostoma exile</i>	Iowa darter
<i>Semotilus atromaculatus</i>	creek chub
<i>Luxilus cornutus</i>	common shiner
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Etheostoma nigrum</i>	johnny darter
<i>Campostoma anomalum</i>	central stoneroller
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Notropis dorsalis</i>	bigmouth shiner

ECO~CENTRICS

ESD99-20. Cobb Creek, Deuel County, T114N, R48W, S2.

Flows through pasture. Scattered willows, cottonwoods with cropland on the upper areas. Green algae and pondweed noted. Date: 29 August 1999

<u>Scientific Name</u>	<u>Common Name</u>
<i>Lepomis macrochirus</i>	bluegill
<i>Semotilus atromaculatus</i>	creek chub
<i>Percina maculata</i>	blackside darter
<i>Etheostoma exile</i>	Iowa darter
<i>Nocomis biguttatus</i>	hornyhead chub
<i>Pimephales notatus</i>	bluntnose minnow
<i>Luxilus cornutus</i>	common shiner
<i>Esox lucius</i>	northern pike
<i>Etheostoma nigrum</i>	johnny darter
<i>Pimephales promelas</i>	fathead minnow

BIG SIOUX RIVER DRAINAGE

ESD/SDTS99-1 Newton Hills State Park tributary, Lincoln County T97, R49W, S12.

Stream very small .8m – 1m wide, .15m deep. Flows through well-vegetation area with reed canary grass, nettles, and trees.

Date: 16 August 1999.

<u>Scientific Name</u>	<u>Common Name</u>
<i>Campostoma anomalum</i>	central stoneroller
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Pimephales promelas</i>	fathead minnow
<i>Catostomus commersoni</i>	white sucker
<i>Culaea inconstans</i>	brook stickleback

ESD/SDTS99-2 Ninemile State Game Production Area (Ninemile Creek), Lincoln County, T100N, R49W, S35. Date: 16 August 1999.

<u>Scientific Name</u>	<u>Common Name</u>
<i>Pimephales promelas</i>	fathead minnow
<i>Semotilus atromaculatus</i>	creek chub
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Micropterus salmoides</i>	largemouth bass
<i>Lepomis cyanellus</i>	green sunfish

ECO~CENTRICS

ESD/SDTS99-3 Hidewood Creek, Deuel County T114N, R50W, S16.

Sampled just east of I-29. The stream has a boulder-gravel-silt stream bed with depths up to .75m and an average width of 5m.

Surrounding land use is cropland with some pasture.

Date: 29 August 1999.

<u>Scientific Name</u>	<u>Common Name</u>
<i>Notropis topeka</i>	Topeka shiner
<i>Rhinichthys atratulus</i>	blacknose dace
<i>Pimephales promelas</i>	fathead minnow
<i>Semotilus atromaculatus</i>	creek chub
<i>Notropis stramineus</i>	sand shiner
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Luxilus cornutus</i>	common shiner
<i>Campostoma anomalum</i>	central stoneroller
<i>Cyprinella lutrensis</i>	red shiner
<i>Catostomus commersoni</i>	white sucker
<i>Ameiurus melas</i>	black bullhead
<i>Noturus flavus</i>	stonecat
<i>Noturus gyrinus</i>	tadpole madtom
<i>Lepomis cyanellus</i>	green sunfish
<i>Perca flavescens</i>	yellow perch
<i>Culaea inconstans</i>	brook stickleback

ESD/SDTS99-4 East Brule Creek, Union County T95N, R49W, S4/S9.

Straightened stretch along Highway 11 – some meanders have come back (small meanders within the ditch). Cropland and pasture are principal land use practices. Date: 16 September 1999.

<u>Scientific Name</u>	<u>Common Name</u>
<i>Pimephales promelas</i>	fathead minnow
<i>Semotilus atromaculatus</i>	creek chub
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Cyprinella lutrensis</i>	red shiner
<i>Notropis stramineus</i>	sand shiner
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Campostoma anomalum</i>	central stoneroller
<i>Catostomus commersoni</i>	white sucker
<i>Lepomis humilis</i>	orangespotted sunfish
<i>Etheostoma nigrum</i>	johnny darter

ECO~CENTRICS

ESD/SDTS99-5 Brule Creek in Union County State Park, Union County
T94N, R50W, S32. Rocky stream with side pools and rock riffles.
Old spillway structure present. Fresh beaver dam started. Banks
are wooded with ash, boxelder and walnut.
Date: 16 September 1999.

<u>Scientific Name</u>	<u>Common Name</u>
<i>Pimephales promelas</i>	fathead minnow
<i>Semotilus atromaculatus</i>	creek chub
<i>Hybognathus hankinsoni</i>	brassy minnow
<i>Cyprinella lutrensis</i>	red shiner
<i>Notropis stramineus</i>	sand shiner
<i>Notropis dorsalis</i>	bigmouth shiner
<i>Noturus flavus</i>	stonecat
<i>Ictalurus punctatus</i>	channel catfish
<i>Micropterus salmoides</i>	largemouth bass

Appendix B
Maps

ECO-CENTRICS

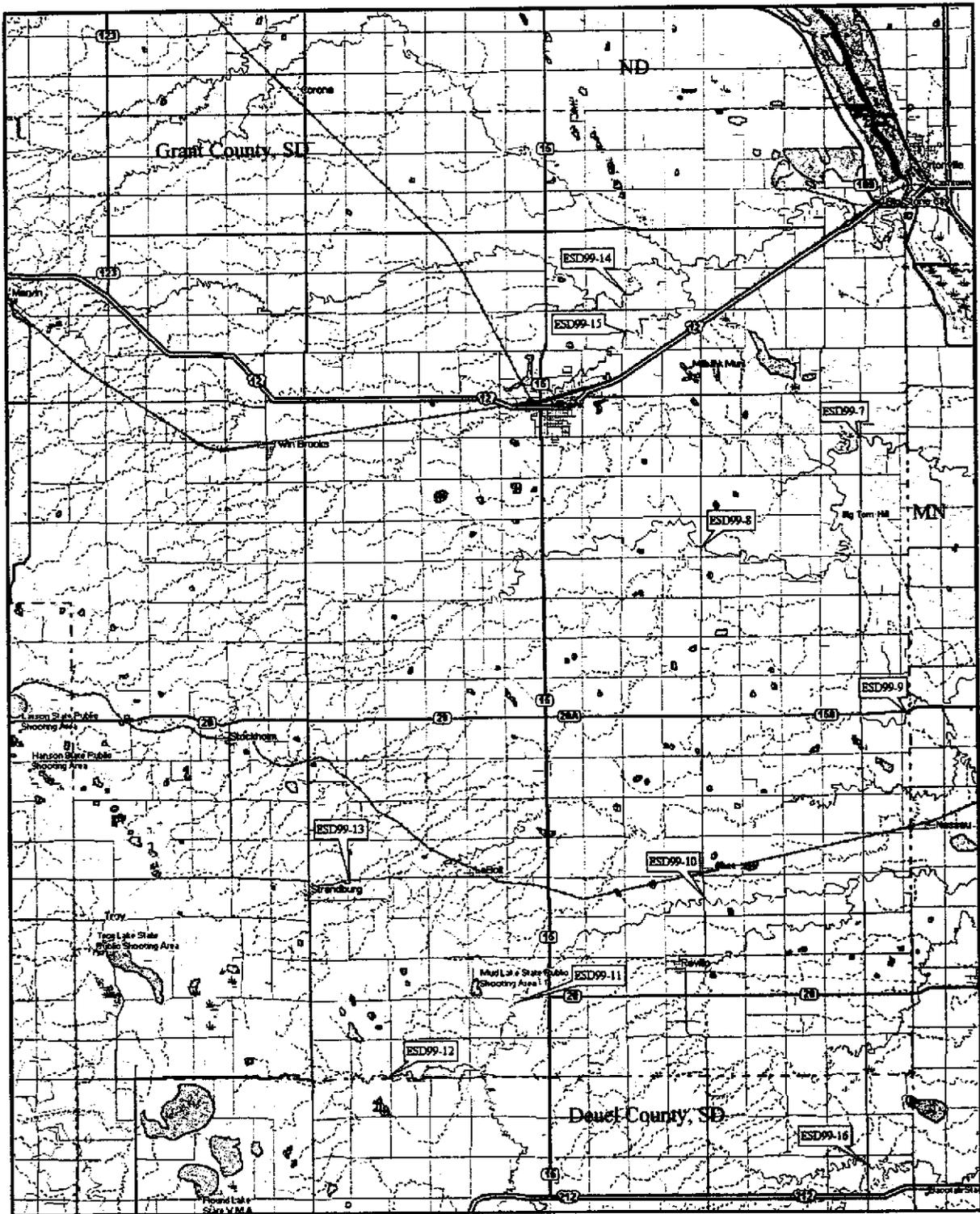


Figure 1. Stream sampling locations in the Minnesota River Drainage (Grant County and northern Deuel County, SD.)

ECO~CENTRICS

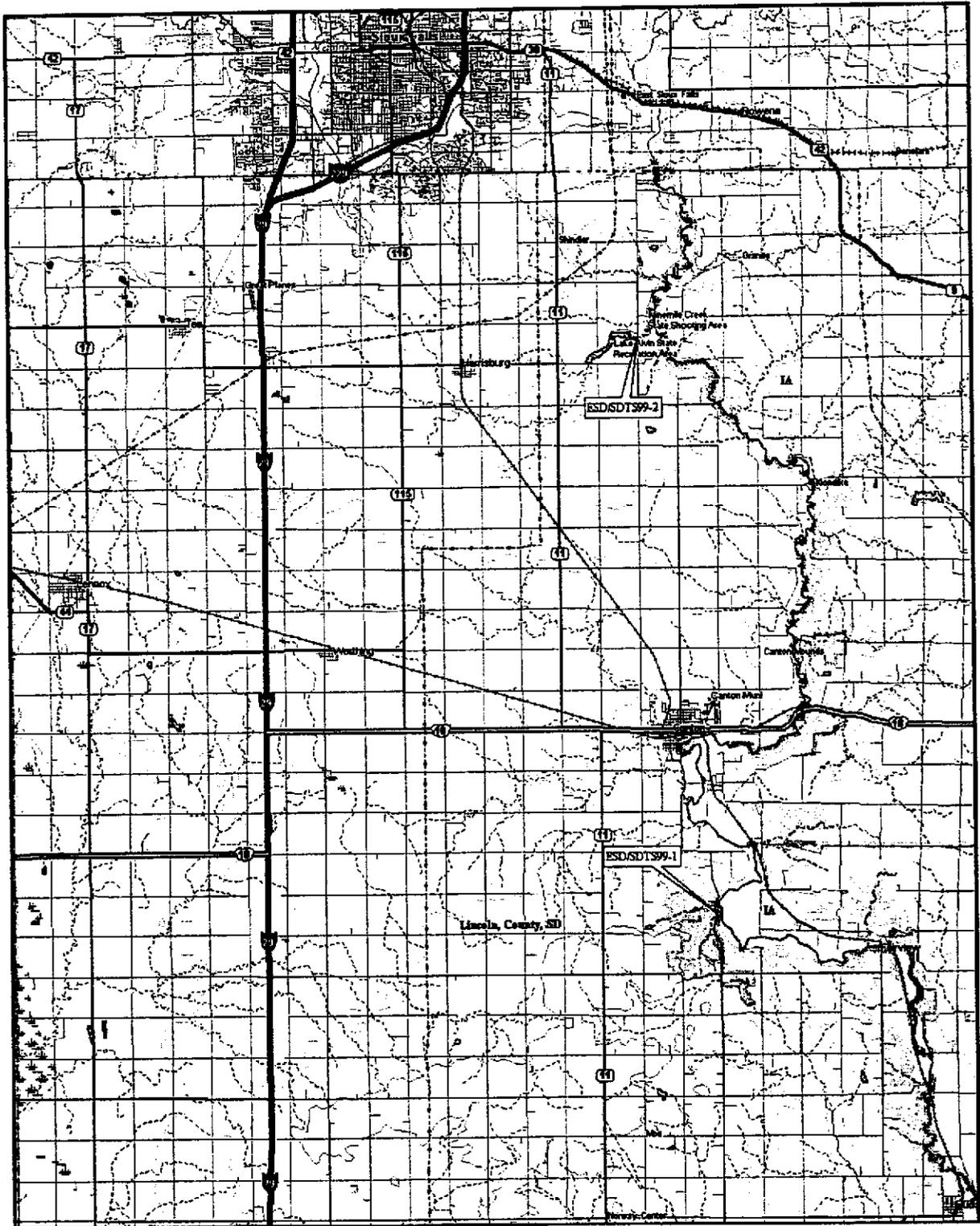


Figure 3. Lincoln County sampling sites.

ECO-CENTRICS

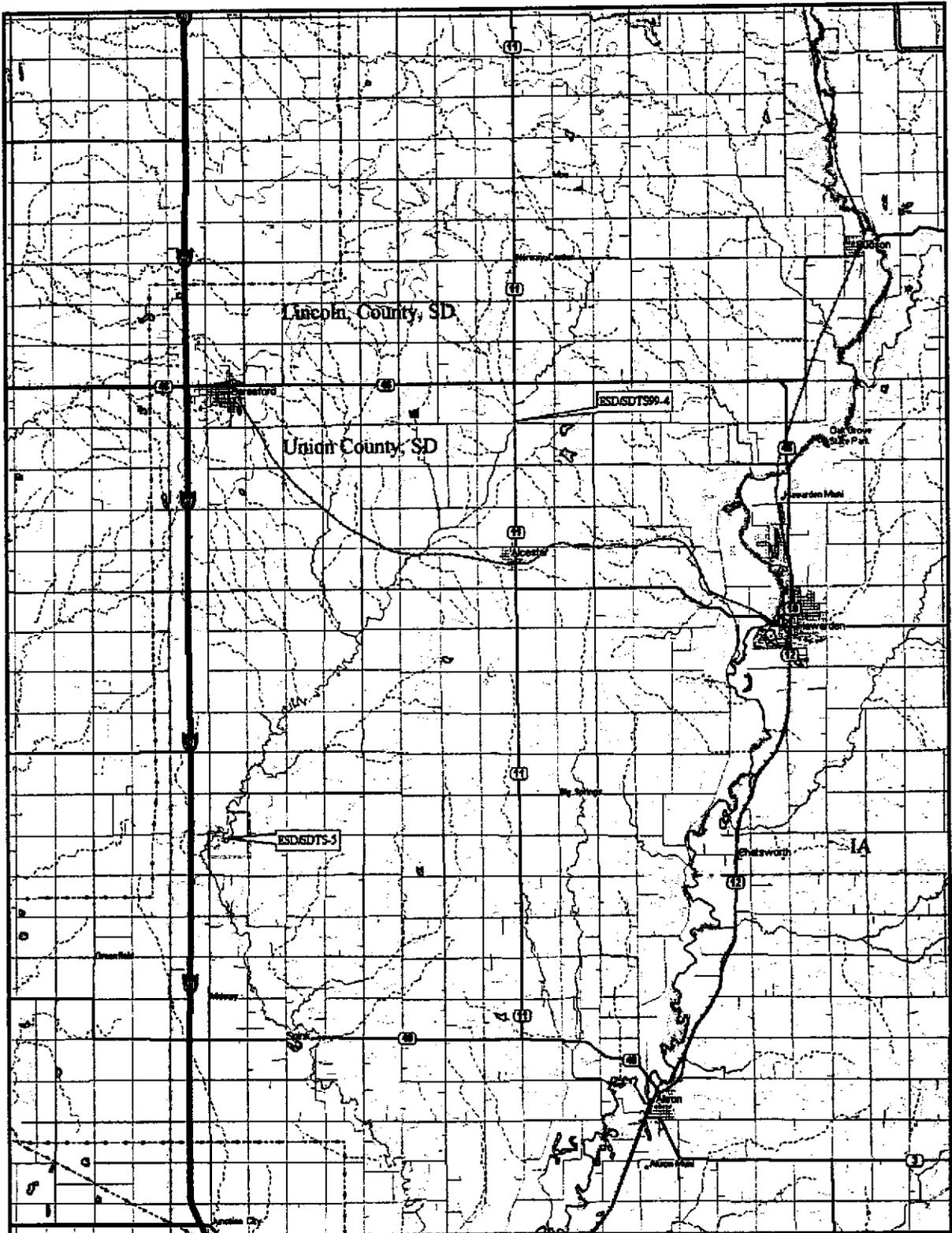


Figure 4. Union County sampling sites.

