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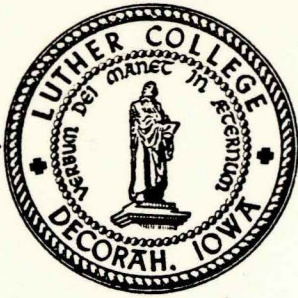
NATURAL RESOURCE STUDY
VOLGA RIVER STATE RECREATION AREA
FAYETTE COUNTY, IOWA

ENVIRONMENTAL ASSESSMENT OF CLIMATE, SOILS
AND TETRAPOD VERTEBRATES

REPORT TITLE

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319-387-1117

August 30, 1979

Ken,

In order to remove ornate box turtles reference for people outside of Iowa State Conservation Commission, do the following.

- (1) Pull Figure 10
- (2) Page 74 obliterate lines
15 - "Sec. 11, T93N, R8W, 5PM"
16 - "Sec. 11"
17 - "Sec. 11"
- (3) Page 77 obliterate line
4 - "Section 11"

Its been a fun project. Hope you ended up with what you had in mind.

Dave Roslien

Environmental Assessment of Climate, Soils
and Tetrapod Vertebrates
of

VOLGA RIVER STATE RECREATION AREA

Fayette County, Iowa

September 1, 1979

Iowa Conservation Commission Contract 8152

Report submitted to:

Planning Section

Iowa State Conservation Commission

Wallace Building

Des Moines, Iowa 50319

Report submitted by:

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INTRODUCTION TO THE VOLGA RIVER REPORT

The Volga River State Recreation Area is located in Westfield township, Fayette County, Iowa (R-8W, T-93N, 5 P.M.). It contains 5,434 acres of deciduous forest, mixed grassland, agricultural land, rock outcrop, ponds, streams and spring fed seeps. This study is an assessment of the climate, soils, and higher vertebrates of the area. The observations, data, and recommendations offered in this report are both objective and subjective in nature. Some environmental parameters such as temperature or soil type are easy to quantify while others such as exact population level or habitat preference for a wild species are often difficult to measure. Hopefully the professional judgements presented in this report adequately reflect actual field circumstances.

The Volga River Recreation Area is an important area for both wildlife species and recreational users in northeast Iowa. For the human user it offers many recreational opportunities and for many wildlife species it represents a habitat oasis in a desert of row crop monoculture. Intensive agriculture, tourism, and other development in future years will increase the areas importance as wildlife habitat. Volga river is unique because of the great mix of habitats it contains. At present few unusual species reside there, but in future years even the now common species may need valuable refuge. The area provides exceptional opportunities for management, both for human and non human species. It has great potential for becoming a truly multiple-use area and with regulation the potential for multiple-misuse seems minimal.

This report is based on intensive field observation and data collection during June and July 1978 and during June 1979. Additional on site visits occurred in each month from September 1978 to August 1979.

CLIMATE OF VOLGA RIVER RECREATION AREA

Fayette County, because of its inland location, has a continental climate with typically warm summers and cold winters. Prolonged periods of intense cold or of intense heat are rare. The climate at Fayette, Iowa is cited as typical for the county. The Fayette weather monitoring station is only about two miles from the Volga River Recreation Area and has collected comprehensive data on temperature and precipitation since 1951. The data presented here for the Fayette recording station was originally compiled by the National Oceanic and Atmospheric Administration in 1975.

Temperature

Temperature data for the Volga River Recreation Area is presented in Tables 1, 2, 3, and 4. A climograph for the area is presented in Figure 1.

Mean monthly temperatures vary from a low of 15.2°F in January to a high of 71.4°F in July (Table 1). Temperatures of 90°F or higher occur on an average of 11 days each year. Temperatures of zero or colder occur about 28 days each year (Table 2). An average year has 66 days when the daily high temperature does not reach 32°F and 165 days when the daily low temperature dips below the freezing point (32°F). Extreme high temperatures are most likely to occur in June, July and August and extreme low temperatures during January, February and March (Table 3). In an average year there is a 10 percent chance of a temperature of 32°F or lower occurring after May 26 and a 90 percent chance of a freezing or lower temperature after April 25. The Volga River Area will experience a first time fall

temperature below 32⁰F before September 14 about one year out of each 10. The probability of a daily temperature below 32⁰F prior to October 10 is 90 percent (Table 4). The growing season for the area varies between 130-140 days in most years.

A climograph relating temperature and moisture conditions for the Volga Area (Figure 1) shows similarities to climographs from both the eastern deciduous woodland and the tall grass prairie. This relationship indicates that historically the Volga River Area occupied a transitional vegetation zone at the fringes of the so called "driftless" area. In a historical sense the area could be described as a place "where the eastern forests met the western grasslands".

Precipitation

Precipitation data for Fayette County is presented in Tables 5, 6, 7, 8, and Figure 1.

The Volga River Area receives an average annual precipitation of 32.87 inches. About 71 percent of the annual amount of precipitation falls during the 6 months of April through September (Table 5). During March, April, and May the area can expect to receive about 30 percent of the total annual precipitation. During this period much of the cropland in the Volga River and Frog Hollow Creek watersheds are not protected by vegetation. Erosion and siltation will no doubt be significant factors to consider in the management of Frog Hollow Lake.

Precipitation totaling 0.1 inch or more per day is received on about 64 days during each year. Some 21 days per year are characterized by precipitation of one-half inch or more. Precipitation of one inch or more per day occurs only about eight times each year (Table 6). The annual pattern of precipitation varies from less than an inch in January to more

than four and a-half inches in June. This is a direct consequence of the availability of moisture from the Gulf-of-Mexico area and the proximity of the northeastward moving storm track. During winter, the storm track is often displaced well to the south of Iowa. The storm track (largely controlled by the upper atmosphere polar jetstream) shifts northward in May and June bringing heavier rainfalls, especially during June. By early August, storms track across Canada, and Iowa is usually free of severe atmospheric turbulence. A secondary, but lesser, rainfall maximum is associated with the southward movement of the prevailing storm track across Iowa in late August and September.

Most of Iowa's and Fayette Counties violent weather is associated with thunderstorms. The frequency of storms increases with the seasonal increase in precipitation, reaching a maximum during the warmer months. A total of about 40 thunderstorm days occur on the average each year. Many of these storms are nocturnal. Thunderstorms provide most of Fayette County's rainfall, hail, high winds, lightning and tornadoes. Flash floods are also most likely to be associated with severe storms.

Thunderstorm "cells" typically persist for about 30 minutes and extend for a distance of a few miles. Large storm "cells" may persist for an hour or even several hours. Intense periods of rainfall are usually associated with these "supercells" as are hail and tornadoes. Hail is observed throughout northeast Iowa roughly three times per season. The greatest hail frequency occurs in June (Lamoureux, 1952).

Light rain or drizzle occurs in northeast Iowa with a greater frequency than storms and are not associated with severe atmospheric disturbances. Light rains are most often associated with stable situations such as the passage of a warm front. Data on the frequency of "cloudbursts" is limited

for the Volga River Area because of the relatively short time records have been kept. In general terms a rainfall of 1.0 inch or more during a 30 minute period is expected about once each year. Only about once in 100 years is a rainfall of 2.4 inches expected during the same time period. For a 24 hour period, 2.6 inches may fall once a year, 5.6 inches about once in 50 years, and 6.3 inches once in 100 years.

The average amount of snowfall received annually on the Volga River Area is 43.9 inches (Table 7). In about half of the years a snowfall of 8 inches or more is received in one day. In about one-third of the years a snowfall of 10 inches or more is received in one day. The greatest average snowfall is received in March. Rapid melting and runoff following a heavy March snow can create local flooding and serious soil erosion. Snow cover normally disappears on the area during March or early April.

During the winter months flooding is controlled more by air temperature than by the amount or frequency of precipitation. This is especially evident during winters when the area has repeated snow-melts interspersed with new accumulations of snow. Because the ground remains frozen during winter months water from snow-melt disperses as sheet runoff and "gully washers". These may be capable of extensive erosion of stream banks and of moving large blocks of rock short distances down gulleys.

Wind

Specific information on wind at the Volga River Area is not available however, certain data for northeast Iowa is pertinent. Except for gusts, wind velocities of 55 miles per hour can be expected at a height of 30 feet above the ground about once every other year. Velocities of 90 miles per hour can be expected about once in 50 years and velocities of 95 miles per hour can be expected about once each century. In exposed areas winds of such high velocity may reach ground level. Tornadoes are most frequent

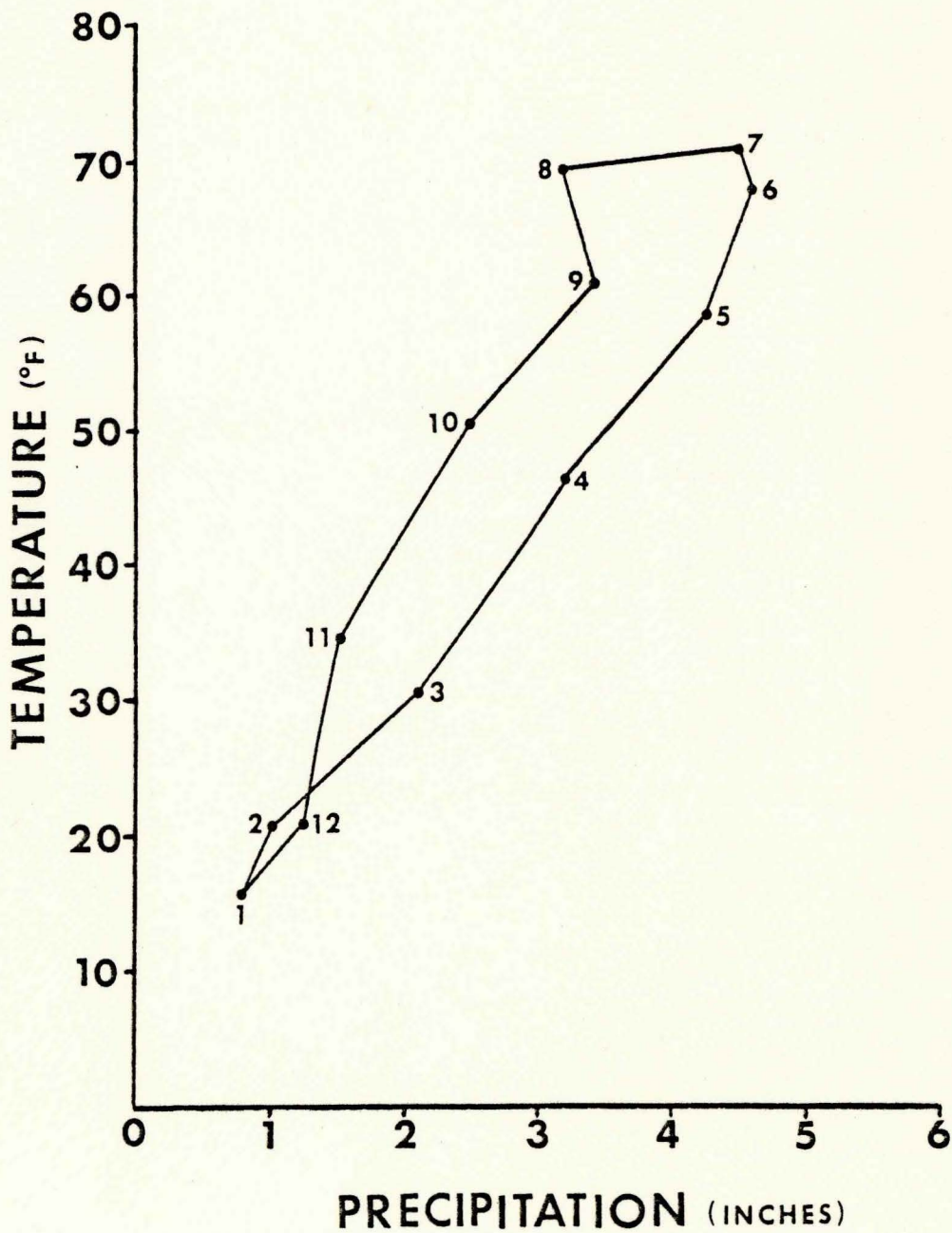


Figure 1. Climograph for Volga River Recreation Area, Fayette County, Iowa (1951-1973). Mean monthly temperature ($^{\circ}$ F) vs. mean monthly precipitation (inches). Months are numbered consecutively beginning with January.

in May and June.

Humidity

The average relative humidity for northeast Iowa ranges from about 60 percent in the afternoon to 80 percent in the morning. The relative humidity is highest in January, February, and December and it is lowest in April, May, and October. August is normally the most humid of the summer months.

Sunshine

The amount of sunshine received ranges from about 40 percent of the total possible in December to about 70 percent of total possible in July. Total incoming solar radiation increases by about fourfold in July compared to December.

Table 1. Mean temperature data for Volga River Recreation Area, Fayette County, Iowa (1951-1973).¹

Month	Mean temperatures °F		
	Daily maximum	Daily minimum	Monthly
January	24.6	5.8	15.2
February	30.6	11.0	20.9
March	40.9	21.1	31.0
April	58.0	35.0	46.5
May	70.1	46.6	58.4
June	79.0	56.5	67.8
July	82.6	60.2	71.4
August	81.1	58.3	69.7
September	72.6	49.2	60.9
October	62.4	39.0	50.7
November	44.1	25.3	34.7
December	29.9	12.9	21.4
Year	56.3	35.1	45.7

1. Data based on Fayette, Iowa reporting station. National Oceanic and Atmospheric Administration, National Climatic Center, Asheville, North Carolina.

Table 2. Mean number of days with high and low temperatures for Volga River Recreation Area, Fayette County, Iowa (1951-1975).¹

Month	Mean number of days			
	Maximum		Minimum	
	90°F and above	32°F and below	32°F and below	0°F and below
January	0	22	31	12
February	0	15	28	7
March	0	7	27	2
April	0	0	13	0
May	0	0	3	0
June	3	0	0	0
July	4	0	0	0
August	3	0	0	0
September	1	0	1	0
October	0	0	9	0
November	0	4	23	1
December	0	18	30	6
Year	11	66	165	28

1. Data from Fayette, Iowa reporting station. National Oceanic and Atmospheric Administration, National Climatic Center, Asheville, North Carolina.

Table 3. Temperature extremes for Volga River Recreation Area, Fayette County, Iowa (1951-1973).¹

Month	Temperature extremes (F ⁰)	
	Record high	Record Low
January	51	-38
February	58	-36
March	78	-33
April	90	1
May	91+	23
June	99	35
July	100+	41+
August	99+	35
September	98	24
October	91	10
November	73	-7
December	60	-24+
Year	100+	-38

1. Data from Fayette, Iowa reporting station. National Oceanic and Atmospheric Administration, National Climatic Center, Asheville, North Carolina.

Table 4. Probabilities of last freezing temperature in spring and first freezing temperatures in fall for Volga River Recreation Area.

Probability	Dates for given probability and temperature.				
	16°F or lower	20°F or lower	24°F or lower	28°F or lower	32°F or lower
Spring:					
1 year in 10 later than	Apr. 15	Apr. 17	Apr. 28	May 14	May 26
3 years in 10 later than	Apr. 6	Apr. 10	Apr. 20	May 5	May 17
5 years in 10 later than	Mar. 31	Apr. 5	Apr. 14	Apr. 29	May 11
7 years in 10 later than	Mar. 25	Mar. 31	Apr. 9	Apr. 23	May 4
9 years in 10 later than	Mar. 15	Mar. 24	Apr. 1	Apr. 14	Apr. 25
Fall:					
1 year in 10 earlier than	Oct. 26	Oct. 13	Oct. 7	Sept. 20	Sept. 14
3 years in 10 earlier than	Nov. 3	Oct. 22	Oct. 15	Sept. 29	Sept. 21
5 years in 10 earlier than	Nov. 8	Oct. 29	Oct. 21	Oct. 5	Sept. 27
7 years in 10 earlier than	Nov. 13	Nov. 4	Oct. 27	Oct. 11	Oct. 2
9 years in 10 earlier than	Nov. 21	Nov. 13	Nov. 4	Oct. 20	Oct. 10

1. Data from National Oceanic and Atmospheric Administration, Environmental Data Service, National Climatic Center, Asheville, N.C., April 1975.

Table 5. Mean total precipitation data for Volga River Recreation Area, Fayette County, Iowa (1951-1973)¹

Month	Total precipitation (inches)				
	Mean	Greatest			
		Monthly	and Year	Daily	and Year
January	0.88	2.27	1969	1.13	1967
February	1.06	3.66	1971	1.27	1971
March	2.23	5.85	1951	1.90	1959
April	3.26	7.91	1951	2.22	1951
May	4.32	8.21	1962	4.41	1962
June	4.63	7.70	1969	2.90	1959
July	4.48	10.02	1962	4.86	1968
August	3.19	6.18	1959	2.86	1952
September	3.43	8.39	1965	3.35	1961
October	2.55	5.13	1961	2.70	1955
November	1.57	3.98	1961	2.40	1958
December	1.27	2.51	1965	1.20	1973

1. Data based on Fayette, Iowa reporting station records. National Oceanic and Atmospheric Administration, National Climatic Center, Asheville, North Carolina.

Table 6. Mean numbers of days per month in which the Volga River Recreation Area receives total precipitation greater than 0.10 inch.¹

Month	Mean number of days with total precipitation of		
	.10 inch or more	.50 inch or more	1.00 inch or more
January	3	0	0
February	3	1	0
March	5	1	0
April	7	2	1
May	8	3	1
June	7	3	2
July	7	3	1
August	6	2	1
September	6	2	1
October	5	2	1
November	4	1	0
December	3	1	0
Year	64	21	8

1. Data from National Oceanic and Atmospheric Administration, Environmental Data Service, National Climatic Center, Asheville, N.C., April 1975.

Table 7. Mean total precipitation in form of snow and sleet for Volga River Recreation Area, Fayette County, Iowa (1951-1973)¹

Month	Snow, sleet (inches)						
	Mean	Greatest					
		Monthly	and	Year	Depth	and	Year
January	7.8	17.3		1971	21.0		1971
February	7.9	34.2		1962	23.0		1971
March	12.9	39.5		1951	27.0		1959
April	2.0	11.0		1973	11.0		1973
May	0.0	-		-	-		-
June	0.0	-		-	-		-
July	0.0	-		-	-		-
August	0.0	-		-	-		-
September	0.0	-		-	-		-
October	0.1	1.5		1955	1.0		1955
November	3.2	11.5		1959	8.0		1957
December	10.0	21.5		1969	16.0		1969
Year	43.9	39.5		March 1951	27.0		March 1959

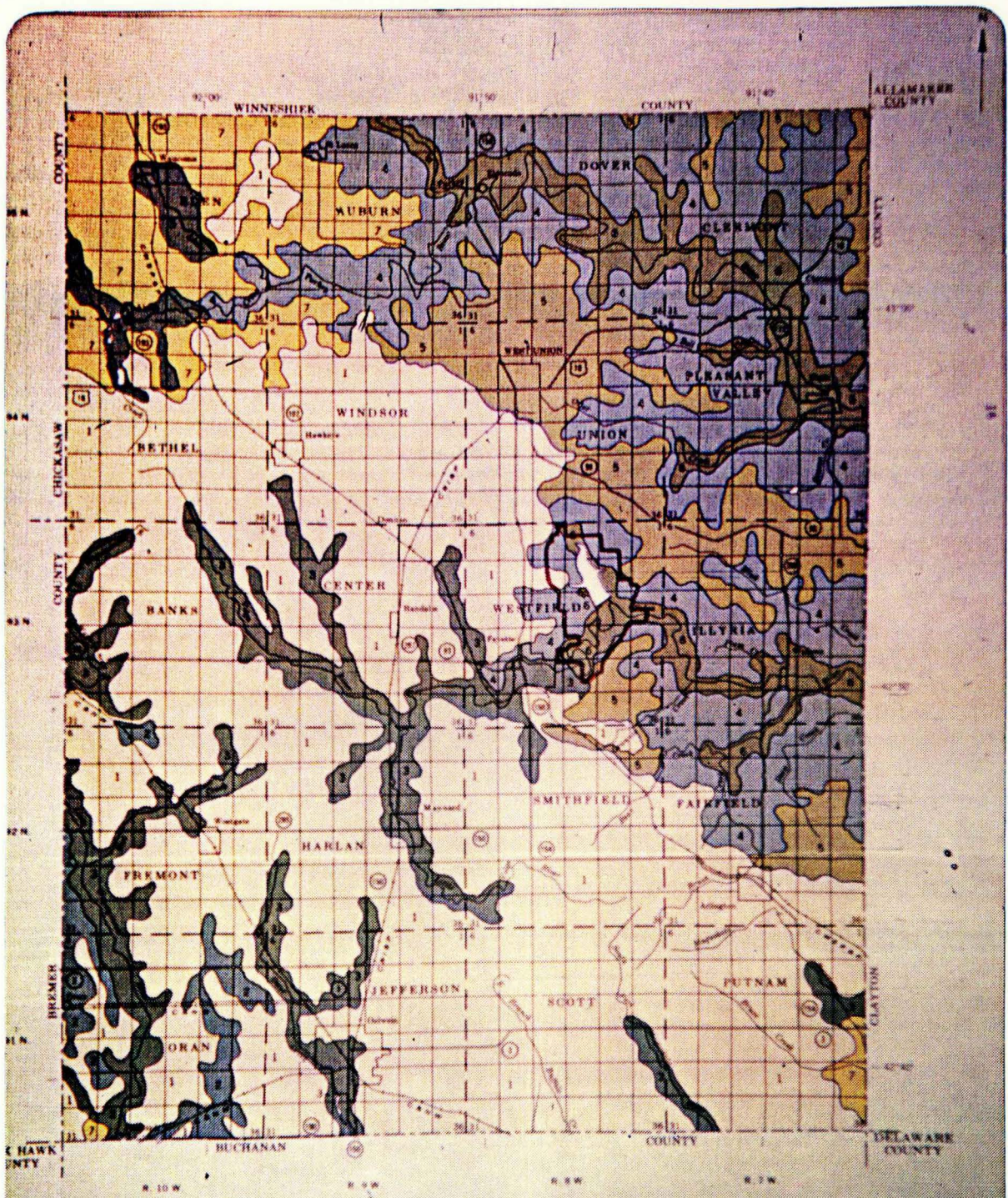
1. Data based on Fayette, Iowa reporting station records. National oceanic and Atmospheric Administration, National Climatic Center, Asheville, North Carolina.

SOILS OF THE VOLGA RIVER RECREATION AREA

Technical information on soils presented in this section was abstracted from the Soil Survey of Fayette County, Iowa (1978), Principal Soils of Iowa (1965) and Highway Guide of Iowa Soil Associations (1967). Specific comments are based on field work completed during June 1978 and 1979. This soils report will be most useful when used in conjunction with the geological features report prepared by Richard Kellogg. In some cases (erosion, sedimentation, eutrophication) the aquatic report of James Eckblad will also correlate with the soils report.

Soil Associations at Volga River

Four soil associations occur within the boundaries of the Volga River State Recreation Area (Figure 2). These are the Dorchester-Saude-Wapsie Association, the Fayette-Nordness-Rock Outcrop Association, the Downs-Fayette Association, and the Kenyan-Clyde-Floyd Association. Each soil association area has a repeating pattern of two or more major soil types. The arrangement of these soil types and other features such as topography give each soil association area a characteristic landscape. Major soil types are grouped into associations when they occur in certain combinations to form patterns which are repeated from place to place within a certain geographical area. Soil associations are named by placing together the names of two or three soil series which occupy major areas within each soil association. Soil types other than those which occur in an association name obviously may occur in each soil association area. The soils in one association may also occur in another association, but must be in a different pattern. There are then as many soil associations as there are landscapes that have distinctive proportional patterns of soils. Some twenty principal soil association areas have been recognized in Iowa and this report deals with only the four at Volga River (Oschwald



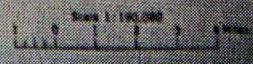
SOIL ASSOCIATIONS

- Kenyon-Clyde-Floyd association: Nearly level to moderately sloping, moderately well drained to poorly drained soils that formed in loamy material and glacial till; on uplands
- Readlyn-Oran-Tripoli association: Nearly level to gently sloping, somewhat poorly drained and poorly drained soils that formed in loamy material and glacial till; on uplands
- Loamy Alluvial Land-Saupe-Flagler association: Nearly level to moderately sloping, somewhat excessively drained to poorly drained soils that formed in loamy and sandy alluvial sediment; on bottom lands and stream benches
- Fayette-Wardness-Rock outcrop association: Moderately sloping to very steep, well drained and somewhat excessively drained soils that formed in loess overlying limestone bedrock and rock outcrop; on uplands
- Downs-Fayette association: Gently sloping to moderately steep, well drained soils that formed in loess; on uplands
- Dorchester-Saupe-Wapota association: Nearly level to moderately sloping, moderately well drained and well drained soils that formed in silty and loamy alluvial sediment; on bottom lands and stream benches
- Readlyn-Ellyria-Wapota association: Nearly level to moderately sloping, well drained to somewhat poorly drained soils that formed in loamy material underlying

Figure 2. Soil association areas of Fayette County and the Volga River Area (Approximate Area boundary in red).

U. S. DEPARTMENT OF AGRICULTURE
 SOIL CONSERVATION SERVICE
 IOWA AGRICULTURE AND HOME ECONOMICS EXPERIMENT STATION
 COOPERATIVE EXTENSION SERVICE, IOWA STATE UNIVERSITY
 DEPARTMENT OF SOIL CONSERVATION, STATE OF IOWA

**GENERAL SOIL MAP
 FAYETTE COUNTY, IOWA**



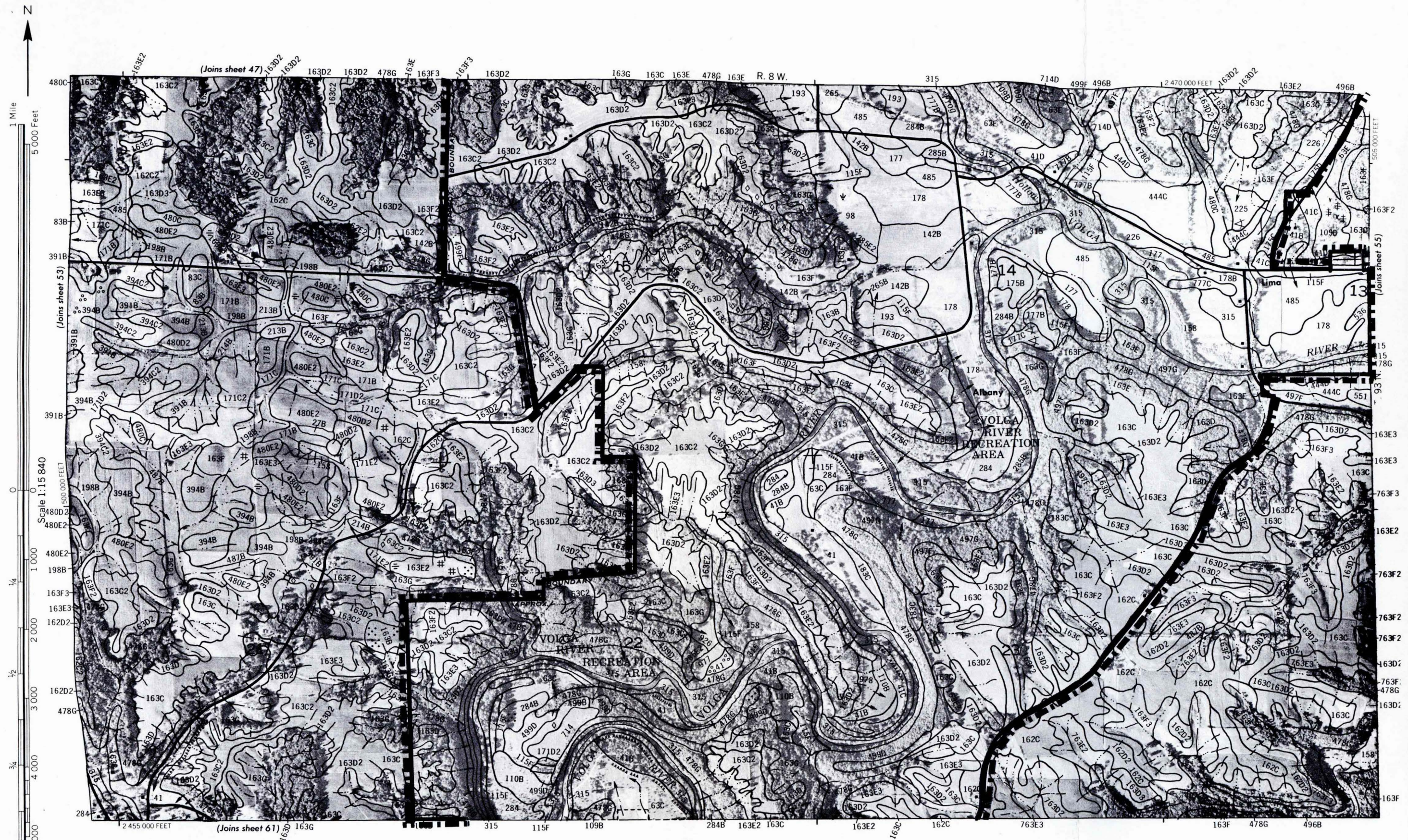


Figure 3C. Soil map of Volga River Area sections 13,14,15,21,22,23. (Area outlined in red; consult Table 8 and Figure 3E for symbol interpretation.)

FAYETTE COUNTY, IOWA

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND

CULTURAL FEATURES

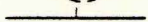
BOUNDARIES

National, state or province	
County or parish	
Minor civil division	
Reservation (national forest or park, state forest or park, and large airport)	
Land grant	
Limit of soil survey (label)	
Field sheet matchline & neatline	

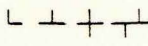
AD HOC BOUNDARY (label)

Small airport, airfield, park, oilfield, cemetery, or flood pool	
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STATE COORDINATE TICK



LAND DIVISION CORNERS (sections and land grants)



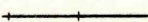
ROADS

Divided (median shown if scale permits)	
Other roads	
Trail	

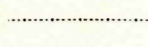
ROAD EMBLEMS & DESIGNATIONS

Interstate	
Federal	
State	
County, farm or ranch	

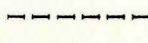
RAILROAD



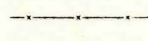
POWER TRANSMISSION LINE (normally not shown)



PIPE LINE (normally not shown)



FENCE (normally not shown)



LEVEES

Without road	
With road	
With railroad	

DAMS

Large (to scale)	
Medium or small	

PITS

Gravel pit	G.P.
Mine or quarry	QU.

MISCELLANEOUS CULTURAL FEATURES

Farmstead, house (omit in urban areas)	
Church	
School	
Indian mound (label)	
Located object (label)	
Tank (label)	
Wells, oil or gas	
Windmill	
Kitchen midden	

WATER FEATURES

DRAINAGE

Perennial, double line	
Perennial, single line	
Intermittent	
Crossable with tillage implements	
Not crossable with tillage implements	
Drainage end	
Canals or ditches	
Double-line (label)	
Drainage and/or irrigation	

LAKES, PONDS AND RESERVOIRS

Perennial	
Intermittent	

MISCELLANEOUS WATER FEATURES

Marsh or swamp	
Spring	
Well, artesian	
Well, irrigation	
Wet spot	

SPECIAL SYMBOLS FOR SOIL SURVEY

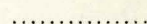
SOIL DELINEATIONS AND SYMBOLS



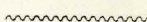
ESCARPMENTS

Bedrock (points down slope)	
Other than bedrock (points down slope)	

SHORT STEEP SLOPE



GULLY



DEPRESSION OR SINK



SOIL SAMPLE SITE (normally not shown)



MISCELLANEOUS

Blowout	
Clay spot	
Gravelly spot	
Gumbo, slick or scabby spot (sodic)	
Dumps and other similar non soil areas	
Prominent hill or peak	
Rock outcrop (limestone)	
Saline spot	
Sandy spot	
Severely eroded spot	
Slide or slip (tips point upslope)	
Stony spot, very stony spot	
Muck area 2 acres or less	
Gray clay area 2 acres or less	
Limestone 1 to 4 Feet below the surface	
Shale spot	
Glacial till outcrop	
Borrow area	B.A.
Made land	M.L.

Figure 3E. Symbols used on Volga River Area soils maps (Figure 3A-3D).

et al. 1965).

The 90 soil types present at Volga River are presented in Figure A-D and the appropriate soil map symbols and soil names to accompany Figure 3 are presented in Table 8.

A brief characterization of each Volga River Area soil association follows. Since the Fayette-Nordness-Rock outcrop and Dorchester-Saude-Wapsie associations occur most frequently they will receive more attention than the Downs-Fayette and Kenyan-Clyde-Floyd associations.

A. Fayette-Nordness-Rock Outcrop Association

This soil association occurs on uplands and is moderately sloping to very steep, well drained and in places somewhat excessively drained. These soils formed in loess overlying limestone bedrock and rock outcrops. This association includes Fayette, Nordness, Rock outcrop and Dubuque soil types as major components and several minor soils including Downs, Jacwin, Chaseburg, Dorchester, and Volney. The rock outcrop and Nordness soil complexes are responsible for much of the scenic rugged beauty of the Volga River Area. A typical pattern of soils and underlying material for this complex is presented in Figure 4. This soil association occurs in sections 2, 3, 4, 9, 10, 11, 12, 13, 14, 15, 21, 22, and 23 at Volga River. Some typical areas are in the W 1/2, Sec. 2; NE 1/4, Sec. 3. N 1/4, Sec 11; W 1/2, Sec. 15. It is a very prevalent association along the Volga River.

Soils of this association are an uplands characterized by narrow, moderate to strongly sloping ridgetops. Side slopes are strongly sloping to very steep and dissected by many side-valley waterways. This association is very prevalent along the Turkey River as well as the Volga and its tributaries. A typical landscape includes narrow, meandering valleys bordered by very steep, irregular side slopes. On the side slopes between the bottom lands and the highest ridges are limestone outcrops. These outcrops range in height from

10 to 150 feet. Woodlands border the outcrops in most places at Volga River. Irregularly shaped timber areas are common and scattered hardwood species occur in the drainageways. Patches of oak and hickory are distinctive features of the landscape and some are quite old and may even persist from the native vegetation. Some excellent examples occur in sections 10 and 15. Roger Knutson's report on vegetation should be examined for detailed locations of mature and distinctive timber stands.

The Fayette County Soil Conservation District estimates average annual soil loss from erosion in this soil association as 5-10 tons per acre (Figure 8).

The major soils in this association are described as follows:

Fayette soil: soils are gently sloping to very steep and occur on side slopes on uplands. These soils are well drained with a light colored silt loam surface layer. Steeper Fayette soils should be used only for woodland while less sloping areas may be cropped. Soil erosion is a major limitation of this soil when native vegetation is removed or cropping patterns instigated.

Nordness soil: soils are gently sloping to steep (2-25%) and are on side slopes and escarpments on uplands. These are excessively drained soils with a light colored silt loam to loam surface layer. Bedrock usually is at a depth of 5-18 inches. Native vegetation on this soil was deciduous trees. Soil erosion and droughtiness are major limitations of this soil when native vegetation is removed or cropping patterns instigated. The shallow limestone bedrock interferes with many types of development (Table 10).

Rock outcrop: outcrops of limestone on very steep side slopes and escarpments on uplands. In some places a thin layer of silt loam or loam overlies the bedrock and in other areas outcrops of limestone are at the surface. Rock outcrop areas are usually complexed with Nordness soils on 25-60 percent slopes in a ratio of 50 percent outcrop to 40 percent Nordness soils. This complex is best suited to woodland and wildlife at Volga River.

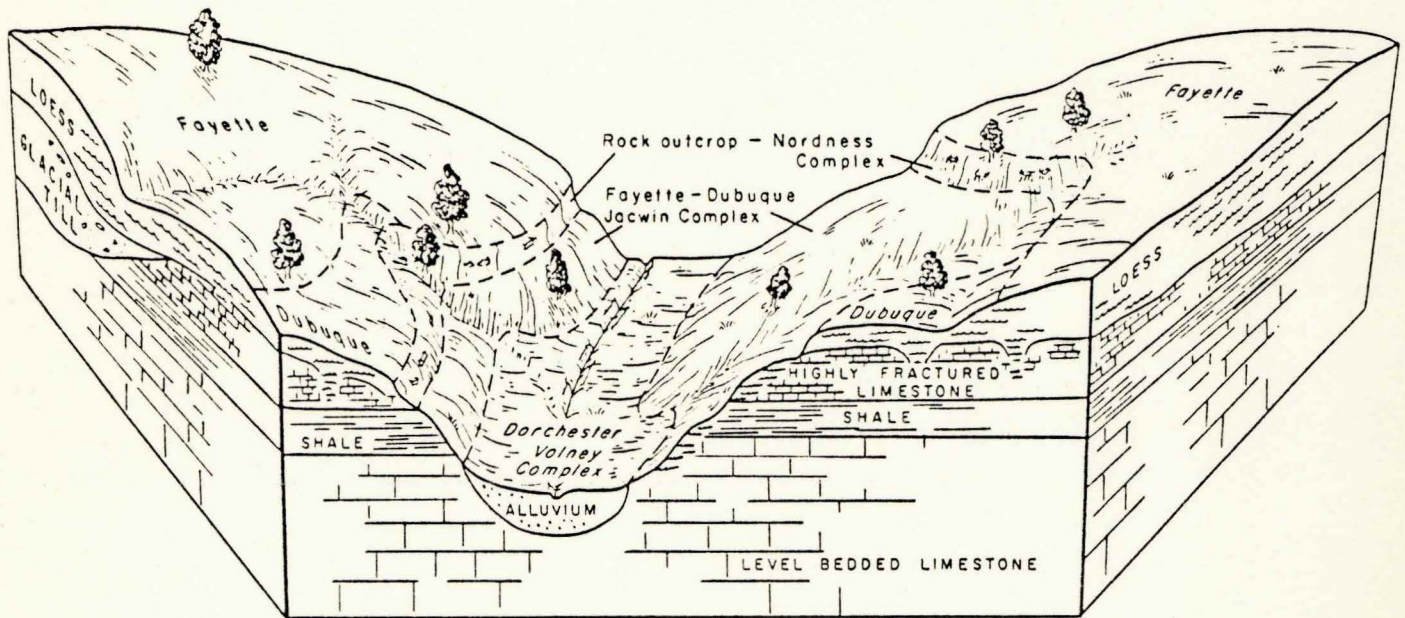


Figure 4. Typical pattern of soils and underlying material in the Fayette-Nordness-Rock outcrop association at Volga River State Recreation Area.

B. Dorchester-Saude-Wapsie Association

This soil association occurs on bottom lands and stream benches characterized by nearly level to moderately sloping areas with a few strongly sloping to steep areas along the terrace escarpments. These soils are moderate to well drained and formed in silty and loamy alluvial sediment on bottom lands and stream benches. This association includes Dorchester, Saude, Wapsie, Waukee, Bassett and Spillville soil types as major components and several minor soils including Burkhardt, Caneek, Flagler, Hanlon, Richwood, and Canoe. This association is adjacent to the Volga River and is scenic when viewed along river and tributary bottom lands. It is filled with old stream meanders and oxbows. A typical pattern of soils and underlying material for this complex is presented in Figure 5. This soil association occurs in sections 3, 4, 10, 11, 13, 14, 15, 22, 23, and 27 at Volga River. A good part of the "Central Valley" of the Volga River Area would be typical of this complex as well as S 1/2, Sec 13; S 3/4, Sec 14; NW 1/2, Sec. 23; and E 1/2, Sec. 22. The W 1/2, Sec 11 and E 1/2, Sec 10 are also quite typical.

Bottomland soils of this association are subject to high-velocity flooding of short duration. Evidence of this is usually plentiful anywhere along the lower reaches of Frog Hollow Creek in sections 11 and 14. Most soils on higher stream valley benches are free from flooding, but do receive run off water from adjacent hillsides.

The Fayette County Soil Conservation District estimates average annual soil loss from erosion in this soil association as 2-5 tons per acre (Figure 8).

The major soils in this association are described as follows:

Dorchester soil: nearly level soils (0-2% slope) on bottom lands. These soils are subject to frequent, high-velocity, short-duration flooding. These soils are moderately well drained with a light colored silt loam surface layer of rather recent deposit. Dorchester soils may be complexed with Volney soils

along the narrow upland drainageways at Volga River. This soil has severe limitations for recreational development because of flooding (Table 10).

Saude soil: nearly level to moderately sloping (0-9%) and on benches. These soils are well drained with a dark colored, loamy surface layer. Most often found along stream terraces and in outwash areas on uplands. Native vegetation on these soils was mixed prairie grasses. Erosion and droughtiness tends to be a problem on more sloping areas.

Wapsie soil: nearly level to moderately sloping (0-9%) soils on the uplands. These soils are well drained with a dark colored, loamy surface layer. Most often found along stream terraces and in outwash areas on uplands. Native vegetation on these soils was mixed prairie grasses and deciduous trees. These soils tend to be droughty even when rainfall is average. Erosion is a problem on the more sloping soils.

lesser soils: In this association Bassett soils are on summits with Schley soils downslope from them. Clyde soils are in the drainageways. The Wapsie and Burkhardt soils are above the Bassett soils and Schley soils on the summits and knobs. It is this soil sequence which causes many of the side slope seepage areas at Volga River. These side seep areas often form muck areas at lower elevations. Most of the lesser soils in this association have some erosion problems when disturbed, without proper management, for agriculture.

In summary the Dorchester-Saude-Wapsie association is suitable for cultivated crops as well as wildlife habitat. Some association areas at Volga River are also in timber. Some association areas drain poorly and provide scattered wet areas important to amphibians and invertebrates. A typical example of a wet area would be the temporary pond in the Spillville soil (map symbol 485, Figure 3) in the SE 1/4, NW 1/4, Sec. 11.

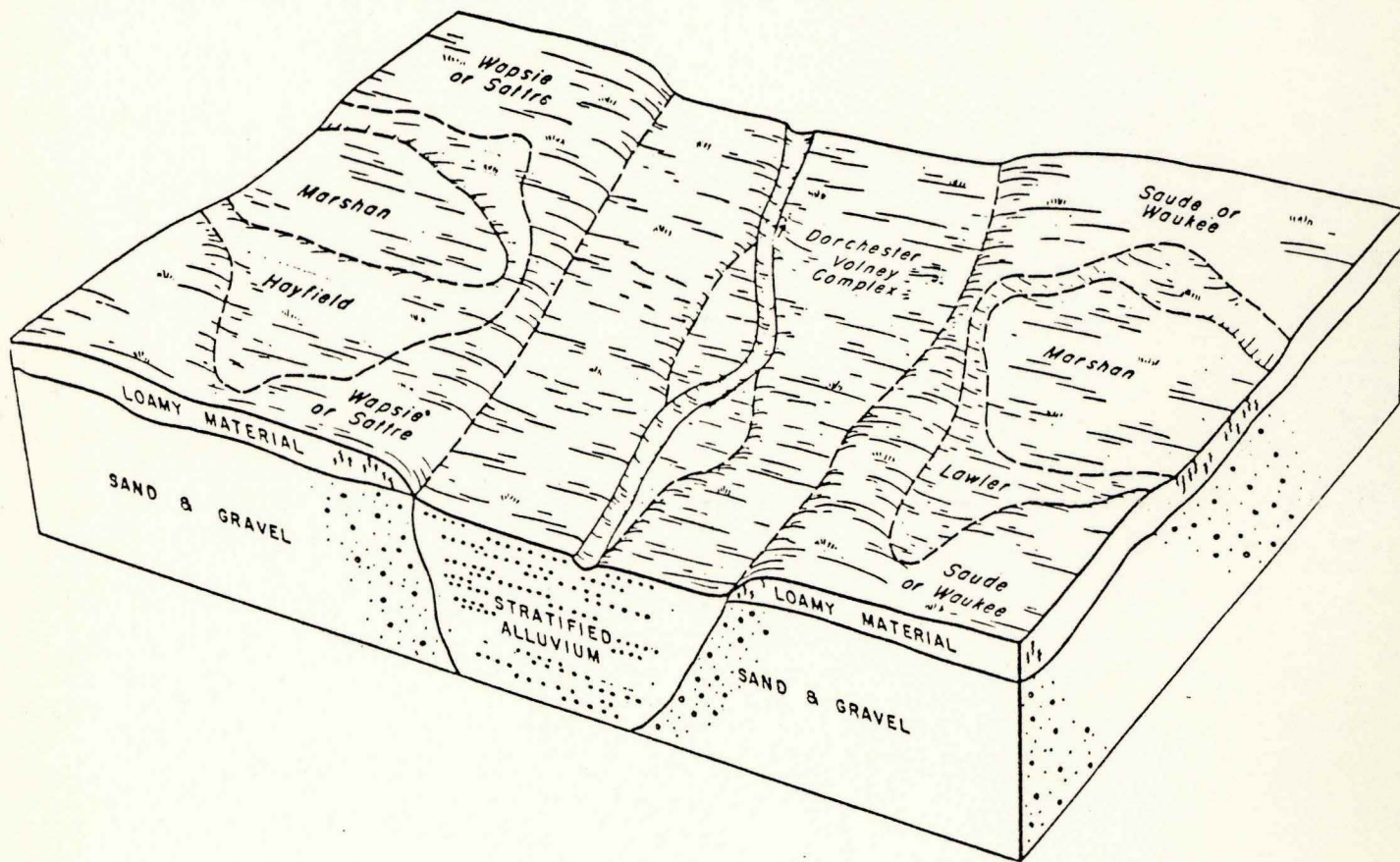


Figure 5. Typical pattern of soils and underlying material in the Dorchester-Saude-Wapsie association at the Volga River State Recreation Area.

C. Downs-Fayette Association

This soil association occurs on uplands characterized by gently sloping to moderately sloping narrow ridgetops and strongly sloping to moderately steep side ridges. These soils formed from loess. This association includes Downs and Fayette soils as major components and several minor soils including Exette, Otter and Huntsville soils. A typical pattern of soils and underlying material for this complex is presented in Figure 6. This soils association occurs in sections 11, 12, 23, and 26 at Volga River. Some typical areas are in the S.E. 1/4, Sec 23 along the area boundary road and in the NE 1/4, Sec 26 along the area boundary road. This associations limited occurrence in the area make it less important than the two prior groupings; however these soils require careful management because they are highly erodible.

Soils in this association are well drained. Side slopes are dissected by many small drainageways often with gullies. Scattered trees grow in the drainageways with a few more extensive timber areas.

The Fayette County Soil Conservation District estimates average annual soil loss from erosion in this soil association as 10 or more tons per acre (Figure 8).

The major soils of this association are described as follows:

Downs soil: soils are gently sloping to strongly (2-18%) sloping on ridges and convex side slopes. These soils are well drained with a moderately dark silt loam surface layer. Native vegetation was prairie grass and deciduous trees. Long upland slopes are subject to erosion but also well suited to management. This soil has few limitations for camp, picnic and trail areas (Table 10).

Fayette soil: soils are gently sloping to very steep (2-40% slope) on upland ridges and convex side slopes. Fayette soils are usually more sloping than Downs soils. Soil is well drained with a light colored silt loam surface layer. The native vegetation was deciduous trees. At slopes of 2-9% this

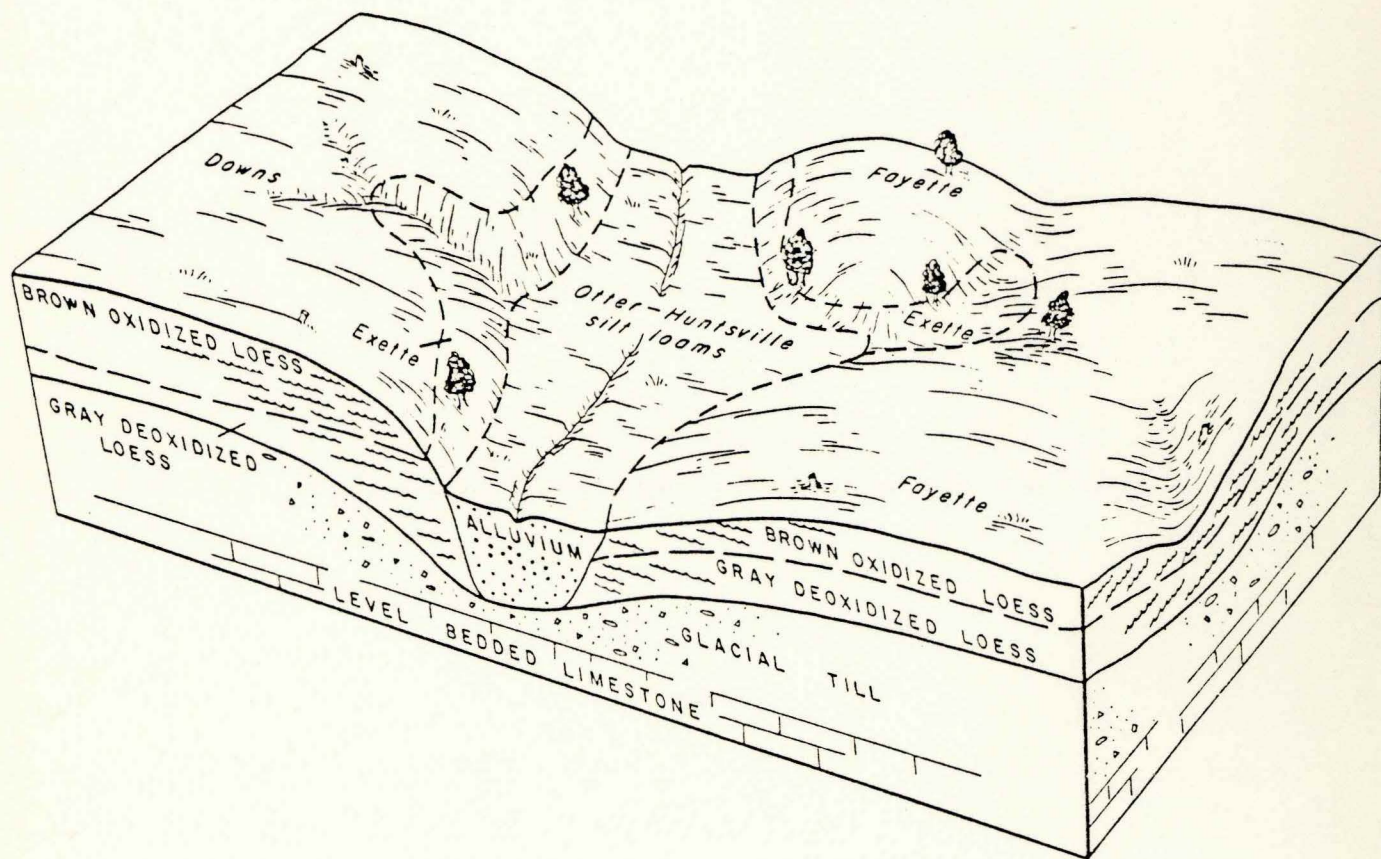


Figure 6. Typical pattern of soils and underlying material in the Downs-Fayette association at Volga River State Recreation Area.

soil has few limitations for camping, picnicing and hiking areas. At slopes over 10% there are moderate to severe limitations in recreational development (Table 10). Potential for wildlife habitat development is good for most habitat elements (Table 9).

Erosion and gullies tend to be problems on these soils because of steep slopes.

D. Kenyon-Clyde-Floyd Association

This association occurs on uplands characterized mainly by long, gentle slopes, slightly rounded hills and low gradient waterways through which water moves slowly. These soils are nearly level to moderately sloping. Stones and boulders are conspicuous landscape features in undisturbed areas. This association includes Kenyan, Clyde, Floyd, Bassett and Cresco soil types as major components and several minor components including Burkhardt, Dickinson, Donnan, Flagler, Olin, Oron, Ostrander, Readlyn, Rockton, Saude, Schley, Sparta and Tripoli soils. A typical pattern of soils and underlying material for this complex is presented in Figure 7. This is a very limited association at Volga River and occurs only in section 9. A typical example of this association occurs along the Volga River Area entrance road in the East central portion of section 9. Though limited in the area it is a very significant soil association for Volga River Area management because much of the watershed for the Area on the West and Northwest is made up of soils in this association. Erosion control is essential on soils of this association if they are used for agriculture.

The Fayette County Soil Conservation District estimates average annual soil loss from erosion in this soil association as 2-5 tons per acre (Figure 8).

The major soils in this association are described as follows.

Kenyon soil: soils are gently sloping on ridge tops and moderately sloping (2-9%) on side hills. Soils are dark colored on the surface and moderately well drained. The native vegetation was prairie grass. This soil is present

at Volga River on only a few acres in the east central part of section 9.

Clyde soil: soils in drainageways and lower concave positions on uplands. These soils are nearly level to gently sloping and poorly drained. Native vegetation was prairie grasses and other plants with high tolerance for wetness. This soil does not occur on the Volga River Area.

Floyd soil: soils in concave downslope positions. This soil is nearly level to gently sloping and somewhat poorly drained. Native vegetation was prairie grasses. This soil does not occur on the Volga River Area.

Bassett soil: soils are gently sloping on ridge tops and moderately sloping on side slopes (2-18%). This soil has a dark, loamy surface layer and is moderately well drained. Native vegetation was mixed prairie grasses and deciduous trees. Erosion is a major limitation for cultivation. A typical Bassett soil occurs on the extreme western edge of the Volga Area along the entrance road in the East central portion of section 9.

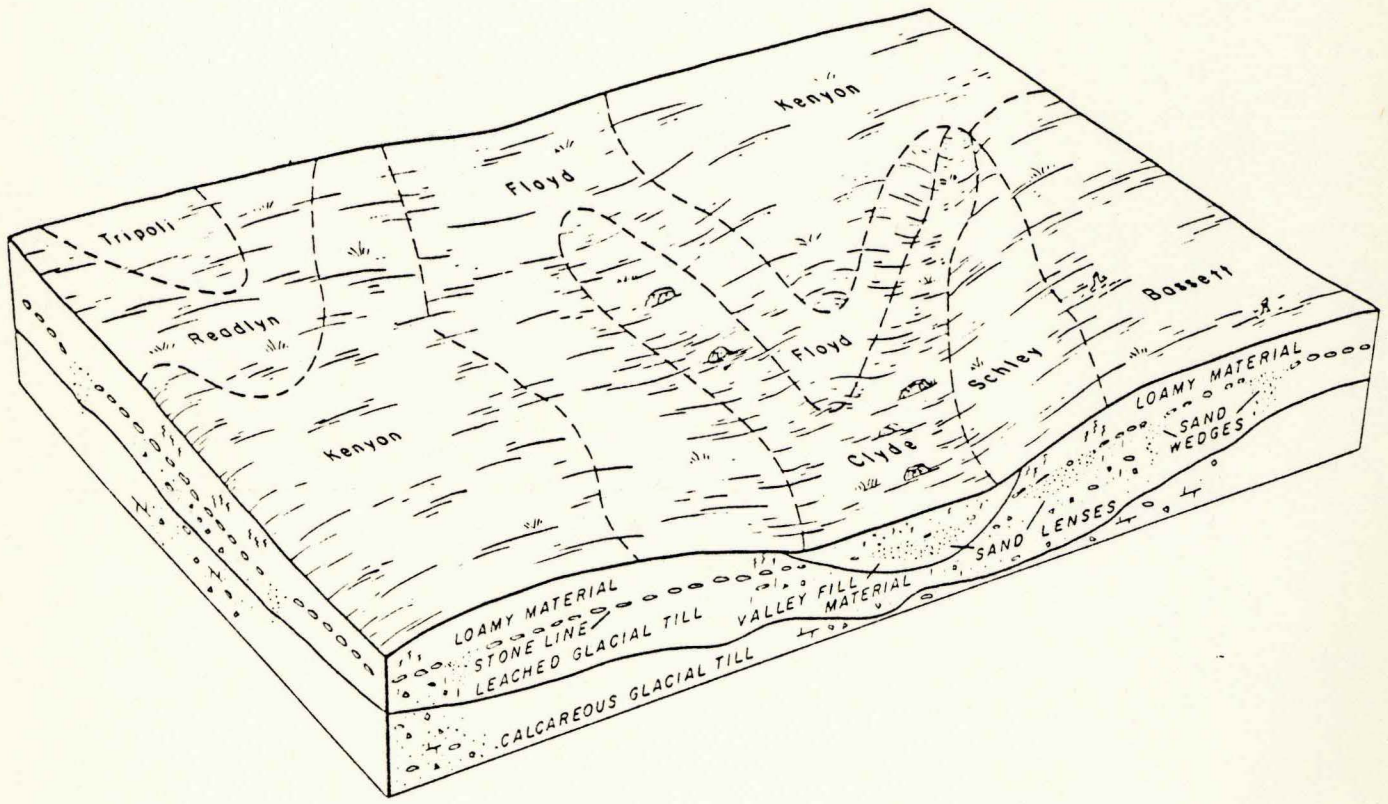


Figure 7. Typical pattern of soils and underlying material in the Kenyon-Clyde-Floyd association at Volga River State Recreation Area.

Table 3. Guide to soil map symbols and soil names used on soil map in report
Figure 3 for Volga River Recreation Area, Fayette County, Iowa.¹

Soil map symbol	Soil name and percent slope
41	Sparta loamy fine sand, 0-2% slopes
41B	Sparta loamy fine sand, 2-5% slopes
41C	Sparta loamy fine sand, 5-9% slopes
41D	Sparta loamy fine sand, 9-14% slopes
63C	Chelsea loamy fine sand, 2-9% slopes
63E	Chelsea loamy fine sand, 14-25% slopes
98	Huntsville silt loam, 0-2% slopes
109B	Backbone fine sandy loam, 2-5% slopes
109C	Backbone fine sandy loam, 5-9% slopes
109D	Backbone fine sandy loam, 9-14% slopes
110B	Lamont fine sandy loam, 1-5% slopes
110C	Lamont fine sandy loam, 5-14% slopes
115F	Sandy escarpments, 14-30% slopes
142B	Chaseburg silt loam, 2-5% slopes
158	Dorchester silt loam, 0-2% slopes
162C	Downs silt loam, 5-9% slopes
163B	Fayette silt loam, 2-5% slopes
163C	Fayette silt loam, 5-9% slopes
163C2	Fayette silt loam, 5-9% slopes, moderately eroded
163D	Fayette silt loam, 9-14% slopes
163D2	Fayette silt loam, 9-14% slopes, moderately eroded
163D3	Fayette silt loam, 9-14% slopes, severely eroded
163E	Fayette silt loam, 14-18% slopes
163E2	Fayette silt loam, 14-18% slopes, moderately eroded
163E3	Fayette silt loam, 14-18% slopes, severely eroded

Table 3 (continued)

Soil map symbol	Soil name and percent slope
163F	Fayette silt loam, 18-25% slopes
163F2	Fayette silt loam, 18-25% slopes, moderately eroded
163F3	Fayette silt loam, 18-25% slopes, severely eroded
163G	Fayette silt loam, 25-40% slopes
171B	Bassett loam, 2-5% slopes
171C	Bassett loam, 5-9% slopes
171C2	Bassett loam, 5-9% slopes, moderately eroded
171D2	Bassett loam, 9-14% slopes, moderately eroded
171E2	Bassett loam, 14-18% slopes, moderately eroded
175B	Dickinson fine sandy loam, 2-5% slopes
175C	Dickinson fine sandy loam, 5-9% slopes
175D	Dickinson fine sandy loam, 9-14% slopes
177	Saude loam, 0-2% slopes
177B	Saude loam, 2-5% slopes
177C	Saude loam, 5-9% slopes
178	Waukee loam, 0-2% slopes
178B	Waukee loam, 2-5% slopes
183C	Dubuque silt loam, 20-30 inches to limestone, 5-9% slopes
183D2	Dubuque silt loam, 20-30 inches to limestone, 9-14% slopes
193	Camden silt loam, 0-2% slopes
213B	Rockton loam, 30-40 inches to limestone, 2-5% slopes
215E	Goss loam, 9-18% slopes
225	Lawler loam, 24-32 inches to sand and gravel, 0-2% slopes
226	Lawler loam, 32-40 inches to sand and gravel, 0-2% slopes
265	Bixby loam, 0-2% slopes
265B	Bixby loam, 2-6% slopes

Table 3. (continued)

Soil map symbol	Soil name and percent slope
284	Flagler sandy loam, 0-2% slopes
284B	Flagler sandy loam, 2-5% slopes
285B	Burkhardt sandy loam, 2-5% slopes
285E2	Burkhardt sandy loam, 9-18% slopes, moderately eroded
302B	Coggan loam, 2-5% slopes
302C	Coggan loam, 5-9% slopes
315	Loamy alluvial land
354	Marsh
408C	Olin fine sandy loam, 5-9% slopes
444C	Jacwin loam, 5-9% slopes
444D	Jacwin loam, 9-14% slopes
478G	Rock outcrop - Nordness complex, 25-60% slopes
480C	Orwood silt loam, 5-9% slopes
480D2	Orwood silt loam, 9-14% slopes, moderately eroded
485	Spillville loam, 0-2% slopes
487B	Otter-Huntsville silt loam, 2-5% slopes
490	Caneek silt loam, 0-2% slopes
496B	Dorchester-Volney complex, 2-5% slopes
497F	Fayette-Dubuque-Jacwin complex, 14-25% slopes
497G	Fayette-Dubuque-Jacwin complex, 25-40% slopes
499B	Nordness silt loam, 2-5% slopes
499D	Nordness silt loam, 5-14% slopes
499F	Nordness silt loam, 14-25% slopes
536	Hanlon fine sandy loam, 0-2% slopes

Table 3. (continued)

Soil map symbol	Soil name and percent slope
714	Winneshiek loam, 20-30 inches to limestone, 0-2% slopes
714B	Winneshiek loam, 20-30 inches to limestone, 2-5% slopes
714C	Winneshiek loam, 20-30 inches to limestone, 5-9% slopes
714D	Winneshiek loam, 20-30 inches to limestone, 9-14% slopes
725	Hayfield loam, 24-32 inches to sand and gravel, 0-2% slopes
763D2	Exette silt loam, 9-14% slopes, moderately eroded
763F3	Exette silt loam, 18-25% slopes, severely eroded
777	Wapsie loam, 0-2% slopes
777B	Wapsie loam, 2-5% slopes
777C	Wapsie loam, 5-9% slopes
782	Donnan loam, 0-2% slopes
926	Canoe silt loam, 0-2% slopes
977	Richwood silt loam, 0-2% slopes
978	Festina silt loam, 0-2% slopes

1. Soil symbols and soil names are from Soil Survey of Fayette County, Iowa. Survey was issued in December 1979 based on field work completed during period 1962-1972 by Soil Conservation Service, USDA.

Wildlife Potential Of Soils At Volga River

The species diversity and abundance of wildlife at Volga River depends on the amount and distribution of food, cover, space and water. These habitat elements are ultimately related to the soil since it directly affects the kind and amount of vegetation available to wildlife as food and cover. The soil also affects water because of its holding and impounding capacity in addition to its erodability which can decrease usability of water for wildlife. Wildlife cannot live in any area where the essential habitat elements are missing, inadequate or inaccessible.

If the soils of an area have potential for creating essential habitat elements the wildlife manager can design or improve habitat by planting appropriate vegetation or foster the natural establishment of desirable plants. Proper management of existing plant cover often provides the best management at the least cost.

The Soil Conservation Service (1978) report on Fayette County soils includes a section on rating county soils for their wildlife potential. Ratings for all soils of the Volga River Area have been extracted from this report and are presented in Table 9. No perfect system exists for determining wildlife potentials of soils but this type of information may be useful as a general guide to determine the following:

- a) deciding on the intensity of management needed for each habitat element,
- b) deciding which soils are suitable for designing, improving or maintaining specific elements of wildlife habitat,
- c) deciding the locations of refuge areas, nature study area, hunting areas, and multiple use areas.
- d) deciding on priorities for land acquisition programs in order to achieve specific wildlife management goals.

The Soil Conservation Service rates soils as having good, fair, poor, or very poor potential for a number of habitat elements affecting wildlife. These ratings are defined at the end of Table 9 and are also presented here. It must be emphasized that the ratings are general and apply to a wide variety of species. An area such as a tallous slope, for example, might be rated very poor for food, cover and water yet be a favorite sunning area for the ring-necked snake. Many birds require specific types of vertical layering in the grassland or woodland canopy. A soil may be rated good for woodland, but if a specific layer of understory is absent a specific avian species may not frequent an area generally described as being good potential wildlife habitat. Specific management decisions must always be based on the individual species requirements viewed within the general habitat element framework presented in Table 9.

The rating system is defined as follows:

Good - means that a specific kind (say woodland, seed crop, legume etc.) of wildlife habitat element is easily designed, improved, or maintained. The soil type would place few or no limitations on management decisions related to the specific designated purpose indicated in Table 9.

Fair - means that a specific kind of wildlife habitat element can be designed, improved or maintained in most places on the soil type. Moderate intensity of management and fairly frequent attention are required for satisfactory results.

Poor - means that a specific kind of wildlife habitat element may have severe limitations on its development. Habitat can be designed, improved or maintained in most places but management is difficult and requires intensive effort.

Very Poor - means that a specific kind of wildlife habitat element may have very severe restrictions on its development. Often unsatisfactory results can be expected from attempted management. This condition often means a

specific wildlife habitat is impractical or even impossible to create, improve or maintain on a specific soil.

The term "elements of wildlife" habitat as used in Table 9 are defined as follows by the Soil Conservation Service (USDA). Locations of these specific habitat elements at Volga River are provided in the vegetation report filed by Roger Knutson.

Grains and seeds - seed-producing annuals used by wildlife. Examples on the Volga River Area might include corn, oats, soybeans, melons as well as many nonagricultural seed producing plants. The major soil properties affecting grains and seeds are depth of root zone, available water and wetness, slope, flood hazard, texture of surface and stoniness. Soil temperature and moisture are also obvious considerations.

Grasses and legumes - domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Species such as fescue, bluegrass, lovegrass, switch grass, bromegrass, timothy, orchardgrass, clover, alfalfa, trefoil, and crownvetch are valid species to consider at Volga River. Soil properties affecting these species are the same as above.

Wild herbaceous plants - native or naturally established herbaceous grasses and forbs, including weeds, that provide food and cover for wildlife. A complete list of these species at Volga River will be found in the vegetation report by Roger Knutson but a sample of important species includes blue-stem, indian grass, goldenrod, ragweed, pigweed, and dock.

Hardwood trees - trees and associated woody understory which provide cover, nuts, fruit, buds, catkins, twigs, bark or foliage important to wildlife. An extensive list of native plants and their locations are provided in the vegetation report but a sample of important species includes oaks, maples, poplar, cherry, hickory, black walnut, blackberry, grape, ash, and briars. Commercially available shrubs such as Russian-olive and autumn-olive are also included in this category and would be expected to do well on soils listed as

good.

Conifers - cone-bearing trees, shrubs or ground cover that furnish cover or supply food in form of browse, seeds or fruitlike cones. Common examples are pine, spruce, cedar, hemlock, fir, yew, and juniper. White pine, scotch pine and red pine have been used in habitat planning by the Iowa Conservation Commission.

Wetland plants - annual and perennial wild herbaceous plants that grow on moist or wet sites. Category commonly includes smartweed, rushes, sedges, reeds, arrowhead, and cattail. Locations of these plants at Volga River will be included in the vegetation and aquatic reports by Knutson and Eckblad.

Shallow Water Areas - bodies of surface water with an average depth of less than five feet which are useful to wildlife. These include naturally wet areas such as "Sweetflag Marsh" in section 2 at Volga River or they can be formed by dams or water control devices (in marshes or streams). Beaver ponds and all shallow ponds at Volga River also fit into this category. These areas all depend upon a consistent water supply.

The wildlife habitats referred to in Table 9 are defined as follows:

Openland habitats - areas in cropland, pasture, meadows and areas overgrown with grasses, vines, herbs, and shrubs. These areas produce grain and seed crops, grasses, legumes, and wild herbaceous plants. The vertebrates important to these areas are discussed in the vertebrate section of this report, but some of the most characteristic species at Volga River would include: Bobwhite, Ring-necked pheasant, meadowlark, field sparrow, killdeer, cottontail, red fox, woodchuck, bullsnake and box turtle.

Woodland habitat - hardwoods and conifers or a mixture of both and associated grasses, legumes and wild herbaceous plants. Some typical wildlife species would include woodpeckers, fox, raccoon, fox squirrels, American toad, turkey, grouse, and white-tailed deer.

Wetland habitat - Water-tolerant plants in open, marshy or swampy shallow water areas. Typical wildlife species might include ducks, geese, herons, shore birds, kingfishers, muskrat, mink, beaver, water snakes, turtles and amphibians.

ISCC planners and managers may find it helpful to use Tables 8 and 9 along with Figure 3 to properly judge the potential for wildlife development at specific sites or acreages at Volga River. The potential of the soil(s) in an area should be considered along with other factors and objectives in determining the feasibility of any development. The problems caused by excessive erosion and sedimentation will probably be limiting factors for some types of development at Volga River.

Table 9. Wildlife habitat potentials of Volga River Recreation Area soils.^{1,2}

Soil map symbol	Soil name	Potential of soil for various habitat elements							Potential of soil as habitat for		
		Grains and seeds	Grains and legumes	Wild and herbacious plants	Hardwoods	Conifers	Wetland plants	Shallow water plants	Openland wildlife	Woodland wildlife	Wetland wildlife
41, 41B 41C, 4D	Sparta	P	F	F	F	F	VP	VP	F	F	VP
63C, 63E	Chelsea	P	F	F	P	P	VP	VP	F	P	VP
98	Huntsville	G	G	G	G	G	P	P	G	G	P
109B	Backbone	F	F	G	F	F	VP	VP	F	F	VP
109C, 109D	Backbone	P	F	F	F	F	VP	VP	F	F	VP
110B	Lamont	G	G	G	G	G	P	VP	G	G	VP
110C	Lamont	F	G	G	G	G	VP	VP	G	G	VP
115F	Sandy escarpments	VP	F	F	F	F	VP	VP	VP	F	VP
142B	Chaseburg	G	G	G	G	F	P	P	G	G	P
158	Dorchester	F	F	F	F	P	F	P	F	P	P
162C	Downs	F	G	G	G	G	P	VP	G	G	VP
163B	Fayette	G	G	G	G	G	P	VP	G	G	VP
163C, 163C2, 163D, 163D2, 163D3	Fayette	F	G	G	G	G	P	VP	G	G	VP
163E, 163E2, 163E3, 163F, 163F2, 163F3, 163G	Fayette	P	F	G	G	G	VP	VP	F	G	VP
171B	Bassett	G	G	G	G	G	P	F	G	G	F
171C, 171C2, 171D2	Bassett	F	G	G	G	G	P	F	G	G	F
171E2	Bassett	P	F	G	G	G	P	P	F	G	P
175B	Dickinson	F	F	F	F	F	VP	VP	F	F	VP
175C, 175D	Dickinson	F	F	F	F	F	VP	VP	F	F	VP
177, 177B	Saude	G	G	G	G	G	P	VP	G	G	VP
177C	Saude	F	G	G	G	G	P	VP	G	G	VP

Table 9. Wildlife habitat potentials of Volga River Recreation Area soils.^{1,2} (continued)

Soil map symbol	Soil name	Potential of soil for various habitat elements							Potential of soil as habitat for		
		Grains and seeds	Grains and legumes	Wild and herbaceous plants	Hardwoods	Conifers	Wetland plants	Shallow water plants	Openland wildlife	Woodland wildlife	Wetland wildlife
178, 178B	Waukee	G	G	G	G	G	P	VP	G	G	VP
183C, 183D2	Dubuque	F	F	G	G	G	VP	VP	F	G	VP
193	Camden	G	G	G	G	G	P	P	G	G	P
213B	Rocton	G	G	G	G	G	VP	VP	G	G	VP
215E	Goss	VP	P	F	F	F	VP	VP	F	F	VP
225, 226	Lawler	G	G	G	G	G	F	F	G	G	F
265, 265B	Bixby	G	G	G	G	G	P	VP	G	G	VP
284, 284B	Flagler	F	F	F	F	F	VP	VP	F	F	VP
285B	Burkhardt	P	F	F	F	F	VP	VP	F	F	VP
285E2	Burkhardt	VP	F	F	F	F	VP	VP	P	F	VP
302B	Coggon	G	G	G	G	G	F	F	G	G	F
302C	Coggon	F	G	G	G	G	P	F	G	G	F
315	Loamy alluvial	P	F	F	F	P	G	F	F	F	F
354	Marsh	VP	VP	VP	VP	VP	G	G	F	VP	G
408C	Olin	F	G	G	G	G	P	P	G	G	P
444C, 444D	Jacwin	P	P	F	P	P	F	F	P	P	F
478G	Rock outcrop-Nordness	VP	P	P	P	P	VP	VP	P	P	VP
480C, 480D2	Orwood	F	G	G	G	G	VP	VP	G	G	VP
485	Spillville	G	G	G	G	G	F	F	G	G	F
487B	Otter part Huntsville part	G G	G G	G G	F G	P G	G P	G P	G G	F G	G P
490	Caneek	F	F	F	F	P	G	G	F	F	G
496B	Dorchester part Volney part	F P	F F	F F	F F	P F	F VP	P VP	F F	P F	P VP
497F	Fayette part Dubuque part Jacwin part	P P VP	F F VP	G F F	G F P	G F P	VP VP F	VP VP P	F F P	G F P	VP VP F

Table 9. Wildlife habitat potentials of Volga River Recreation Area soils.^{1,2} (continued)

Soil map symbol	Soil name	Potential of soil for various habitat elements							Potential of soil as habitat for		
		Grains and seeds	Grains and legumes	Wild herbaceous plants	Hardwoods	Conifers	Wetland plants	Shallow water plants	Openland wildlife	Woodland wildlife	Wetland wildlife
497G	Fayette part	VP	F	G	G	G	VP	VP	F	G	VP
	Dubuque part	VP	F	F	F	F	VP	VP	F	F	VP
	Jacwin part	VP	VP	F	F	P	P	P	P	F	P
499B	Nordness	P	P	P	P	P	VP	VP	P	P	VP
499D	Nordness	P	P	P	P	P	VP	VP	P	P	VP
499F	Nordness	VP	P	P	P	P	VP	VP	P	P	VP
536	Hanlon	G	G	G	G	G	P	F	G	G	P
714, 714B	Winneshiek	F	G	G	G	G	VP	VP	G	G	VP
714C, 714D	Winneshiek	F	F	G	G	G	VP	VP	F	G	VP
725	Hayfield	G	G	G	G	G	P	P	G	G	P
763D2	Exette	F	G	G	G	G	P	VP	G	G	VP
763F3	Exette	P	F	G	G	G	VP	VP	F	G	VP
777, 777B	Wapsie	G	G	G	G	G	P	VP	G	G	VP
777C	Wapsie	F	G	G	G	G	P	VP	G	G	VP
782	Donnan	G	G	G	G	G	F	F	G	G	F
926	Canoe	G	G	G	G	G	F	F	G	G	F
977	Richwood	G	G	G	G	G	P	P	G	G	P
978	Festina	G	G	G	G	G	P	P	G	G	P

1. Code and definitions:

G = (good): rating of good means that element of wildlife habitat or kind of habitat is easily maintained, improved or designed.

F = (fair): rating of fair means that element of wildlife habitat or kind of habitat can be maintained, improved or designed in most places.

P = (poor): rating of poor means that element of wildlife habitat or kind of habitat has severe limitations and intensive effort is required to maintain, improve and design habitat.

VP = (very poor): rating of very poor means that restrictions for the element of wildlife habitat or kind of wildlife are very severe and unsatisfactory management results can be expected. Wildlife habitat is impractical or even impossible to maintain, improve or design on soils with a very poor rating.

Recreation Potential Of Soils At Volga River

Recommendations for recreational development at Volga River are beyond the scope of my contract with the Iowa Conservation Commission; however, a few comments relating soils to recreational development are appropriate.

The suitability ratings of soils at Volga River for the development of camp areas, picnic areas, playgrounds, paths and trails are presented in Table 10. The table is abstracted from information in the Soil Survey of Fayette County, Iowa (1978). The suitability ratings slight, moderate and severe are based on such restrictive soil features as slope, wetness, texture of the surface layer and flooding. The degree of general limitation implied by each suitability rating in Table 10 is as follows:

Slight - soil properties are generally favorable for development and limitations are minor and easily overcome.

Moderate - soil limitations can be overcome or alleviated by design, planning or special maintenance.

Severe - soil properties are unfavorable and limitations can be overcome only by soil reclamation, special design, intensive maintenance, limited use or some combination of measures.

The fact that soils and their parent materials often dictate construction methods at recreational sites is abundantly clear at Volga Lake. Volga Lake construction also demonstrates that soil and bedrock limitations (ex. - lack of water holding capacity) can be overcome only at very great cost.

Soils are by no means the ultimate determining factor in recreational site selection and development. Perhaps more important are location and accessibility of the area, size and shape of area, scenic qualities, access to water, potential water impoundment sites, and ability of soil to support vegetation and absorb septic tank effluent.

A summary of soil implications for campgrounds, picnic area, playgrounds and trails is presented below. These requirements may be matched with soil types and suitability levels from Table 10 and soil locations at Volga River from Figure 3.

Camp areas: Areas require soils which respond to shaping, leveling, and stabilization of intensively used areas. Soils must also accommodate utility lines and sanitary facilities. The soils of camp areas must also accommodate well to heavy foot and vehicular traffic. Ideal soils at campgrounds have mild slopes, lack wetness, and are not subject to flooding during the period of use. The surface should be free of stones, rocks and boulders and absorb rainfall readily while remaining firm. Soils which form little dust when dry are preferred. Many of the above limitation (slope, wetness, rockiness) can be overcome but at greatly increased camp site construction cost. The best soils at Volga River for campground development are Backbone, Downs, Fayette, Dickinson, Saude, Waukee, Comden, Bixby, Flagler, Wapsie, Nordness and Winneshiek soils with slight to moderate slope.

Picnic areas: Heavy foot traffic is a major consideration in siting picnic areas. The best soils are firm when wet, not dusty when dry and not subject to flooding during the period of use. Slopes and rocks can be overcome in shaping sites, building access roads and parking areas, but only at increased cost. The best soils at Volga River for picnic area development are Downs, Fayette, Bassett, Dickinson, Saude, Waukee, Bixby, Flagler, Coggan, Winneshiek and Wapsie soils with slight to moderate slopes.

Playgrounds: Soils must be able to withstand heavy foot traffic. Soils must not maintain wetness or have much slope. The surface should be free from stones or boulders, be firm after rains and not dusty when dry. Depth of soil over rock should be adequate for grading and anchorage of equipment. The best

soils at Volga River for playground development are Saude, Waukee, Camden, Bixby, Flagler, Wapsie, Richwood and Festina soils with slight slope.

Paths and Trails: Paths and trails for walking, horseback riding, and bicycling, should require as little cutting and filling as possible. The best soils are those that are not wet, are firm after rains, are not dusty when dry and are seldom subject to flooding during the period of use. In many areas these same trails will be ideal for cross-country skiing and snowmobiling during the winter months. Soils may have moderate slopes but few or no surface stones or boulders. Care must be taken to follow contours when designing trails or paths across moderate to severe slopes to avoid erosion. Soil erosion is already a problem on some trails at Volga River. The best soils at Volga River for path and trail development are Huntsville, Backbone, Downs, Fayette, Dickinson, Saude, Waukee, Dubuque, Camden, Rockton, Bixby, Flagler, Burkhardt, Coggan, Orwood, Nordness, Winneshiek, Exette, Wapsie, Richwood and Festina soils of gentle to moderate slope.

Table 10. Suitability of Volga River Recreation Area soils for recreational site development.^{1,2}

Soil map symbol	Soil name	Limitations on soil suitability for			
		Camp areas	Picnic areas	Playgrounds	Paths and trails
41	Sparta	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy
41B	Sparta	Moderate: too sandy	Moderate: too sandy	Moderate: too sandy, slope	Moderate: too sandy
41C	Sparta	Moderate: too sandy	Moderate: too sandy	Severe: slope	Moderate: too sandy
41D	Sparta	Moderate: too sandy, slope	Moderate: too sandy, slope	Severe: slope	Moderate: too sandy
63C	Chelsea	Moderate: too sandy	Moderate: too sandy	Severe: too sandy, slope	Moderate: too sandy
63E	Chelsea	Severe: too sandy, slope	Severe: slope	Severe: too sandy, slope	Moderate: too sandy, slope
98	Huntsville	Severe: floods	Moderate: floods	Moderate: floods	Slight
109B	Backbone	Slight	Slight	Moderate: slope, depth of rock	Slight
109C	Backbone	Slight	Slight	Severe: slope	Slight
109D	Backbone	Moderate: slope	Moderate: slope	Severe: slope	Slight
110B	Lamont	Slight	Slight	Moderate: slope	Slight
110C	Lamont	Moderate: slope	Moderate: slope	Severe: slope	Slight
115F	Sandy escarpments	Severe: slope	Severe: slope	Severe: slope	Moderate: slope
142B	Chaseburg	Severe: floods	Moderate: floods, slope	Severe: floods	Moderate: floods
158	Dorchester	Severe: floods	Severe: floods	Severe: floods	Moderate: floods
162C	Downs	Slight	Slight	Severe: slope	Slight
163B	Fayette	Slight	Slight	Moderate: slope	Slight
163C, 163C2	Fayette	Slight	Slight	Severe: slope	Slight
163D, 163D2, 163D3	Fayette	Moderate: slope	Moderate: slope	Severe: slope	Slight
163E, 163E2, 163E3, 163F, 163F2, 163F3	Fayette	Severe: slope	Severe: slope	Severe: slope	Moderate: slope
163G	Fayette	Severe: slope	Severe: slope	Severe: slope	Severe: slope
171B	Bassett	Moderate: percs slowly	Slight	Moderate: slope	Slight
171C, 171C2	Bassett	Moderate: percs slowly	Slight	Severe: slope	Slight

Table 10, (continued)

Soil map symbol	Soil name	Limitations on soil suitability for			
		Camp areas	Picnic	Playgrounds	Paths and trails
171D2	Bassett	Moderate; slope, percs slowly	Moderate, slope	Severe: slope	Slight
171E2	Bassett	Severe: slope	Severe: slope	Severe: slope	Moderate: slope
175B	Dickinson	Slight	Slight	Moderate: slope	Slight
175C	Dickinson	Slight	Slight	Severe: slope	Slight
175D	Dickinson	Moderate: slope	Moderate: slope	Severe: slope	Slight
177	Saude	Slight	Slight	Slight	Slight
177B	Saude	Slight	Slight	Moderate: slope	Slight
177C	Saude	Slight	Slight	Severe: slope	Slight
178	Waukee	Slight	Slight	Slight	Slight
178B	Waukee	Slight	Slight	Moderate: slope	Slight
183C	Dubuque	Slight	Slight	Severe: slope, depth to rock	Slight
183D2	Dubuque	Moderate: slope	Moderate: slope	Severe: slope, depth to rock	Slight
193	Camden	Slight	Slight	Slight	Slight
213B	Rockton	Slight	Slight	Moderate, slope, depth to rock	Slight
215E	Goss	Moderate: slope, small stones	Moderate: slope, small stones	Severe: slope, small stones	Moderate: small stones
225,226	Lawler	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
265	Bixby	Slight	Slight	Slight	Slight
265B	Bixby	Slight	Slight	Moderate: slope	Slight
284	Flagler	Slight	Slight	Slight	Slight
284B	Flagler	Slight	Slight	Moderate: slope	Slight
285B	Burkhardt	Slight	Slight	Moderate: slope	Slight
285E2	Burkhardt	Moderate: slope	Moderate: slope	Severe: slope	Slight
302B	Coggon	Moderate: percs slowly	Slight	Moderate: slope	Slight

Table 10. (continued)

Soil map symbol	Soil name	Limitations on soil suitability for			
		Camp areas	Picnic Areas	Playgrounds	Paths and trails
302C	Coggon	Moderate: percs slowly	Slight	Severe: slope	Slight
315	Loamy alluvial	Severe: floods	Severe: floods	Severe: floods	Moderate: floods
354	Marsh	Severe: wetness	Severe: wetness	Severe: wetness	Severe: wetness
408C	Olin	Slight	Slight	Severe: slope	Slight
444C	Jacwin	Severe: percs slowly	Moderate: wetness	Severe: slope, percs slowly	Moderate: wetness
444D	Jacwin	Severe: percs slowly	Moderate: slope, wetness	Severe: slope, percs slowly	Moderate: wetness
478G	Rock outcrop part Nordness part	unsuited Severe: slope	unsuited severe: slope	Unsuited Severe: depth to rock	Unsuited Severe: slope
480C	Orwood	Slight	Slight	Severe: slope	Slight
480D2	Orwood	Moderate: slope	Moderate: slope	Severe: slope	Slight
485	Spillville	Severe: floods	Severe: floods	Severe: floods	Moderate: floods
487B	Otter	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: wetness
490	Caneek	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness	Severe: floods, wetness
496B	Dorchester part Volney part	Severe: floods Severe: floods	Severe: floods Severe: floods, stones	Severe: floods Severe: floods, stones, depth to rock	Moderate: floods, stones
497F	Fayette part Dubuque part Jacwin part	Severe: slope Severe: slope Severe: percs slowly	Severe: slope Severe: slope Severe: slope, wetness	Severe: slope Severe: slope, depth to rock Severe: slope, percs slowly	Moderate: slope Moderate: slope Moderate: wetness
497G	Fayette part Dubuque part Jacwin part	Severe: slope Severe: slope Severe: percs slowly	Severe: slope Severe: slope Severe: slope, wetness	Severe: slope Severe: slope, depth to rock Severe: slope, percs slowly	Severe: slope Severe: slope Severe: slope, wetness
499B	Nordness	Slight	Slight	Severe: depth to rock	Slight
499D	Nordness	Moderate: slope	Moderate: slope	Severe: depth to rock	Slight
499F	Nordness	Severe: slope	Severe: slope	Severe: depth to rock	Moderate: slope
536	Hanlon	Severe: floods, soil, blowing	Moderate: floods	Moderate: floods	Slight
714, 714B	Winneshiek	Slight	Slight	Moderate: depth to rock	Slight
714C	Winneshiek	Slight	Slight	Severe: slope	Slight

Table 10. (continued)

Soil map symbol	Soil name	Limitations on soil suitability for			
		Camp areas	Picnic areas	Playgrounds	Paths and trails
714D	Winneshiek	Moderate: slope	Moderate: slope	Severe: slope	Slight
725	Hayfield	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
763D2	Exette	Moderate: slope	Moderate: slope	Severe: slope	Slight
763F3	Exette	Severe: slope	Severe: slope	Severe: slope	Moderate: slope
777	Wapsie	Slight	Slight	Slight	Slight
777B	Wapsie	Slight	Slight	Moderate: slope	Slight
777C	Wapsie	Slight	Slight	Severe: slope	Slight
782	Donnan	Severe: percs slowly	Moderate: wetness	Severe: percs slowly	Moderate: wetness
926	Canoe	Moderate: wetness	Moderate: wetness	Moderate: wetness	Moderate: wetness
977	Richwood	Slight	Slight	Slight	Slight
978	Festina	Slight	Slight	Slight	Slight

1. Definitions of ratings:

Slight: means soil properties are generally favorable for listed use and that limitations are minor and easily overcome.

Moderate: means that soil limitations can be overcome or alleviated by design, planning or special maintenance.

Severe: means that soil properties are unfavorable for listed use and that limitations can be overcome only by soil reclamation, special design, intensive maintenance, limited use or some combination of measures.

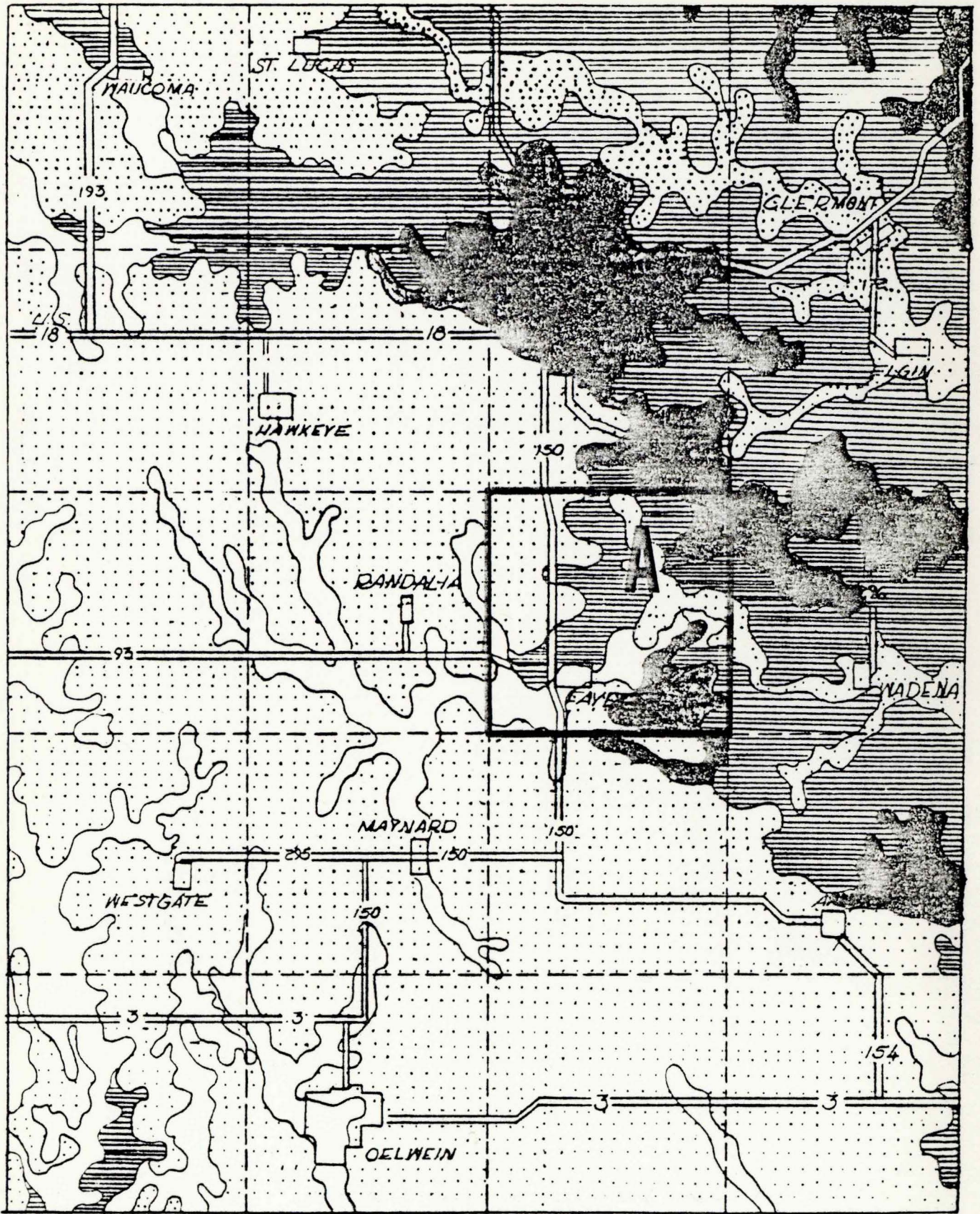
2. Table condensed from recommendations of Soil Conservation Service, USDA. Soil Survey of Fayette County, Iowa (1978), 184pp.

Recommendations On Soils

1. It is recommended that the Iowa State Conservation Commission cooperate in every way possible with the Fayette County Soil Conservation District to control erosion on the watersheds which drain into the Volga River State Recreation Area and the new Volga Lake. The normal 50% cost share agreements entered into by the local Conservation District and private landowners will not provide adequate incentives to guarantee erosion control on private lands surrounding Volga Lake. If additional incentives are not provided to farmers as soon as possible sedimentation and eutrophication will rapidly endanger the quality of the new lake. Experience at Lake Meyer in Winneshiek County indicates at least 80-90 percent cost share funds are needed to insure cooperation by private landowners. The Iowa State Conservation Commission should not hesitate to use every legal (Iowa Soil Conservancy Law) and financial means at its disposal to prevent Volga Lake from filling with sediment and associated agricultural chemicals. (See Eckblad's Aquatic Habitats report for specific information on the sediment problem at Volga Lake).
2. It is recommended that nature trails constructed at Volga River give some priority to presenting information about soils. The area is well suited to teaching about soils since four major associations and some 90 specific and identifiable soils are present. A nature trail only 0.5 miles long in the central part of section 11 would pass through 3 major soil associations. Short trails in sections 3, 4, 9, 10, 13, 14, 15, 22 and 23 would pass through at least two distinct associations. Self guiding nature trails could be designed to convey information about soil profile, soil depth, soil type, slope, parent material, erodibility, productivity, value to wildlife, native vegetation, and fertility. All of the technical information needed to implement this recommendation is contained in this soils

report or in the Fayette County Soil Survey.

3. If a museum, nature center or teaching station is installed at Volga River it is recommended that a display on soils and soil conservation practices be included. Some of our states most severe soil conservation problems occur in Northeast Iowa and it would be appropriate to emphasize education related to land at Volga River. Such displays might focus on soil profiles, topographic landscape models, vegetation, wildlife, and photographic presentations. The technical information needed to prepare this display is found in this report and in the Fayette County Soil Survey.
4. If soil conservation practices are installed at Volga Lake to control erosion on trails, fields, or slopes it is recommended that design be done in such a way that the structure could also serve an educational purpose (i.e., hiking trails leading into the practices so they can be viewed by the public).
5. It is recommended that all landscape altering management plans initiated at Volga River during its development be consistent with recommended soil conservation practices. This would include the siting of trails, campgrounds, picnic areas, septic tank drain fields, sewage lagoons and landfills.



**ANNUAL
SOIL LOSS
(TONS / ACRE)**

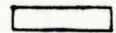
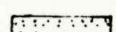


0 - 2	
2 - 5	
5 - 10	
10+	

Figure 8. Soil loss estimates for Fayette County and Westfield Township. (A indicates general location of Volga River Area; Westfield Township outlined in red).

VERTEBRATES OF THE VOLGA RIVER RECREATION AREA

I. Amphibians

Introduction

A general survey of the amphibian species present on the Volga River Recreation Area was attempted during June 1978. It was apparent from the beginning that our contract period started too late in the season to complete a satisfactory survey. Work on amphibians was completed during April and May 1979.

Our field work in 1978 and 1979 included modified time-area flushing counts, searches for rare or threatened species, and recording of species and their locations based on visual and vocal observations made while conducting routine fieldwork.

A list of the most suitable pond and stream habitats for amphibians will be described by Eckblad (1979) in his Volga River report. In addition Sweet Flag Marsh in section 2, Sand Hill Marsh in section 11, and "Oxbox Pond" in section 3 will be described by Knutson (1979) in his Volga River report.

The total number of amphibian species observed at Volga River was nine (Table 11). It is possible the Bullfrog (Rana catesbeiana) might occur along the Volga River but none were observed. The Bullfrog is very common along the Mississippi River in Clayton County and the species may find some suitable habitat along the Turkey and Volga Rivers. The mudpuppy (Necturus maculosus) was not observed but no doubt occurs in the area.

A, Amphibian time-area flushing surveys.

Three areas judged to be excellent habitat for amphibians were censused on

Table 11. Amphibian species that occur or are likely to occur at the Volga River Recreation Area.

<u>Common name</u>	<u>Scientific name</u>	<u>Status at Volga River</u>
Mudpuppy	<u>Necturus maculosus</u>	Uncommon, not observed
E. Tiger Salamander	<u>Ambystoma t. tigrinum</u>	Common
American Toad	<u>Bufo a. americanus</u>	Abundant
Blanchard's Cricket Frog	<u>Acris crepitans blanchardi</u>	Present, status undetermined
Western Chorus Frog	<u>Pseudacris t. triseriata</u>	Common
Northern Spring Peeper	<u>Hyla c. crucifer</u>	Common
E. Gray Treefrog	<u>Hyla v. versicolor</u>	Uncommon
Green Frog	<u>Rana clamitans melanota</u>	Common
N. Leopard Frog	<u>Rana p. pipiens</u>	Common

three separate occasions during the period June 15-20, 1978. These locations were: Oxbow Pond on Frog Hollow Creek in sections 3 and 4, Green Pond in section 3, and Peeper Pond in section 15. Mud Pond, recently constructed in section 9, was also censused as an example of habitat judged to be less suitable for amphibians.

A modified flushing census was used for all areas. This consisted of two observers walking in parallel around the perimeter of a pond and counting all the frogs flushed during a ten minute period. The observers walked one meter apart; one in the water and one on shore. Since the ponds were small and the walking relatively easy the entire pond circumference could usually be censused in the ten minute period. We are confident the technique is adequate for routine amphibian census work; however, some variables may not be controlled or even recognized and the technique should probably be viewed as an index to the relative abundance of species rather than as an absolute count. The technique was limited to the Ranidae in our study including the Green Frog (Rana clamitans) and the Leopard Frog (Rana pipiens).

The results of these flushing surveys are presented in Table 12. The Green Frog is more abundant at Volga River than at any location I have found in Northeast Iowa. The species is not common in Howard, Winneshiek and Allamakee Counties but it is locally abundant at Volga River.

The Oxbow Lake area will no doubt be submerged during times of high water at Volga Lake. If the lake construction disturbs the beaver colony, a spring flood will probably wash out the beaver dam which forms Oxbow Pond and it will no longer be suitable habitat for the large number of Green and Leopard Frogs now residing there.

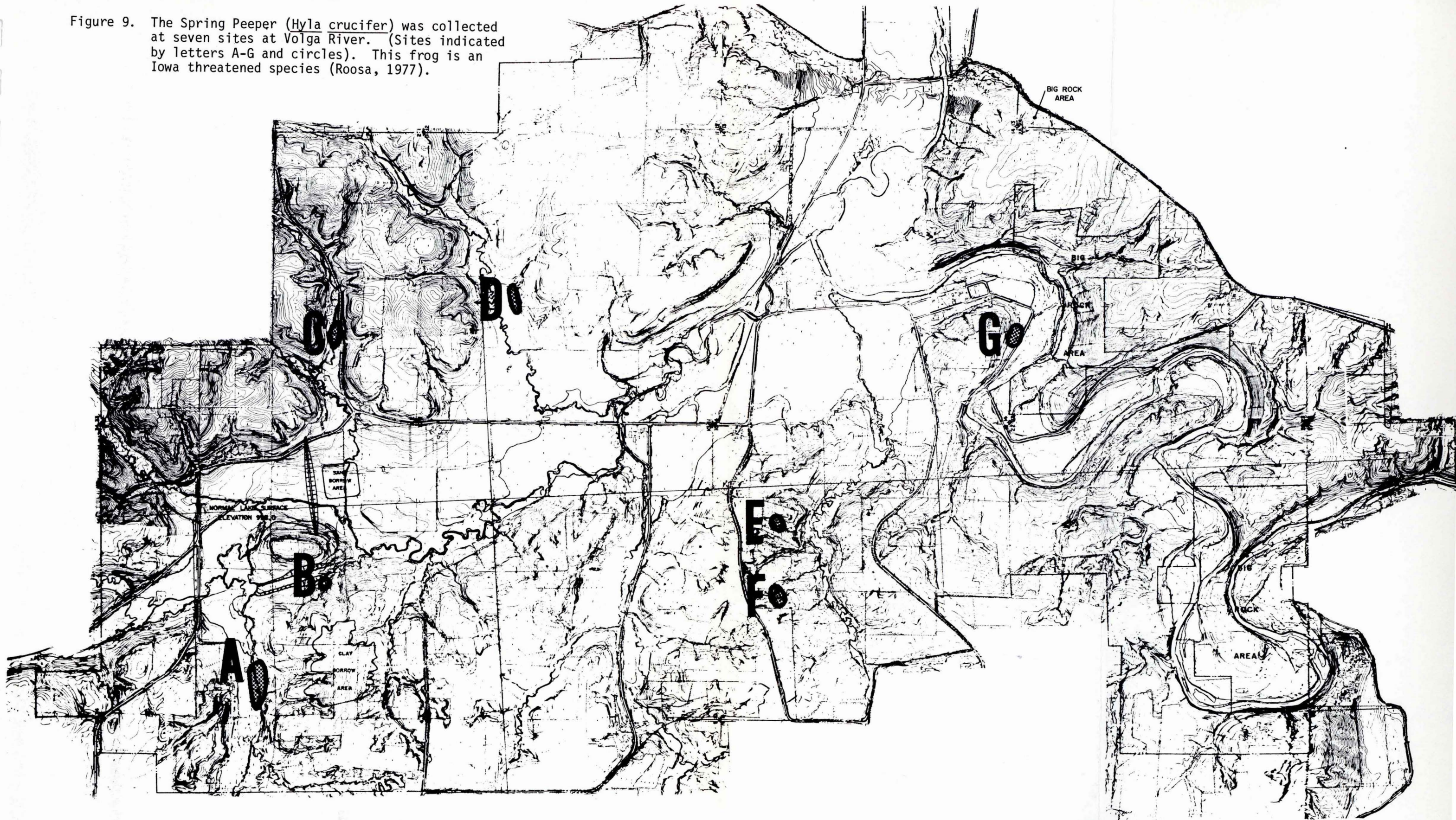
Green Pond should receive very high priority as amphibian habitat. If some shoreline areas of the new Volga Lake are left undisturbed they no doubt will be used by Green Frogs.

Table 12. Mean numbers of Ranidae flushed during three successive counts on four ponds at the Volga River Recreation Area, June 1978.

Area	Location	Mean number flushed	
		<u>Rana clamitans</u>	<u>Rana pipiens</u>
Green Pond ¹	SW $\frac{1}{4}$, Sec. 3	12	2
Mud Pond ²	NE $\frac{1}{4}$, Sec. 9	0	0
Oxbow Pond ³	E $\frac{1}{4}$, Sec. 4, W $\frac{1}{4}$, Sec. 3	30	7
Peeper Pond ⁴	NE $\frac{1}{4}$, Sec. 15	0	12

1. Pond with mature vegetation along perimeter. North edge of pond borders woodland.
2. Pond with "raw edges" - recently constructed, no vegetation along perimeter.
3. Pond really an oxbow on Frog Hollow Creek backed up behind a large beaver dam.
4. Pond at midslope of a grassy field. South edge of pond borders a woodland.

Figure 9. The Spring Peeper (*Hyla crucifer*) was collected at seven sites at Volga River. (Sites indicated by letters A-G and circles). This frog is an Iowa threatened species (Roosa, 1977).



VOLGA RIVER STATE RECREATION AREA



Leopard Frogs are generally common at Volga River, but the populations are not concentrated into such limited areas. Most of the stream areas provide suitable habitat as well as the following ponds and marshes described by Eckblad and Knutson; Woodland, East Peeper, Sweet Flag, and Sand Hill.

No direct measurement of American Toad (Bufo americanus) populations was attempted. The number of toads observed while conducting woodland reconnaissance was recorded. An average of one toad was observed per 90 minute reconnaissance period. In general, the American Toad is common at Volga River.

B. Threatened, rare or unusual amphibians.

The Spring Peeper (Hyla c. crucifer) is the only amphibian species at Volga River which is listed as threatened by Roosa (1977).

Field work started late in 1978 (June) and observations could not be completed until April-May 1979. Two specimens were observed at Peeper Pond and an individual at Sweet Flag Marsh during June 1978. Specimens were collected at five additional sites in 1979 (Figure 9). Based on our survey it appears the Spring Peeper is common at Volga River but rare or absent from many other parts of Iowa. Volga River is a very important refuge for this species and its habitats should be protected from alteration.

C. Natural history of common amphibians.

The purpose of this section of the Volga River report is to provide basic natural history information on some of the most common vertebrates of the area. Specific information relating species to the study area is provided along with information of a more general nature from the published literature. This information should be useful as source material for displays, public information leaflets, naturalists talks and related information-education functions if the area eventually becomes a state park, recreation area or multiple use area. The following write-ups on each species contain both popular and technical information in the hope adequate information for several purposes might be made available.

Amphibians and reptiles are often referred to by the collective name herpetile. Herpetiles play important roles in many Iowa ecosystems and several species seem to be especially abundant at the Volga River Recreation Area. Amphibians and reptiles serve as important controls on many insects and other small animals. In turn they provide an important food source for larger predators. Herpetiles are the least well studied of all the vertebrate groups. Natural history information on amphibians is presented below; reptiles are covered at end of the next section.

1. Mudpuppy, Necturus maculosus. A shy creature known mainly by fishermen, the mudpuppy spends its days in hiding in mud and weedy water. It is neotonous, having found that to retain the larval form into adulthood can be advantageous. The mudpuppy is grey to rust brown, with indistinct, scattered, round blue-black spots along the back. A dark stripe runs through each eye, the belly is pale or grey colored, and the compressed tail may be a bright orange red. Perhaps the most distinctive features are the three sets of bright maroon gills, waving like plumes. The head and body are flattened, and the entire length ranges from

8-13 inches. Each foot has 4 toes. The mudpuppy is aquatic, living in lakes, ponds, rivers, streams, or permanent bodies of water. It is active at night when it swims at depths of 4-8 feet, leisurely hunting for fish, fish eggs, crayfish, aquatic insects, and molluscs. In the autumn male and female may share a sheltered hollow and mating occurs before the winter hibernation. In the spring the female lays over 100 yellow eggs 1/4 inch in diameter in a gelatinous mass on stones or in a sandy, sunlit nest. She remains in the vicinity of the eggs for the 40-60 days required for hatching. The young are 3/4 inch at hatching and may be uniformly grey, or have a middorsal dark stripe flanked on either side by a yellow stripe. A dark stripe of the side gills reaches to the tail tip. In ten weeks the young are 1 1/2 inches; sexual maturity is reached in 5-7 years and the life span may be 20 years. The gills may reflect the environment - large and bushy for foul, warm water and smaller for cold, clear water. The range of the mudpuppy is west New England to Manitoba, south to the drainage of the Tennessee and Missouri Rivers. They are called waterdogs in the south due to the false belief that they bark. The mudpuppy is best observed along the Volga River.

2. Eastern Tiger Salamander, Ambystoma t. tigrinum. This salamander has a stout body, 1-4 intercostal folds, and tubercles on the soles of its feet. Color above is greenish to brown or black with yellow spots or bars, or small dark spots. The underside is a marble of light and yellow brown on olive yellow. A size of 7-13 inches makes it the largest terrestrial salamander in the world. The versatile salamander lives in manure piles, drains, pine barrens, semi-desert, or woodlands, making burrows in soft earth. It feeds on small terrestrial animals such as insects, and often makes nocturnal migrations. In February-March the male heads for the nearest water and greets the female with a form of courtship or love-play. He then releases spermatophore to fertilize the eggs. The female releases 25-75 eggs in a 3 x 4 inch jelly-like mass in

deep water ponds. The egg mass is usually attached to a branch, rock, or other object. Young hatch in 12-18 days, and metamorphosis occurs at 10-12 weeks when they are 3/4 inch long. The life span ranges from 10-16 years. Frequently neotonic forms are found in the western U.S. which retain the gills into adulthood. In Mexico there is a neotonous form called the axolotl which, when transported to the different temperatures and elevations of this area, has been transformed to the tiger salamander we know. Tiger salamanders can often be found in the early spring when they arouse from hibernation and, in their wanderings for food, become stuck in the ice on ponds and marshes. Distribution is erratic, from Long Island to Florida and west to Mississippi. They are best seen at the Volga Recreation Area in early spring in the vicinity of the woodland ponds, especially those in sections 3 and 15. In early summer salamanders can be found in the woodlands in the vicinity of these ponds.

3. American Toad, Bufo terrestris americanus. Easily identified because it is the only toad present at Volga Lake, the American toad is normally 2 - 3 1/2 inches long. It may be plain brown or brown to grey to olive with yellow or buff patches, and possibly a middorsal stripe. The chest and forward abdomen are usually spotted dark. One to two large warts may be on the back in the largest dark spots, and enlarged warts are on the thighs. Warts may be yellow, orange, or red. The parotoid gland may be separated from the ridge behind the eye or connected by a short spur. An American toad is at home anywhere, in a backyard, garden, cultivated field, or mountain wilderness. Requirements include a moist hiding place with loose soil and shallow bodies of water for breeding. A two-inch sticky tongue attached at the front of the mouth serves to capture insects and invertebrates for food. In September or in cooler weather the toad ceases feeding, and burrows backwards into the soil 3-4 inches. By late March or April when the air outside is 48-50°F the toads emerge, males first, usually, and proceed to the nearest water in early evening. The male

gives a long, musical trill lasting from 6-30 seconds at a rate of 30 per second, and both male and female paddle about in the water. He has a black throat and is generally smaller than the gaily patterned female. Between March and July she may deposit jelly-like strings which sink to the bottom. They may be 70 feet long and contain 4-12,000 black and white eggs, 1/12 inch in diameter. In 3-10 days the black tadpoles hatch and are preyed upon by birds, fish, and turtles during the 40-60 days before metamorphosis. The new toads are 2/5 inch long and go to the shore, remaining near the water for 10-14 days where they are often preyed upon by snakes. As toad characteristics develop they spread to new home ranges. While growth continues the skin remains one size, and it must be shed every few weeks. It splits in half and is drawn up over the head and swallowed for its many nutrients. An older toad may shed its skin 3-4 times a season. A toad reaches maturity in 2-3 years and may live as long as 36 years, though is in constant danger from hawks, owls, snakes, and skunks. While the toad does not give warts, when startled it secretes a fluid from the parotoid gland which is irritating to eyes and mouth. If handled it secretes a watery, colorless, harmless liquid. In France toads are used as a biological control against insects in gardens. The range of the American toad is widespread, from the Maritime provinces to southeast Manitoba, south to Mississippi and northeast Kansas. The toad is the most common amphibian in the woodlands at Volga Lake throughout the summer months. A few minutes of searching in any of the mature moist forest areas in late June is likely to produce several fine specimens.

4. Blanchard's Cricket Frog, Acris crepitans blanchardi. A warty, green and brown skin is characteristic of this cricket frog with a light brown or grey belly. The dark stripe on the thigh is ragged, blending with the dark above and in the anal region. Between the eyes is a light V-shape; the toes have large webs. This is a little frog, only 5/8 - 1 3/8 inches long, and gets its name

from the shrill, penetrating clicking call of the males. Sandy, gravelly, muddy bars and banks of small streams is a good habitat for the cricket frog, with permanent shallow water and much sunny vegetation where it can catch insects. Quick, erratic hops are typical of this good jumper, up to 36 times its length, but it is a poor climber. It emerges early from hibernation, and has even been heard singing during winter days south of Maryland. Eggs are laid in early February in the south or as late as July in the north, and hatch in 4 days if the air is 72°F. Tadpoles transform from May to October, 50-90 days after hatching, into froglets 1/2 inch long. They are heavily preyed upon by snakes, fish, turtles, and birds. The range is Michigan and Ohio to eastern Colorado and northeast Mexico. Not common at Volga Lake, but occasionally may be found along banks of small feeder streams leading into Volga River.

5. Western Chorus Frog, Pseudacris t. triseriata. The striped chorus frog is small, 3/4 - 1 1/2 inches, and lives in shallow bodies of water or near agricultural areas, though it was originally of the prairie. The back may be pale grey, dark brown, green, or olive. Three dark stripes down the back are as broad as the dark lateral stripe from snout to groin through the eye. These stripes may be broken into spots, or the middle stripe may fork. A dark triangle may be between the eyes, and a light line is always seen along the upper lip. Underparts are plain with a whitish or spotted throat. These frogs have small toe disks and slightly webbed toes; thus are poor climbers and feed mostly on insects among low vegetation. Mating may not occur until June in the north. Small egg masses are laid on leaves and stems of plants in ditches, swamps, or temporary bodies of water. The call of "reap reap reap" with a rising inflection is heard in great numbers during the mating season but seldom any other time of the year. Distribution is from south Quebec and western New York to Kansas and Oklahoma. They occur at pond, marsh and seep areas at Volga River, especially in sections 2, 10, 11, 14, and 15.

6. Spring Peeper, Hyla crucifer. The spring peeper is a tiny treefrog 3/4 - 1 3/8 inches with a brown X on its back giving it its name. It is waxy tan, yellowish, grey, light brown, or olive, and has obscure bands on the limbs and a pale yellow pectoral region. The skin is smooth, the muzzle is pointed beyond the lower jaw, and the fingers have no webs. It is a good leaper, and the adhesive disks on the toes and fingers make it a good climber. Favorable habitats include woodland ponds, swamps at sources of streams, low shrubby growth, sphagneous or cattail pools, ditches, and shallow ponds in grassy or muddy areas. Insects, gnats and mosquitoes are common food sources. One of the earliest frogs in the spring, the male peeper wakes early from hibernation in mid-March and proceeds to the nearest pond, followed by the female in mid-April. The male is liver or chestnut brown with a primrose yellow groin, and has ringing, metallic 1/2 second peeps that are so shrill and high they may be heard a mile away. The female is slightly larger and lighter in color. A male will rear on its haunches and inflate its large vocal sac to attract the female, and clasp her on the back in the water pouring sperm as she lays eggs. The white or creamy and black or brown eggs are in a firm jelly that sticks to plant stems. Breeding lasts from April 1st to June 15th, and a female may lay 800-1000 eggs, 1/25 inch in diameter. They hatch in 5-15 days, usually between July and August; the tadpoles are 3/8 - 9/16 inch long and feed on algae and protozoans for 3 months. A newly metamorphosed frog is the size of a fly. The Spring Peeper is the only small Treefrog in the North, and is nocturnal, singing from 4 p.m. to early morning. It covers a wide range in eastern North America to Florida and Texas. The Spring Peepers status in Iowa is threatened, but it is still common at Volga Lake in the early spring. You're sure to find several if you visit the ponds in sections 10 and 15 or the marsh areas in sections 2 and 11 during late March, April and May. The spring fed seep areas along Frog Hollow Creek in section 14 are also

fine places to search for peepers. These are fragile frogs and should be handled with care. It is important to release them after proper observation since they are a threatened species in Iowa.

7. Eastern Gray Treefrog, Hyla v. versicolor. This common treefrog is the only large treefrog in the north, ranging from 1 1/4 - 2 3/8 inches in size. Its granular skin and warty back which give it the name of tree toad is grey-brown or green-gray, and is subject to changes in color. A light spot beneath the eye and bright orange on the inside of the hind legs are characteristic markings; there may also be a large dark blotch on the back. Tubular disks are located on the toes and the hind feet are webbed. It avoids large permanent swamps, preferring to be near quiet shallow water. Well-camouflaged and quiet, it is shy and spends a nocturnal existence among small trees, shrubs, mossy and lichen stone fences, searching for tiny insects in the bark. Hibernation is spent in a tree stump or hole until reappearance in April when mating begins. Short trills less than 3 seconds can be heard then. From April to August the females each lay 30-40 eggs about 1/25 inch in diameter, then spread out to their home ranges. The eggs hatch in 5 days, revealing tadpoles of green-gold with red tails. Predators of the larvae include beetles, fish, and water-snakes. In 7 weeks the 1/2 inch frog emerges to land. Distribution of the common treefrog is from New Brunswick to N. Canada, west to eastern N. Dakota and south to the Gulf states. While not common at Volga Lake it occurs throughout the summer and early fall in moist woodland areas and in the vicinity of ponds and marshes.

8. Green Frog, Rana clamitans. A solitary resident of swamps, large and small ponds, pools, and reservoirs, the green frog may grow from 2-4 inches long. The slightly rough skin is green-brown with a green mask, yellow throat, and dusky bars on the legs. Underparts are white, and scattered black spots may be on the back. The dorso-lateral fold does not extend to the groin, but has a branch at right angles behind the ear. On the fourth toe the last two phalanges

are free of any web. Food includes vegetation and aquatic insects and larvae. Hibernation, in mud under water, lasts until March when the water is 50°F. Mating occurs from May to mid-August, later in the south. The male has a yellow throat ring and yellow around the ear, an enlarged thumb and ear, and internal paired vocal sacs. He gives a low-pitched, explosive call sounding like a loose banjo string, which warns off other males and attracts females. The black and white 1/16 inch eggs are laid on the surface film, 1-4,000 at a time covering less than a square foot. Tadpoles are 2 1/2 inches long, green mottled with brown with a long tail. They transform by September when they are 7/8 - 1 1/2 inches, and may live up to 11 years. Predators include hawks and crows and bass fishermen. Distribution is in eastern North America, from the Hudson Bay to the Gulf of Mexico. These are very common residents of the pond and of the marshy feeder stream areas of section 3 at Volga Lake. The small pond in section 3 could well be named "Green Frog Pond" because of the abundance of this species.

9. Leopard Frog, Rana pipiens. Almost everyone is familiar with this common frog. Two rows of irregular spots with light borders run down the brown, gray, or green back; underthighs are white, dark bands are on the legs, light ridges follow down the side of the back. A light line is on the upper jaw. The slender body has a pointed head, smooth skin, and paired vocal sacs between the tympanum and arms. In the spring these frogs can be found in marshes, by summer they may have moved to grassy woodlands and swamps, and winter hibernation quarters are commonly in pools and marshes. Insects are the main fare, in all cases. Hibernation begins in October when they burrow into soft mud underwater and lasts until April. The mating season lasts until May; eggs 1/16 inch in diameter are laid in flattened clumps or spheres 3-6 inches wide. They hatch early into 3/8 inch tadpoles with tails lighter than the bodies. By July or August they are frogs 3/4 - 1 1/4 inches long which will grow to a full size of 2-4 inches and live up to 9 years. Leopard frogs are good jumpers and

swimmers, calling while afloat with a long, low, guttural moaning rattle-grunt kerrrock. Color changes may occur rapidly. As many an unfortunate student discovers, one will readily empty its bladder on a molester. The range is from South Labrador to the southern District of Mackenzie, south to northern Georgia, west to the Pacific States and southwest to Mexico. They are likely to be encountered along any water course or pond at Volga Lake during spring, summer or fall.

D. Recommendations for Amphibians

1. Amphibians cannot survive apart from the water they require for reproduction. Aquatic areas (ponds, streams, spring seeps, marshes) should be maintained and protected at Volga River.
2. Sweet Flag Marsh (Sec 2), Peeper Pond (Sec 15) and Sand Hill Marsh (Sec 11) are the best Spring Peeper habitats at Volga River. These should all receive protection as unique habitat for this Iowa threatened species.
3. Green Pond (Sec 3) has very high densities of the Green Frog. This pond should be protected as habitat for an amphibian species not common in many areas of northeastern Iowa.
4. Habitat manipulation which fosters marsh development should be encouraged at Volga River. This might well be accomplished in the shallow water areas of the new Volga Lake as silt and sediment are deposited and mud flats develop.
5. Amphibian habitat will increase as a result of the Volga Lake development. Development threatens amphibian habitat throughout the United States and Volga River is an important Iowa habitat reservoir for these species.
6. Amphibians are well suited to the purposes of education since they are both visible and vocal. An educational center should have displays and perhaps live specimens of the common species. Nature trails could be designed to pass by important habitat.

II. Reptiles

Introduction

As a group reptiles are not abundant at Volga River, although some species are locally common. The lack of reptile sightings may be due to low numbers, low visibility, poor timing of field activity or some combination of factors. Field work on reptiles was carried out during June 1978 and early June 1979. Additional observations were made in September 1978.

A. Turtles

Turtle species observed or expected to occur at the Volga River Area are presented in Table 10. Four species of turtles were observed during the study period: Common Snapping Turtle (Chelydra serpentina), Painted Turtle (Chrysemys picta), Spiny Soft Shell Turtle (Trionys spiniferous) and the Ornate Box Turtle (Terrepenne ornata). The Volga River, associated sandbars, and lowlands provide the major habitat for snapping and softshell turtles. The softshell is considered common because it is often seen along the Volga River. Few snapping turtles were seen and they are listed as uncommon. Painted turtles were observed most often basking on beaver dams along Frog Hollow Creek in sections 3 and 4. The reader is referred to section D of this section for a detailed report on the box turtle at Volga River. This species is considered threatened in Iowa.

Blandings Turtle (Emydoidea blandingi) was not observed at Volga River. This threatened species has been collected a number of times in Winneshiek, Howard, and Allamakee Counties and it very likely occurs in Fayette County. The swampy areas in sections 2, 10, and 11 seem to provide the best potential habitat. The Volga River Area is large enough to provide a haven for this species.

Table 13. Turtle species that occur or are likely to occur at the Volga River Recreation Area.

<u>Common name</u>	<u>Scientific name</u>	<u>Status at Volga River</u>
Common Snapping Turtle	<u>Chelydra s. serpentina</u>	Uncommon
Blandings Turtle	<u>Emydoidea blandingi</u>	Not observed, may be present
Ornate Box Turtle	<u>Terrepene o. ornata</u>	Uncommon
Painted Turtle	<u>Chrysemys picta belli</u>	Common
Map Turtle	<u>Graptemys geographica</u>	Not observed, may be present
Spiny Softshell Turtle	<u>Trionyx spiniferous</u>	Common

B. Lizards

No lizards were observed at the Volga River Area during the summer of 1978 or in June 1979. The five-lined skink has been reported from Allamakee, Clayton and Winneshiek Counties and it likely occurs in Fayette County. Skinks were found in two locations in Winneshiek County during May 1979 so the species is definitely viable in northeast Iowa. Its favorite locations appear to be rocky prairie openings in deciduous woodlands on south or west facing slopes and rocky woodlands with sun, rotting stumps and damp rockpiles. Sections 11 and 14 appear to have suitable habitat but extensive searches provided no specimens.

C. Snakes

Snake species expected to occur at the Volga River Area are presented in Table 14. Several species are included from the literature and from distribution maps even though they were not observed during this study. In many respects the area appears to provide ideal habitat, but the number or species diversity is not great. The Northern Water Snake (Natrix sipedon) is reasonably common along the Volga River throughout the study area.

Bull snakes (Pituophis melanoleucus) were often observed along the boundary between sections 22 and 23. Garter snakes (Thamnophis sirtalis) were not as abundant as expected but still were considered common. A single Blue Racer (Coluber constrictor) was observed along the Volga River entry road about a half mile west of the resident park officers home. The Eastern Milk Snake (Lampropeltis triangulum) was common especially south of the Lima area in section 13 and in section 22. No other species were actually observed at Volga River; however, others no doubt are present (Table 14).

The Timber Rattlesnake (Crotalus horridus) was not observed during our study. Many suitable habitats are available and the species no doubt is present at Volga River. Local farmers tell "great stories" about finding rattlesnake

Table 14. Snake species that occur or are likely to occur at the Volga River Recreation Area.

Common name	Scientific name	Status at Volga River
Eastern Hognose Snake	<u>Heterodon p. platyrhinos</u>	Uncommon, none observed
Brown Snake	<u>Storeria dekayi</u>	Uncommon, none observed
Northern Red-bellied Snake	<u>Storeria occipitomaculata</u>	Not observed, may be present
Western Smooth Green Snake	<u>Opheodrys vernalis blanchardi</u>	Not observed, not likely to be present
Prairie Ringneck Snake	<u>Diadophis punctatus arnyi</u>	Uncommon, none observed
Blue Racer	<u>Coluber constrictor foxi</u>	Uncommon
Northern Water Snake	<u>Natrix s. sipedon</u>	Common
Fox Snake	<u>Elaphe v. vulpina</u>	Not observed, may be present
Black Rat Snake	<u>Elaphe o. obsoleta</u>	Not observed, rare & not likely to be present
Eastern Milk Snake	<u>Lampropeltis t. triangulum</u>	Common
Bullsnake	<u>Pituophis melanoleucus sayi</u>	Common
Eastern Plains Garter Snake	<u>Thamnophis r. radix</u>	Not observed, may be present
Eastern Garter Snake	<u>Thamnophis s. sirtalis</u>	Common
Red-sided Garter Snake	<u>Thamnophis sirtalis parietalis</u>	Uncommon
Eastern Massasauga	<u>Sistrurus c. catenatus</u>	Not observed, rare & not likely to be present
Timber Rattlesnake	<u>Crotalus h. horridus</u>	Uncommon

dens in sinkholes at Volga River and then using dynamite to rid the world of these "pests". One such story claims that scores of snakes were killed at a single location but data on exact location of the area is somewhat vague. At present the species is certainly not abundant. The Volga River Area is large enough to provide a valuable refuge for this declining species.

D. Threatened, rare or unusual reptiles.

The most exciting reptile discovered during our studies at Volga River was the Ornate Box Turtle (Terrapene ornata). Roosa (1977) lists this turtle as threatened in Iowa. The species is considered endangered in Wisconsin. This species is in trouble because of excessive damage to its habitat from developmental pressure and from excessive collecting. Box turtles occur in Iowa along the Missouri and Mississippi River and in southern Iowa.

A total of eight Ornate Box Turtles were observed at Volga River (Figure 10). They were observed in basically a single area, but specimens were picked up at three different sites in the SE 1/4, NW 1/4, Sec. 11, T93N, R8W, 5 P.M. One site appears from aerial photos to project slightly into the NE 1/4 of Sec. 11 and I would describe it as N 1/2, SW 1/4, NE 1/4, Sec. 11. The sites are located on a south-southwest facing Chelsea loamy fine sand soil of about 14-20 percent slope. The major site is a sloping hillside of what could best be described as nearly "pure" sand overlooking a small temporary marsh and an agricultural field (hay). The relatively undisturbed portion is dominated by Little Bluestem (Andropogon scoparius), with accompanying dry prairie forbs: white and purple prairie clover, Browneyed Susan, and Blazing Star. Juniper is invading the area.

A second site is very similar to the first in vegetation, slope and soil type but is located across the creek about one-eighth of a mile to the northeast. The third site, also similar in all respects, is located about one-

eighth mile west and slightly south of the principal site described above. A visitor is immediately impressed by the similarity of the sites, by the lack of ground cover, and by the presence of pure sand.

This area was identified as a turtle nesting area in June 1978 because of heavy predation losses to turtle eggs. A total of 11 nests were discovered after they had been excavated by predators in 1978 and 5 additional nest were discovered in June 1979. No examination of undisturbed nests was possible and no intact eggs survived to be measured. The predation was probably the work of striped skunks, badgers or Gray Fox. A fox den was discovered in the area during 1979 and badger sign was abundant in 1978 and 1979. .

It is not known if the Volga River Area turtles represent an isolated relict colony but this is possible and even probable given the disturbances that have occurred in the surrounding area, the unique nature of their preferred habitat, and the lack of observed specimens from the inland (non Mississippi River border) counties in northeastern Iowa. In the border areas of the driftless region prairie outliers interdigitate with forests and the Ornate Box Turtle shows a strong preference for the prairie outliers. It can be inferred (Smith, 1961) that the present isolated colonies are remnants of a formerly wildspread distribution in the prairie biome and specimens are now localized on some remaining sand prairie habitats.

The eight turtles were observed between June 8-12, 1979. The specimens included two mature males, four mature females, one subadult female and one juvenile of undetermined sex. The specimens were weighed, measured, tagged and released. Tagging was accomplished by mutilation of the marginal carapace scutes.

It should be emphasized here that the Meadow Jumping Mouse (Zapus hudsonius) was also collected at this site. While not rare this species is seldom collected in routine trapping. The temporary marsh adjacent to the site harbors the

Figure 10. Location of sand area at Volga River used by the Ornate Box Turtle and other turtle species (S.E. ¼, N.W. ¼, Sec. 11 and S.W. ¼, N.E. ¼, Sec. 11). Letters A,B,C and circles identify specific box turtle collection sites.



FAYETTE COUNTY, IOWA NO. 47

This map is compiled on 1974 aerial photography by the U. S. Department of Agriculture, Soil Conservation Service and cooperating agencies. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

N

1 Mile

5,000 Feet

Scale 1:15 840

0 1,000

2,000

3,000

4,000

5,000

Spring peeper (Hyla crucifer) listed by Roosa (1977) as being threatened in Iowa.

From the standpoint of vertebrates this is the most unique area examined at Volga River. At present I feel the entire northern half of section 11 should receive maximum protection and minimum human use. It may be possible to reduce the size of the protected area when more is known about the population levels, distribution patterns and home ranges of the turtles inhabiting the area. The extent to which nearby farming (melon fields) benefit the box turtle is unknown at present; however, most references to box turtles mention melons as a very favored food when available. Melon culture probably is a benefit to this species at this site.

E. Natural History of Common Reptiles

Natural history write-ups on the most common reptiles at Volga River are presented below. This information may be useful in species management, but it is probably more valuable in developing outdoor education materials for use at Volga River.

Turtles

1. Common Snapping Turtle (Chelydra serpentina). The Common Snapping Turtle is a large aquatic turtle of ponds, dredge ditches, lakes, streams and rivers. At the Volga River Area it is most common along the Volga, Frog Hollow Creek and other smaller creeks. Specimens are often seen inland from water because this species has a habit of migrating overland from one pond or stream to another. Specimens are occasionally seen along roads at Volga River. This species is slow moving and awkward, both on land and in water. It seems to prefer to lie in wait, buried on the bottom of pond or stream, for invertebrates, fish, amphibians, birds, or mammals. Snappers rarely spend time basking in the sun. Normally inoffensive underwater, newly captured individuals are fearless

and will lunge forward and strike repeatedly with their powerful jaws. The inexperienced should be discouraged from picking up wild specimens to avoid a nasty bite to arm or leg. In early June females bury eggs in holes which they dig in soil near water or at times many yards distant. Young are hatched in September or October. In northeastern Iowa snappers are hunted by some for use in soups and stews. The stew is delicious but overhunting of snappers may be lowering population levels.

2. Ornate Box Turtle (Terrapene ornata). This turtle is on the Iowa threatened species list and is considered endangered in Wisconsin. The most important and unusual reptile at Volga River where it occurs commonly in a few favorite sand hill type habitats. This species should always be left in the wild if discovered since it is so rare. A broad hinge across the bottom (plastron) allows this turtle to completely withdraw into and close up its shell, thus the name "box" turtle. Many specimens examined at Volga River appear to have been chewed on by foxes or badgers, but the turtle remains secure inside its shell. This is a terrestrial rather than aquatic turtle and it prefers prairies, savannas, and sand areas, but sometimes specimens are also found in woodlands and swamps or marshes. During hot days on the sand it burrows to escape the heat. On warm June days at Volga River this species can be found digging itself into the sand by midmorning. It is most active in early morning, at dusk, or during rain storms. Melons, plants, earthworms, insects and other small animals are all eaten. Females lay 3-5 eggs in June, but nests are seldom observed. Specimens live 30-40 years and sometimes reach 4-5 inches in length. Habitat destruction and the consumption of insecticides on their favorite foods have been blamed for their decline.

3. Painted Turtle (Chrysemys picta). This species is a resident of shallow water, ponds, marshes, ditches, edges of lakes, backwaters and sloughs. Although primarily aquatic this turtle is often found in land at some distance from water. Individuals are rather wary in the wild and often are not seen even though

the species is common. They are often observed on floating logs or on beaver dams basking in the sun at Volga River. The best places to look are on beaver dams along Frog Hillow Creek and at the upper end of the new Volga Lake. Painted turtles feed underwater on aquatic plants, insects, crayfish, molluscs, crustaceans, and carrion. Before mating, the male swims backwards in front of the female, tickling her face with his claws. In early summer 5-20 eggs are laid underground within a few yards of water. Young hatch by fall or the following spring and may live for 10 or more years. This species was highly symbolic to the Plains Indians and it is easily recognized by most people in northeastern Iowa.

4. Eastern Spiny Softshell (Trionyx spinifer). This species prefers rivers, ponds, lakes and small streams. Canoers along the Volga River frequently see it (if they move quietly) basking alone or in groups on dead trees that have fallen into the river or on sandbars. It likes to hide under mud and ambush its favorite foods: insects, crayfish, molluscs, earthworms, and frogs. Some plants and carrion are also eaten. This turtle is very alert and once alarmed it is almost impossible to catch or even see. They are excellent swimmers and better than average runners. The unwary Volga River visitor should not handle softshells because captured individuals are agile and extremely vicious. Females lay 10-30 eggs in sand or soil near water in early summer. Young hatch in 2-3 months and may live for 25 years and grow to a foot in length.

Snakes

1. Northern Water Snake (Natrix sipedon). The only large water snake in the north, this snake may grow to a length of 52". It is light brown in color with broad dark cross bands which are wide on the back and narrow on the sides. Underneath is white or yellow with red dots and black blotches. With increasing age the blotches fade and go together. The stout body and flat head have keeled

scales and a divided anal. It may be found under rocks and boards in or near water, streams, ponds, marshes, swamps, or branches in water. Food includes fish, amphibians, crayfish, crustaceans, and small mammals. The same home range will be used by a water snake many years. A female gives birth to 9-47 young between August and October. These young are brightly marked with a pattern of jet black on gray, and may live for 7 years. A water snake swims well, will bite and draw blood if attacked though it has no fangs, and will give a foul-smelling anal secretion if provoked. A common species along the Volga River where it is seen swimming or sun bathing on dead tree limbs or snags.

2. Eastern Garter Snake (Thamnophis sirtalis). Most children who play outdoors become familiar with this snake. Three narrow light stripes on a green or orange-brown or black back with the side stripes on the second and third scale rows are characteristics. Colors vary, but the back stripe is never orange, and the stripes may break up into dots. The belly is greenish-white and unmarked; there may be two rows of indistinct spots partly hidden under the overlapping portion of the ventrals. The head is distinct from the neck, scales are keeled, anal single. Fields, meadows, marshes, roadsides, woodlands, gardens, often near water, are all good habitats for the gartersnake. It may occur almost anywhere at the Volga River Area. Prey includes earthworms, amphibians, mice, young birds, insects, spiders, and fish. It is the last to hibernate in the fall and the first to emerge in the spring. The male courts the female by rubbing his chin barbules over her back, and three to 85 young are born June-September. They are 5-9" long, eat only earthworms the first year, and mature in three years. Average length is 18-26", but they may grow up to 48". It will live for up to 12 years.

3. Blue Racer (Coluber constrictor). The blue racer is plain blue above, with a darker head and darker area back from the eye. Chin and throat are white, with a paler bluish belly. Scales are smooth, anal divided. It prefers an

open habitat of prairies, woodlands, and lakes. Prey includes insects, frogs, toads, snakes, birds, eggs, and rodents. Contrary to the name the blue racer does not constrict, but holds the prey on the ground when killing it. In June-July 5-20 white, leathery eggs are laid in a moist area under a stone or in the sun. After 4-8 weeks, they hatch in July-September. The 12 inch young are strongly patterned, with a mid-dorsal row of dark grey, brown, or red-brown blotches, small dark spots on flanks and venter, and an unpatterned tail. An eventual length of 36-60 inches may be reached in the five years of its life. This agile snake will fight when cornered, vibrating its tail in dead leaves and biting several times.

4. Bullsna^ke (Pituophis melanoleucus). The bullsna^ke has 40-65 squarish black or brown blotches on a yellow background. Underneath are two rows of dark blotches on yellow. The dark yellow head has a dark band on top and a dark band below the eye. The stout body has a small, pointed head, an enlarged nose plate for burrowing, and keeled scales, anal single. It roams through prairies, fields, roadsides, farmlands and buildings looking for rats, mice, gophers, ground squirrels, and birds. In July or August 5-22 leathery adhesive eggs are laid, and in 56-85 days 15-20 inch young hatch in August-October. This 100 inch snake may appear frightening with its loud hiss, but it is beneficial to man. Most often observed in sections 22 and 23 at the Volga River Area.

5. Eastern Milk Snake (Lampropeltis triangulum). A common inhabitant of farmland, the eastern milk snake is slender, 3/5 inch in diameter, and is 34-40 inches long. Color is grey with brown, olive, or chestnut saddles, and a white belly with a checkerboard of black splotches. Three or five rows of blotches bordered with black are on the back, and a light Y or V may be on the nape of the neck. Scales are smooth and satiny, with anal single. It makes its home in open fields, meadows, or wooded areas, near limestone edges, sandy soil, under logs, boards, or stones. Active in late afternoon and early evening, the nocturnal existence is spent catching young snakes, mice, rodents, frogs, eggs,

young birds, fish, and earthworms. In July 6-15 oval white eggs are buried in the ground or in moist rotten wood. The young hatch in September, brightly marked, 6-8 inches long. Age may be to 8 years. The name is due to the false notion that it steals milk from cows. At Volga River this species was most often observed in sections 13 and 23. It frequently seeks refuge under old crushed pails, car hoods or lumber at Volga River. A particular abandoned car hood along the area road in section 23 always hid one and sometimes 3 milk snakes during early June 1979.

F. Recommendations and management for reptiles.

1. See body of report for suggestions on important reptile species.
2. Habitat of the Ornate Box Turtle at Volga River should be protected from all development. This Iowa threatened species is probably the most unique vertebrate at Volga River and the ISCC should take all steps necessary to ensure its survival. Some additional study of this species' habitat and food requirements at Volga River would be desirable. Some information on home range, seasonal distribution and movement would also be helpful in determining the size of area to be protected.
3. South and southwest facing sand slopes are especially important for reptiles at Volga River and development should be avoided at these locations.
4. Sand bars and old tree snags along the Volga River provide excellent habitat for aquatic turtles. These habitat elements should be left undisturbed.
5. The following habitats are especially significant for reptiles. Some can be created by good management while others should simply be protected when they develop.
 - a. woodland pools and quiet portions of rivers
 - b. natural and artificial marsh and seep areas
 - d. river and stream oxbow and inlet areas
 - e. rock outcrops near woodland edges

6. Intensive agriculture, woodlot clearing and grazing, and industrial development all destroy reptile habitat and Volga River will be an important refuge area for reptiles in northeast Iowa. The welfare of reptile populations in the area should be considered when wildlife management plans are developed.

7. Information on reptiles should be included in any nature center or educational displays developed at Volga River. Reptiles, especially lizards and snakes, are not well liked by many recreationists and the ISCC needs to focus some resources toward changing public attitudes about these valuable creatures. Nature trails leading to or by many of the river sand bars, sand hill areas, or woodland border-rock outcrops will often provide a view of some reptile species in its natural habitat.

III. Birds

Introduction

A general survey of the avian species present on the Volga River Recreation Area was completed during June 1978 and July 1979. Our observations included a breeding bird survey, time-area counts, call-index counts, specific habitat searches for rare, threatened and unusual species and general bird observations obtained while engaged in other field activities.

The Volga River area is situated near the center of Fayette County and it was assumed that the species on the area occur with approximately the same frequency as for the county as a whole. This proved true with a few notable exceptions discussed below.

The total number of migrant and breeding species recorded within all Fayette County is 231. County records for June include 113 species of which 89 are considered breeding species. A total of 97 species were observed during June 1978. A single additional species was added from a September observation.

A. Breeding bird survey

The breeding bird survey was completed between June 25 and June 28, 1978. Experienced observers spent the entire day in the field and recorded all species observed both visually and vocally. This data is presented in Table 15. A total of 98 avian species were recorded at Volga Lake with fewer than half (42) observed breeding. Breeding records were based on actual nest observations during June 1978 or in some cases on observations at Volga Lake during past years by Mr. Schaufenbuel. Additional species will no doubt be added to both the total and breeding tally over the next few years. An attempt has been made to provide an annotated list based on records from Iowa Bird Life and from the personal records for Fayette County

Table 15. Species of birds observed at Volga River Recreation Area during summer 1978¹

Species	Scientific name	Breeding status at Volga Lake ²	Status in June '78	
			Sighting only	Breeding Record
Great Blue Heron	<u>Ardea herodias</u>	UBS	X	
Green Heron	<u>Butorides virescens</u>	FCBS	X	
Wood Duck	<u>Aix sponsa</u>	FCBS	X	
Mallard	<u>Anas platyrhynchos</u>	UBS	X	
Turkey Vulture	<u>Cathartes aura</u>	Rather uncommon in June, possibly a breeding bird	X	
Red-tailed Hawk	<u>Buteo jamaicensis</u>	CBS	X	X
Broad-winged Hawk	<u>Buteo platypterus</u>	CM	6	
Rough-legged Hawk	<u>Buteo lagopus</u>	Winter resident	6	
Bald Eagle	<u>Haliaeetus leucocephalus</u>	UM	6	
Osprey ³	<u>Pandion haliaetus</u>	UM	X	
American Kestrel	<u>Falco sparverius</u>	FCBS	X	
Bobwhite	<u>Colinus virginianus</u>	Irregular, common breeder in June 1978	X	X
Ring-necked Pheasant	<u>Phasianus colchicus</u>	CBS	X	X
Turkey	<u>Meleagris gallopavo</u>	FCBS, reintroduced	X	X
Killdeer	<u>Charadrius vociferus</u>	CBS	X	
Upland Sandpiper	<u>Bartramia longicauda</u>	UBS, decreasing	X	
American Woodcock	<u>Philohela minor</u>	FCBS	X	
Rock Dove	<u>Columba livia</u>	Common breeder around farms	X	X
Mourning Dove	<u>Zenaidura macroura</u>	CBS	X	X

Table 15, continued.

Species	Scientific name	Breeding status at Volga Lake	S.O.	B.R.
Yellow-billed Cuckoo	<u>Coccyzus americanus</u>	FCBS	X	X
Black-billed Cuckoo	<u>Coccyzus erythrophthalmus</u>	FCBS	X	
Screech Owl	<u>Otus asio</u>	UBS	X	
Great Horned Owl	<u>Bubo virginianus</u>	CBS	X	X
Barred Owl	<u>Strix varia</u>	UBS	X	
Whip-poor-will	<u>Caprimulgus vociferus</u>	UBS	X	X
Chimney Swift	<u>Chaetura pelagica</u>	CBS	X	
Ruby-throated Hummingbird	<u>Archilochus colubris</u>	FCBS	X	
Belted Kingfisher	<u>Magaceryle alcyon</u>	FCBS, decreasing	X	
Yellow-shafted Flicker	<u>Colaptes auratus</u>	CBS	X	X
Pileated Woodpecker	<u>Dryocopus pileatus</u>	UBS	X	
Red-bellied Woodpecker	<u>Centurus carolinus</u>	CBS	X	X
Red-headed Woodpecker	<u>Melanerpes erythrocephalus</u>	Varies from very common to common breeding species	X	X
Hairy Woodpecker	<u>Dendrocopus villosus</u>	FCBS	X	X
Downy Woodpecker	<u>Dendrocopus pubescans</u>	CBS	X	X
Eastern Kingbird	<u>Tyrannus tyrannus</u>	CBS	X	X
Great Crested Flycatcher	<u>Myiarchus crinitus</u>	CBS	X	
Eastern Phoebe	<u>Sayornis phoebe</u>	FCBS	X	X
Acadian Flycatcher	<u>Empidonax virescens</u>	RBS	X	
Alder Flycatcher	<u>Empidonax alnorum</u>	RBS?	X	4

Table 15, continued.

Species	Scientific name	Breeding status at Volga Lake	S.O.	B.R.
Willow Flycatcher	<u>Empidonax traillii</u>	FCBS	X	
Least Flycatcher	<u>Empidonax minimus</u>	RBS? ⁵	X	
Eastern Wood Pewee	<u>Contopus virens</u>	CBS	X	X
Horned Lark	<u>Eremophila alpestris</u>	CBS	X	
Rough-winged Swallow	<u>Stelgidopteryx ruficollis</u>	CBS	X	X
Barn Swallow	<u>Hirundo rustica</u>	CBS	X	X
Cliff Swallow	<u>Petrochelidon pyrrhonota</u>	UBS	X	
Purple Martin	<u>Progne subis</u>	CBS	X	
Blue Jay	<u>Cyanocitta cristata</u>	CBS	X	
Common Crow	<u>Corvus brachyrhynchos</u>	CBS	X	X
Black-capped Chickadee	<u>Parus atricapillus</u>	CBS	X	X
Tufted Titmouse	<u>Parus bicolor</u>	FCBS and decreasing	X	
White-breasted Nuthatch	<u>Sitta carolinensis</u>	CBS	X	
House Wren	<u>Troglodytes aedon</u>	VCBS	X	X
Short-billed Marsh Wren	<u>Cistothorus platensis</u>	Uncommon-possible breeding species at Volga Lake	X	
Catbird	<u>Dumetella carolinensis</u>	CBS	X	X
Brown Thrasher	<u>Toxostroma rufum</u>	CBS	X	X
Robin	<u>Trudus migratorius</u>	VCBS	X	X
Wood Thrush	<u>Hylocichla mustelina</u>	FCBS	X	
Eastern Bluebird	<u>Sialia sialis</u>	Formerly common, now rather uncommon	X	

Table 15, continued.

Species	Scientific name	Breeding status at Volga Lake	S.O.	B.R.
Blue-gray Gnatcatcher	<u>Polioptila caerulea</u>	FCBS	X	X
Cedar Waxwing	<u>Bombycilla cedrorum</u>	Irregular, generally FCBS	X	X
Starling	<u>Sturnus Vulgaris</u>	ABS	X	X
Bell's Vireo	<u>Vireo bellii</u>	RBS?	X	
Yellow-throated Vireo	<u>Vireo flavifrons</u>	FCBS	X	
Red-eyed Vireo	<u>Vireo olivaceus</u>	FCBS	X	
Warbling Vireo	<u>Vireo gilvus</u>	CBS	X	
Blue-winged Warbler	<u>Vermivora pinus</u>	Early June breeder at Volga area	X	
Yellow Warbler	<u>Dendroica petechia</u>	FCBS	X	X
Chestnut-sided Warbler	<u>Dendroica pensylvanica</u>	UBS ²	X	
Ovenbird	<u>Seiurus aurocapillus</u>	FCBS	X	
Yellowthroat	<u>Geothlypis trichas</u>	VCBS	X	X
Yellow-breasted Chat	<u>Icteria virens</u>	RBS? ³	X	
American Redstart	<u>Setophaga ruticilla</u>	CBS	X	
House Sparrow	<u>Passer domesticus</u>	ABS	X	X
Bobolink	<u>Dolichonyx oryzivorus</u>	FCBS, may be decreasing	X	X
Eastern Meadowlark	<u>Sturnella magna</u>	VCBS - decreasing as breeding species?	X	X
Western Meadowlark	<u>Sturnella neglecta</u>	CBS	X	
Red-winged Blackbird	<u>Agelaius phoeniceus</u>	ABS	X	X
Orchard Oriole	<u>Icterus spurius</u>	RBS? ⁴	X	

Table 15, continued.

Species	Scientific name	Breeding status at Volga Lake	S.O.	B.R.
Baltimore Oriole	<u>Icterus galbula</u>	CBS	X	X
Common Grackle	<u>Quiscalus quiscula</u>	ABS	X	X
Brown-headed Cowbird	<u>Molothrus ater</u>	CBS	X	X
Scarlet Tanager	<u>Piranga olivacea</u>	FCBS	X	
Cardinal	<u>Richmondia cardinalis</u>	CBS	X	X
Rose-breasted Grosbeak	<u>Pheucticus ludovicianus</u>	CBS	X	
Indigo Bunting	<u>Passerina cyanea</u>	VCBS	X	X
Dickcissel	<u>Spiza americana</u>	Irregular at Volga Lake, common in county	X	
American Goldfinch	<u>Spinus tristis</u>	CBS	X	
Rufous-sided Towhee	<u>Pipilo erythrophthalmus</u>	CBS	X	
Savannah Sparrow	<u>Passerculus sandwichensis</u>	CBS	S	
Grasshopper Sparrow	<u>Ammodramus savannarum</u>	UBS	X	
Henslow's Sparrow	<u>Passerherbulus henslowii</u>	RBS? ⁵	X	
Vesper Sparrow	<u>Pooecetes gramineus</u>	CBS	X	
Chipping Sparrow	<u>Spizella passerina</u>	CBS	X	X
Field Sparrow	<u>Spizella pasilla</u>	CBS - decreasing?	X	X
White-crowned Sparrow	<u>Zonotrichia leucophrys</u>	UM	6	
White-throated Sparrow	<u>Zonotrichia albicollis</u>	CM	6	
Song Sparrow	<u>Melospiza melodia</u>	CBS	7	X

Table 15, continued.

1. June nesting records were summarized for 1978 from field data and from previous years from records provided by Joseph Schaufenbuel, St. Lucas, Iowa.
2. Abbreviations used in status report
 - ABS - Abundant Breeding Species
 - VCBS - Very Common Breeding Species
 - CBS - Common Breeding Species
 - FCBS - Fairly Common Breeding Species
 - UBS - Uncommon Breeding Species
 - RBS - Rare Breeding Species
 - UM - Uncommon Migrant
 - CM - Common Migrant
3. Osprey sighted September 12, 1978 after regular summer survey had been completed.
4. First record for Fayette County.
5. First June record for species in Fayette County. .
6. Species not observed during counts. Record provided by ISCC.

provided by Mr. Joseph Schaufenbuel, St. Lucas, Iowa. In general a species was defined as "abundant" when it occurred in large numbers, as "common" when found in reasonable numbers in the proper habitat, or as "rare" when absent from most of Fayette County. Rare species would appear in minimal numbers even in the best of habitat. A detailed description of the symbols used to characterize relative abundance is appended to Table 15.

B. Threatened, rare or unusual birds.

The species summarized are those which are on the National Audubon Blue List (American Birds 31:1087, 1977), the Iowa Blue List (Iowa Bird Life 45:95, 1975), and on Roosa's (1976) list of endangered, threatened, or declining-species in Iowa (Iowa Bird Life 46:40, 1976). Blue listed species are defined as probably declining in numbers in the United States, but they are not endangered or in immediate threat of extirpation. Also included in the list below are species thought to be rare, unusual, or previously unreported for Fayette County.

1. Turkey Vulture. Although not on any of the above lists it was unusual to observe 3-4 regularly soaring over Volga Lake. An uncommon summer resident in the county, but one that may breed here. Current management practices at Volga Lake probably are beneficial and may promote an increase in the population in the area.

2. Ruffed Grouse. No evidence of Ruffed Grouse was obtained during June, 1978 and 1979. The timbered areas of the Volga River Area appear suitable for grouse and numerous moss covered logs suitable as activity centers (drumming logs) were located. It seems unusual that not a single Ruffed Grouse was flushed or overheard drumming by any member of the study crew (6 persons) during the entire month of intensive field observations. I assume Ruffed Grouse are present at Volga River but the population must have been very low during the summers of 1978 and 1979. Ruffed Grouse may respond to management at Volga River even though the area is located at

the periphery of the range for the species.

3. Turkey. A reintroduced species at Volga River. Species is doing very well in the area and in my judgement the population will support hunting. A nest with 12 eggs was found in the NE $\frac{1}{4}$, S11 and numerous turkeys were observed in section 10. Turkey sign (tracks, feathers) were also observed in sections 2, 3, 15, 11, and 27. In my judgement the best habitat for turkeys occurs in sections 10, 11, 15, 22, and N $\frac{1}{4}$ of 27.

4. Upland Sandpiper. This grassland bird is on the National Audubon blue list and on Roosa's (1977) list of endangered Iowa species. It is currently decreasing over much of its range. Two upland sandpipers were observed during the study period in sections 14 and 15. The favored habitat seemed to be located in the east central portion of section 15 and the adjacent part of section 14. The species seems to prefer a moist prairie like habitat containing medium length grasses. Since this sandpiper is already present at Volga River it is probable that some habitat preservation and maintenance might favor an increase in its numbers. The Upland Sandpiper is uncommon in Fayette County. Loss of habitat appears to be responsible for the decline in population.

5. American Woodcock. There is a good population of this uncommon breeding bird in the Volga River area. It seems to prefer woodland seep and spring areas as well as river bottoms. These areas are easily recognized at Volga River and preserving them should present no problems if it is the desire of the Iowa Conservation Commission to do so. Some excellent seep areas occur in the SE $\frac{1}{4}$ of section 10. Sections 2, 4, 11, and 14 also have seep, spring, and stream areas suitable for woodcock.

6. Yellow-billed Cuckoo. Fairly common in the Volga River area. Species is declining in Iowa (Roosa, 1976). The overgrown pasture areas at Volga River are probably the most important habitats for this species.

7. Black-billed Cuckoo. Common at Volga River. Species listed as having undetermined status in Iowa by Roosa (1977).

8. Ruby-throated Hummingbird. A common bird at Volga River but considered by Schaufenbuel to be an uncommon breeding bird in Fayette County. Species nominated to the National Audubon blue list. Species should continue to do well at Volga River since woodland is abundant. Jewelweed and thistle are important sources of food for this species.

9. Red-headed Woodpecker. Abundant at Volga River, but considered to be only common in Fayette County. Species is on National Audubon blue list.

10. Acadian Flycatcher. Species is uncommon in Fayette County, but it does not appear on any threatened or endangered lists. A total of two individuals were observed in section 23 at Volga River.

11. Least Flycatcher. Not reported during June in Fayette County prior to present study. A single June record was recorded for S.E. $\frac{1}{4}$, Section 10 at Volga River.

12. Alder Flycatcher. Recently the Traill's Flycatcher was split into two new species: Alder Flycatcher (Empidonax alnorum), and Willow Flycatcher (Empidonax traillii). The status of the Willow is well known in Iowa, the Alder's range is unknown in the state and is poorly known in the rest of the nation. Three were found at Volga River during the study period; these are the third June records for the state. No nests were located but it is possible that the species does breed at Volga River.

13. Tufted Titmouse. During the past five years this species has decreased in much of northeastern Iowa. This species inhabits large stands of mature timber. The best habitat at Volga River appears to be the timber stands in the south central portion of section 10, extreme northern and western portions of section 15, east central portion of section 22, and southeast part of section 21. A total of three individuals were observed during

the study period.

14. Wood Thrush. Fairly common at Volga River. Once considered to be on blue list for Iowa.

15. Eastern Bluebird. Uncommon in Fayette County and decreasing. A single individual observed at Volga River. Species has been on some version of blue list for several years.

16. Warbling Vireo. Common in riparian areas at Volga River. Species is on National Audubon blue list. species should be secure at Volga River unless extensive land clearing takes place.

17. Yellow Warbler. Species considered to be on decline in northeastern Iowa by Joseph Schaufenbuel. This warbler is frequently observed at Volga River and one must conclude that populations are still good in the area. Roose (1977) considers its status in Iowa to be undetermined. It is considered a declining species by National Audubon Society.

18. Chestnut-sided Warbler. An uncommon bird in Fayette County. A single specimen observed in section 12 is only the second June record for Fayette County.

19. Yellow-breasted Chat. A single singing male was observed in section 3 just west of the Volga Lake dam site. Species is included on most lists of declining and threatened species. The Volga River area contains excellent habitat (dense thickets and brush, stream side tangles and dry brushy hillsides) for this species and it would not be surprising to find fair numbers of chat in the area.

20. American Redstart. Fairly common in Volga River Area. Species is on Iowa blue list (Roose, 1966).

21. Orchard Oriole. First record for Fayette County from N.E. $\frac{1}{4}$, Section 15 of Volga River Area during June 1978.

22. Dickcissel. A single individual found at Volga Lake. Species is on National Audubon blue list. The mixed habitats of grain and hay along with numerous weed patches on the Volga River area seen to provide ideal conditions for the Dickcissel.

23. Rufous-sided Towhee. A fairly common species at Volga River. It has been suggested that this species belongs on the "Iowa Blue list" (Iowa Bird Life, 1975, 45:95-96).

24. Grasshopper Sparrow. One individual observed at Volga River. Species is on National Audubon blue list. Common in the rest of Fayette County.

25. Henslow's Sparrow. Three individuals observed near the Volga Lake dam spillway in section 3 of the area. Species is on the National Audubon blue list and is rarely observed in Iowa except in few select locations. Adequate habitat for Henslow's Sparrow appears to be present at Volga River but the species density remains low. The restoration of some prairie areas at Volga River might improve species densities of this rare bird.

26. Vesper Sparrow. A common breeding bird in Fayette County and a fairly common species at Volga River. Prefers the cultivated habitats at Volga River. Species is on National Audubon blue list.

Summary:

The most significant findings at Volga River include the following:

1. Very adequate populations of three game species: Turkey, Bobwhite and Woodcock. A fair to good population of the Ring-necked pheasant is present.

2. The occurrence of several important and seriously threatened "blue list" species: Ruby-throated Hummingbird, Eastern Bluebird, Warbling Vireo, Yellow Warbler, Yellow-breasted Chat, Dickcissel, Henslow's Sparrow and Upland Sandpiper.

3. New Fayette County records: Orchard Oriole and Alder Flycatcher.

4. The appearance of new or rare summer species for Fayette County: Least Flycatcher, Blue-winged Warbler, Chestnut-sided Warbler, Yellow-breasted Chat, Henslow's Sparrow.

5. Unusually high numbers of non-game birds at Volga River: Western Phoebe (5 nests located), Marsh Wren (high count for one day - 12), Ruby-throated Hummingbird (high count for one day - 9), Blue-winged Warbler (10 observed), Bobolink (common in overgrown fields), Eastern Meadow Lark (very common at Volga River), Henslow's Sparrow (3 observed), and Field Sparrow (common over area).

C. Time-area counts.

Time-area counts were made at three sample sites at Volga River on June 29 and 30, 1978 and at six sites on July 7 and 8, 1979. These counts were modified from a method suggested by New (1971) and consisted of slow thirty minute walks through selected habitats and recording both the species and numbers of birds seen or heard. Each sampling area was about ten acres in size. Data on species and numbers of birds is presented in Table 16.

The habitats selected for time-area counts were located throughout the area (Figure 11). Each site was designated by letter and section number. The habitats were characterized as follows:

Site A11. NE $\frac{1}{4}$, Sec. 11. Mature to medium aged woodland composed of basswood, maple, oak and hickory on a moist slope. Undergrowth of fair density. Canopy uniform with a few openings. Edge areas contained prickly ash, hazel and gooseberry.

Site B10. W $\frac{1}{4}$, Sec. 10. Small stream traversed area. Willows (4-18 ft in height) along stream. Area mostly open and grassy. Bordered by gravel road on north and woodland on south.

Site C14. N.E. $\frac{1}{4}$, Sec. 14. Grassy overgrown pasture, bordered by woodland on north, gravel road on south, trail on west, and tree grove on

east. Many young pine and box elder in the area.

Site D10. S.E. $\frac{1}{4}$, Sec. 10. Stream border and overgrown grassland area. Some willow, box elder and cottonwood trees present in area. Most of count time was spent in grassy habitat.

Site E23. N.W. $\frac{1}{4}$, Sec. 23. Overgrown grassland area with juniper, walnut, sumac, ash, elm and prickly ash.

Site F23. S.E. $\frac{1}{4}$, N.W. $\frac{1}{4}$, Sec. 23. Open west facing woodland slope. Basswood, oak, juniper, walnut present as well as a gooseberry and prickly ash understory.

Site G14. N.E. $\frac{1}{4}$, N.W. $\frac{1}{4}$ Sec. 14. Semi-open woodland on a west facing slope. Oak species, walnut, hickory, aspen. Many deciduous saplings in undergrowth.

Site H11. S.E. $\frac{1}{4}$, S.E. $\frac{1}{4}$, Sec. 11. Mature forest. Oak, hickory, basswood and ash.

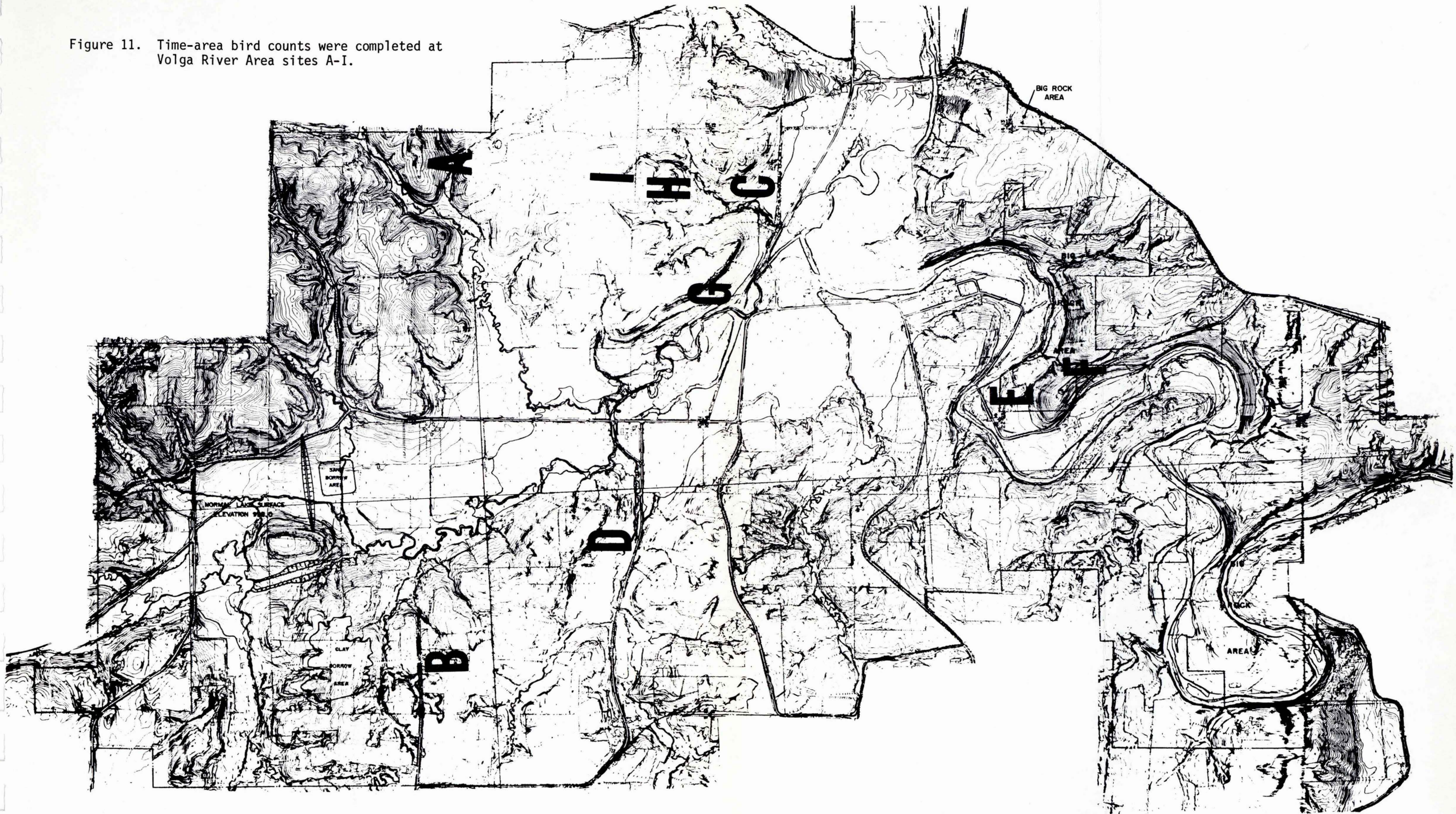
Site I11. N.W. $\frac{1}{4}$, S.E. $\frac{1}{4}$, Sec. 11. Woodland with oak, ash, basswood and aspen. Heavy undergrowth.

No significant differences were observed in the total number of species at each site (Table 16); however, the species composition varied from site to site as would be expected given the habitat differences. Significantly larger numbers of individuals were observed at site A11 due mostly to the relatively large numbers of Eastern Wood Pewee, Black-capped Chickadee and Indigo Bunting observed at the site.

D. Call-index counts

Call-index counts were completed for Bobwhite along roadways which transected the Volga River area. Stops were made at 0.5 mile intervals to conduct counts. The counting procedures were the same as those used by Iowa Conservation Commission biologists. The mean number of calling Bobwhite per route was 18. The major Bobwhite habitat occurs in the "Central Valley" of the Volga River Area in portions of sections 10, 11, 14, 15, 22

Figure 11. Time-area bird counts were completed at Volga River Area sites A-I.



VOLGA RIVER STATE RECREATION AREA



Table 16. Species and numbers of birds observed by time-area count at nine Volga River Area locations.
(See Figure 11 for site locations).

Species	Site and number of birds observed								
	A11	B10	C14	D10	E23	F23	G14	H11	I11
Wood Duck				3					
Red-tailed Hawk			1						
Bobwhite			1						
Mourning Dove		3	1	2	2		1		
Belted Kingfisher	1				1				
Yellow-shafted Flicker	3	1	2						
Red-bellied Woodpecker	3	1					1		
Red-headed Woodpecker	5	2	1	1					2
Downy Woodpecker	2		1			1	1		
Eastern Kingbird		1	1			1			
Great crested Flycatcher	1	1						1	
Eastern Phoebe	1	1							
Rough-winged Swallow			2	2	1		1		
Barn Swallow			1						
Blue Jay	3		2		2		4	1	2
Common Crow							1		
Black-capped Chickadee	7	2	2	1		2	1		
Carolina Chickadee					2				
White-breasted Nuthatch					2		1		
House Wren	2	2	2	1	1	1	1		
Eastern wood Pewee	7								
Willow Flycatcher		3		2					
Least Flycatcher				1					
Short-billed Marsh Wren		2							

Table 16, continued.

Species	Site and number of birds observed								
	A11	B10	C14	D10	E23	F23	G14	H11	I11
Catbird	5			1					
Brown Thrasher		1	1			1			
Robin	4	1	1	1					
Wood Thrush	2								1
Cedar Waxwing						2			
Warbling Vireo		1		2					
Red-eyed Vireo	2								1
Yellow Warbler		4		2					
Blue-eyed Warbler								1	
Yellow-throated Vireo				1	1	1	1		
Ovenbird	2						1	1	
Common Yellowthroat		2	3	3			1		
American Redstart		1		1					
Bobolink			3						
Eastern Meadowlark			4						
Redwinged Blackbird		5	6	2	3				
Baltimore Oriole	2								
Brown-headed Cowbird			1	3	3	1		1	
Scarlet Tanager	3						1		
Cardinal	2	1	4	1	3	2	3	1	1
Rose-breasted Grosbeak	3	1					1		1
Indigo Bunting	7	1	2	2	1		1		
Blue-gray Gnatcatcher	2				1				

Table 16, continued.

Species	Site and number of birds observed								
	A11	B10	C14	D10	E23	F23	G14	H11	I11
American Goldfinch	2	2	1	4	3				
Rufous-sided Towhee	2			1					
Field Sparrow	4		5	2	2	1			
Song Sparrow		3		2	1	1			
House Sparrow		2			1				
Total species	24	25	23	23	17	11	16	6	6
Total individuals	75	46	47	41	30	14	21	6	8

and 23. The agricultural land and associated border areas in sections 14 and 15 provide the best quail habitat.

E. Recommendations and management for avian species.

1. The major avian management objective at Volga River should be to maintain and improve maximum habitat diversity. The major habitats to maintain or improve at Volga River include: deciduous forest, conifer plantations, thickets and second growth, grasslands, lakes, ponds, streams and rivers, freshwater marshland and agricultural fields. A balanced approach to habitat management should maximize the areas potential for both game and non-game avian species. The current "habitat mix" and specific locations for each habitat are best left to the professional judgement of ISCC game and non-game management biologists.

2. If upland avian game species (Turkey, Ring-necked Pheasant and Bobwhite) are to be a priority at Volga River then agricultural practices must be maintained or even increased. Corn, oats and hay all provide valuable food and nesting cover for both game and non-game species. If relatively wide agricultural field borders of grass and shrubs are maintained the agricultural practices serve to maximize edge and provide maximum benefit to non-game species. The amount of row crop grown on the area is currently minimum for correct management of farm game species. A moderate increase in row crop acreage should not be viewed with alarm if all farming practices strictly comply with USDA Soil Conservation Service soil loss limits for each field. Strip cropping would appear to be a very desirable practice for all avian species at Volga River. More intensive practices such as tile intake terraces may or may not be cost effective for the area. If such terraces are installed both the backslope and frontslope of each terrace should be left in grass and annual weeds to promote food and nesting cover for both game and non-game species.

3. The avian management plan should maximize the amount of acreage in ecotone (edge). It should also maximize the number of successional stages available. (In management terms this is what provides maximum habitat diversity). It is recommended that ISCC biologists create successional habitat stages by four procedures at Volga River - a) controlled agricultural practices, b) selective mowing, c) selective burning, and d) selective timber management. These practices all effectively "set back" natural succession and increase habitat diversity. It is desirable to maintain some areas in an undisturbed state at Volga River; however, if the entire area were permitted to revert to its natural state through succession species diversity would be reduced. The most difficult of the four suggested management practices to carry out at Volga River is controlled burning. The steep slopes and irregular field borders will be difficult, but not impossible, to burn. The area could easily become an ISCC experimental area to assess the value of fire as a management tool for game and non-game species. (See Knutson report for areas which might benefit from burning.) The precise location and time frame for carrying out each management practice is best left to ISCC game and non-game managers.

4. All management practices should meet USDA and ISCC standards for erosion control and acceptable soil loss.

5. A management plan balanced for maximum species diversity is most desirable; however, it may become necessary to carry out intensive localized management to favor some species over others at various sites in the area. Volga River will ultimately, if not now, become a diversified habitat oasis in a landscape saturated with corn and soybeans.

The non-game specialists on the ISCC staff should be consulted about specific practices which encourage threatened, rare or endangered species. Often these practices are not unique (i.e. the Vesper Sparrow is declining

nationally but is a fairly common species at Volga River and seems to prefer cultivated habitats. The Dickcissel is declining nationally but is fairly common at Volga River and seems to prefer mixed habitats of grain, hay and weeds.) Game specialists on the ISCC staff should be consulted about specific practices which encourage game species not currently common in the area. The ruffed grouse is an important species and some timber management (creating openings in large timber blocks) may improve the habitat for this species as well as for others (deer). Knutson's report should be consulted to determine areas which may benefit from cutting and to identify forest areas to valuable as natural areas to permit artificial habitat manipulation

6. It appears that birds in general would benefit by:
 - a. a prairie establishment program in the area,
 - b. maintenance of some pine plantations,
 - c. selective logging, leaving some woodlands for posterity,
 - d. limit camping, parking and picnicking to designated areas in the less pristine or less intensely managed parts of the area,
 - e. limit trail bikes, snowmobiles and four-wheel drive vehicles to prescribed trails or other areas designated for their use,
 - f. careful monitoring of pesticide and land use by farmers leasing agricultural land at Volga River.

7. Sediment accumulation in the upper reaches of the new lake will probably increase marsh habitat on the area. Increased mud flat and shallow water areas will improve the area for shorebirds, wading birds and waterfowl at the same time making the area less valuable in the eyes of some recreationists. The development (either natural or artificial) of additional marsh areas would have a positive effect on avian species diversity at Volga River.

8. Avian upland-game management priority should be given to Wild Turkey, Ringnecked Pheasant, Bobwhite and Ruffed Grouse in this order. Both turkey and bobwhite are novelty species in northeastern Iowa and they provide a great deal of interest for hunters, bird watchers, photographers, and general recreationists. The pheasant is locally common and good populations should be maintained in the area. In time the Hungarian or Gray Partridge (Perdix perdix) may expand its range into suitable portions of the Volga River area. This species is already reported from western Winneshiek and Fayette Counties and seems to be increasing its range in Iowa. The presence of both Ruffed Grouse and Gray Partridge would be desirable at Volga River.

9. If a management practice can be demonstrated now or in the future to be detrimental to an endangered or threatened species it should be avoided in localized areas at Volga River. A few species (non-game or game) should not, however, dictate the management of the entire area.

10. If a nature center is constructed at Volga River, avian species should be an important part of displays and interpretive material. The importance of management practices for the well being of birds should be stressed. The area provides an ideal setting to explore the compatibility of game and non-game species in various habitats.

III. Mammals

Introduction

A general survey of the mammalian species present on the Volga River Recreation Area was completed during June 1978 and early June 1979. Our observations included trapping studies for small mammals, specific habitat searches for rare, threatened or unusual species and general mammal observations gathered while engaged in other field activities. In many cases mammal signs (tracks, scats, burrows) proved essential in determining a species presence since actual specimens were not observed. Quantification of abundance for the intermediate sized mammals is somewhat subjective since time and funding did not permit detailed population analysis for each species. Published work by Bowles (1975), Hoslett (1965), and Ripple (1972) were consulted in addition to our own field records to determine whether species were abundant, common, rare or not present in the area. A definitive statement on the absence or presence of mammalian species listed in Roosas (1977) paper on endangered mammals would require many months of intensive field work. In my opinion such a project would be worth undertaking given the size of the area and its very diverse set of plant associations. I have tried to provide an assessment of the status of mammals, both rare and common, at Volga River and relate each species to its favorite habitats. Knutson's (1979) report on plant associations should be consulted to determine the precise locations of the various plant associations. In many cases I have given general areas or precise geographical land sections which appear to be good habitat for a species. This is easy for some species which have narrow habitat requirements, but becomes difficult for many others with broad habitat preference and therefore very widespread distributions. A short natural history write-up is included for each species. If I feel a species has much to offer from the standpoint of

education this has been pointed out. It is hoped natural history information will be helpful should a nature center or other educational facility evolve at Volga River. A short section is included on outdoor user attitudes towards mammals. This is a subjective evaluation and commission planners should not attach a great deal of weight to it since the opinions are my own; however, based on a fair amount of experience. A set of recommendations completes the mammal section.

A. Small mammal survey

Intensive small mammal studies were carried out to determine if endangered or threatened species occurred at Volga River. Several rare species including the Least Shrew, Plains Pocket Mouse, and the Woodland Vole could potentially occur at Volga River. In addition, a number of less common, but not endangered, species could also occur including the Western Harvest Mouse, Southern Bog Lemming, Prairie Vole and the Meadow Jumping Mouse.

Small mammal trapping was completed on 14 sites at Volga River during June 1978. A total of 174 small mammals representing six species were captured during 1320 trap nights for an overall trap success of 13.2% (Table 17).

Each trap line had 10 stations spaced at 15 meter intervals. Three victor break-back traps were set at each station. I estimated each 150 meter line transect adequately sampled about 1500 square meters of habitat. Trap lines were run for two, three or four consecutive nights depending on weather, site and time of week. Population levels were determined by algebraic or graphic methods as outlined in the Wildlife Techniques Manual (1971). In most cases, day of capture plotted against cumulative captures permitted population densities to be graphically extrapolated.

Problems were encountered at several sites distinguishing the deer mouse (Peromyscus maniculatus) from the white-footed mouse (Peromyscus leucopus).

The advice of Bowles (1975) was followed and all doubtful specimens with a hind foot length of 20 mm or more were considered P. leucopus. Habitat type, pelage, and weight were also considered. Some juveniles were assigned to species based on the best judgement of the investigator.

A brief description of the location, habitat and small mammal population density at each trapping site is presented below.

Trapline A. Located in N 1/2, SW 1/4, Sec 2 (Figure 12). A lowland meadow site on Otter-Huntsville soil with 3 percent slope. Some typical plant species at site were goldenrod, brome, mullin, sweet flag, elm, willow, and boxelder. Trap line was operated for four consecutive days and population was estimated at 13.7 animals/1000 M². High density of Masked Shrew here as well as one Meadow Jumping Mouse.

Trapline B. Located in NE 1/4, SE 1/4, Sec 2 (Figure 12). A predominately grass old field area. Sumac, chokecherry, and boxelder present as well as annual weeds. Vegetation on a Fayette silt loam soil with about a 20 percent slope to southwest. Trap line was operated for three consecutive days and population was estimated at 2.3 animals/1000 M².

Trapline C. Located in SE 1/4, SE 1/4, Sec 2 (Figure 12). A flood plain forest environment along a stream draw on a Rock outcrop-Nordness complex soil. Slopes on both sides of draw ranged from 25-60 percent. Typical plant species were nettle, burdock, sumac, elm, maple, basswood and walnut. Trapline was operated for four consecutive days and population was estimated at 22.2 animals/1000 M². Excellent habitat for white-footed mouse.

Trapline D. Located in NE 1/4, NE 1/4, Sec 11 (Figure 12). A south facing 5 percent slope on a Dorchester-Volney complex soil. A moderately disturbed deciduous woodland habitat. Typical plant species included jewel weed, ribes, prickly ash, maidenhair fern, ironwood, basswood and some grass in open areas. Trapline was operated for four consecutive days and population was estimated at 4.8 animals/1000 M².

Trapline E. Located in NE 1/4, NE 1/4, Sec 11 (Figure 12). A north facing 14-18 percent slope on a Fayette silt loam soil. A moderately disturbed deciduous woodland habitat. Typical plant species included ribes, impatiens, ironwood, basswood, white oak and sugar maple. Trap line was operated for four consecutive days and population was estimated at 21.3 animals/1000 M². A text-book woodland habitat for the white-footed mouse, Peromyscus leucopus.

Trapline F. Located in NW 1/4, SW 1/4, Sec 3 (Figure 12). Frog Hollow Creek flood plain and associated meadow on loamy alluvial land. Area was a flat, disturbed old field with sumac, raspberry, prickly ash, boxelder, elm, walnuts, and a grassy understory. Trap line was operated for three consecutive days and population was estimated at 9.1 animals/1000 M². A single Meadow Jumping Mouse taken at this site.

Trapline G. Located in SW 1/4, NS 1/4, Sec. 3 (Figure 12). Hilltop prairie opening on a Fayette silt loam soil with a 10 percent slope to south. Area was relatively flat and open with some prairie vegetation interspersed with deciduous woodland. Trap line was operated for three consecutive days and population was estimated at 4.9 animals/1000 M².

Trapline H. Located in SE 1/4, NW 1/4, Sec. 11 (Figure 12). A northwest facing 14-25 percent slope on a Chelsea loamy fine sand. A semi-open habitat with some little bluestem, mixed grass, sumac, juniper and young red oak. Trap line was operated for three consecutive days and population was estimated at 4.5 animals/1000 M².

Trapline I. Located in SE 1/4, NW 1/4, Sec. 11 (Figure 12). A spring seep area. Open water interspersed with higher ground, wet meadow and brush border. Soil type was Chelsea loamy fine sand on high ground and Spillville loam on low ground. Some typical plants were sedges, smartweed, boxelder and red oak at woodland edges. Trap line was operated for three consecutive days and population was estimated at 11.7 animals/1000 M².

Trapline J. Located in NE 1/4, NW 1/4, Sec. 14 (Figure 12). An abandoned roadbed with many spring seep areas on a chelsea loamy fine sand soil. Some typical plants were sedges, nettle, dogwood, hackberry, boxelder, white oak, along with brush and woodpiles. Trapline was operated for three consecutive days and population was estimated at 29.3 animals/1000 M². This area is "perfect" habitat for the white-footed mouse.

Trapline K. Located in SE 1/4, NE 1/4, Sec 14 (Figure 12). Volga River flood plain forest on loamy alluvial land. Typical plant species were nettle, ribes, wild parsnip, jewel weed, willow, elm, boxelder, cottonwood, and silver maple. Trap line was operated for three consecutive days and population was estimated at 16.1 animals/1000 M².

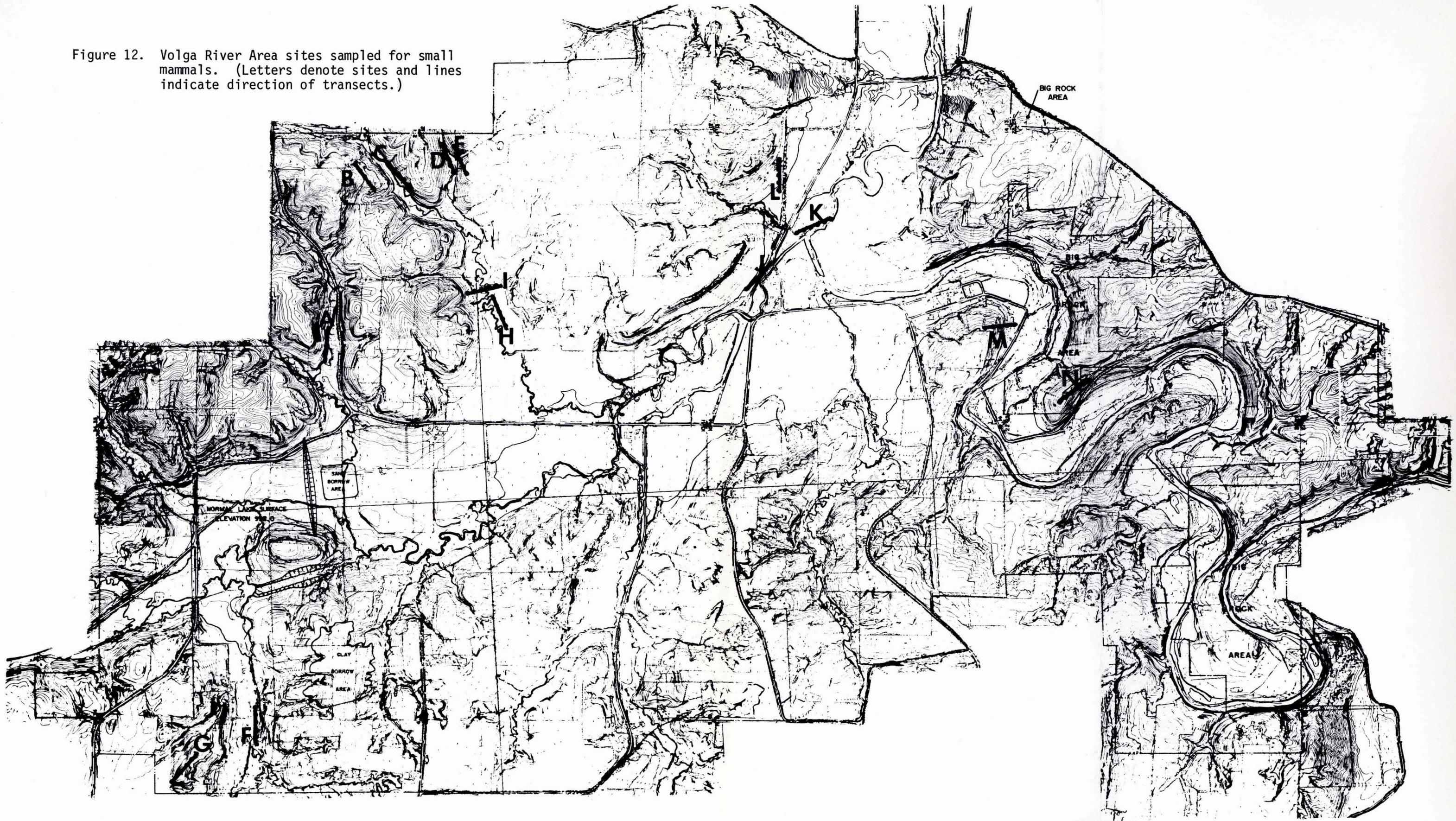
Trapline L. Located in SE 1/4, NE 1/4, Sec. 14 (Figure 12). Old field border and ditch along abandoned roadway on Jacwin loam soil. Typical plant species were elm, ironwood, sumac, boxelder and mixed grasses. Trap line was operated for two consecutive days and population was estimated at 8.3/1000 M².

Trapline M. Located in SW 1/4, SW 1/4, Sec 14 and NW 1/4, NW 1/4, Sec. 23 (Figure 12). A south facing spring flow area on a Rock outcrop-Nordness complex soil with a 25 percent slope. Typical plant species were sedge, raspberry, ribes, jewel weed, boxelder, walnut and white oak on upper elevations. Trap line was operated for three consecutive days and population was estimated at 3.3 animals/1000 M².

Trapline N. Located in SW 1/4, SW 1/4, Sec 23 (Figure 12). A deciduous forest ridge opening on a Rock outcrop-Nordness complex soil. Ridge top was nearly level and opening faced west. Typical plant species included juniper, basswood, white oak and some grasses. Trapline was operated for three consecutive days and population was estimated at 10.8 animals/1000 M².

No endangered or threatened species of small mammals were captured at Volga River during June 1978. More extensive field studies dealing only with

Figure 12. Volga River Area sites sampled for small mammals. (Letters denote sites and lines indicate direction of transects.)



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Table 17. Species and numbers of small mammals captured on fourteen trap lines at the Volga River Recreation Area, June 1978.

Species	Scientific name	Small mammal traplines													
		A	B	C	D	E	F	G	H	I	J	K	L	M	N
Masked Shrew	<u>Sorex cinereus</u>	5								2			4		
Short-tailed Shrew	<u>Blarina brevicauda</u>		1	1							1	1			
White-footed Mouse	<u>Peromyscus leucopus</u>	2		12	7	14	3	7	3	4	26	18	5	3	14
Deer Mouse	<u>Peromyscus maniculatus</u>	2	1		1		5		3	5			2	1	2
Meadow Vole	<u>Microtus pennsylvanicus</u>	6	1				3			3	1		1	1	
Jumping Mouse	<u>Zapus hudsonius</u>	1					1			1					
Total catch/percent success		16 13.3	3 3.3	13 11.0	7 5.8	14 11.7	12 13.3	7 7.8	6 6.7	16 17.8	28 31.1	19 31.7	12 20.0	5 5.6	16 17.8

small mammals may locate rare species at some future date. It appears that the Deer Mouse, White-footed Mouse, Masked Shrew, Short-tailed Shrew and Meadow Vole are common at Volga River. The Meadow Jumping Mouse is reasonably common at Volga River, but it is not captured that frequently in northeastern Iowa. Several records (Hoslett, 1965), exist for Allamakee and Winneshiek Counties during the 1930's and 1940's but I have taken this species in Winneshiek County on only four occasions since 1966. No jumping mice have been reported from Fayette County prior to the present study when specimens were captured at three different sites (Table 17). At present this species should be considered the most unusual small mammal at Volga River.

A brief natural history of the most common small mammals at Volga River is presented below. It is hoped this information is of value in designing interpretive material if an education or public information function evolves as a part of the Volga River Recreation Area development plan. Species specific locations can be obtained by consulting Table 17 in conjunction with Figure 12.

1. Masked Shrew (Sorex cinereus). Species is fairly common in moist grassy areas such as sedge meadow associations and prairie thickets on uplands. It is also found in upland forests and along roads or abandoned right-of-ways at Volga River. This shrew weighs about 3.5 grams and its small size and secretive habits make it seldom seen. This carnivorous gray-brown species remains active year around to forage for the relatively tremendous amount of food required to keep it alive.

2. Short-tailed Shrew (Blarina brevicauda). Distributed throughout the project area and seems to be characteristic of all plant associations on lowlands, hillsides and uplands except where the soil is bare and sandy or where soil is absent in rocky ledges and crevices. Species is most common in wooded areas. This shrew has a home range of about half an acre where it hunts insects, mollusks, spiders and other small mammals. In the winter it works

through leaves under snow hunting for dormant invertebrates. It makes a nest of dry leaves and grass generally located under old logs or stumps. This is the largest shrew present at Volga Lake yet weighs only about 22 grams.

3. Deer Mouse (Peromyscus maniculatus). This mouse occurs commonly in bottomland sedge meadows, mudflat and upland prairie associations and in cultivated fields. It's favorite habitats are weed patches, tall-grass prairies and grassy tangles along fence rows. It is not so common in thickets and the borders of open woods. When spring floods cover its flood-plain habitat the deer mouse often seeks safety on rafts of debris rather than attempting to emigrate from flooded areas (Hoslett 1965). This mouse has an aversion for water and is not so adept at swimming even though it is a common resident on flood plains. This species has a home range of about one acre where it may have several ground burrows. It is a vegetarian, eating grains, grass, berries, and other available plant material.

4. White-footed Mouse (Peromyscus leucopus). As far as actual numbers of individuals this is probably the most abundant mammal at Volga River. It is also the species which inhabits the greatest number of plant associations. This species may be found in the following associations: semiaquatic, mud flat, willow-maple, elm-ash, oak-hickory, linden-maple, upland thicket, conifer and rock slope. The preferred habitats appear to be deciduous woods and brushy areas. Species was common along Volga River and Frog Hollow Creek flood plain borders. White-footed mice range over an acre and a half area and commonly nest on the ground or in an old hollow stump, log, or tree cavity. These mice are good climbers and spend some of their time in trees. They are vegetarians.

5. Meadow Vole (Microtus pennsylvanicus). A common resident of such bottomland associations as the semiaquatic, mud flat, and willow-maple which are not ordinarily affected by high water. The meadow mouse is also abundant in the upland associations where it favors prairies and prairie ridges, but is

also present around thickets and in open woods bordering grass lands. At times this species is very abundant and seems to emigrate from an area. In early spring 1966 the Meadow Vole was so common in the grass along the Upper Iowa River that 63 were captured live by hand in about ten minutes. These vegetarians occupy a home range of about a half acre. After the White-footed Mouse, they are the next most abundant mammal at Volga River.

6. Meadow Jumping Mouse (Zapus hudsonius). Distribution and abundance seems to be sporadic in northeastern Iowa. Preferred habitats are mud flat and willow-maple associations, upland prairies, thickets and oak-hickory associations; prairie grasses and thickets are favorite habitats. This species has a 5 inch (125 mm) long tail and large powerful hind feet. Specimens can jump several feet into the air when chased or alarmed. Species ranges up to three acres and unlike other mice at Volga River it hibernates underground from late fall to early spring.

B. Threatened, rare or unusual mammals.

No mammals listed as endangered or threatened by Roosa (1977) were observed at Volga River during June 1978 and early June 1979. Several species on the Iowa threatened list may ultimately be found at Volga River; however, verification will require extensive fieldwork and perhaps a bit of luck.

The following threatened species may find suitable habitat at Volga River and may be present even though they were not found during this study.

1. Least Shrew - Status listed as undetermined by Roosa (1977). Hoslett (1965) claimed this species could be expected to occur in northeast Iowa and Bowles (1977) indicates part of Fayette County is acceptable habitat. No published records occur for northeastern Iowa or adjoining counties of Minnesota (Gunderson and Beer, 1953). Species probably is absent at Volga River.

2. Keens Myotis - Bowles (1975) claims the distribution of this bat is probably statewide; however, little is published or even known about its natural

history in Iowa. It is speculated that the Keens Bat may have a distribution similar to the Little Brown Bat which is widely distributed in Iowa and common at Volga River. Species taken in Iowa during the summer have all been captured over woodland streams - a habitat which is abundant at Volga River. Several hibernating specimens have been collected in eastern Iowa caves.

3. Plains Pocket Mouse - Range maps for this species include Fayette County; however, no recorded specimens exist from the county. Specimens have been collected nearby in Northwest Delaware County. Hoslett (1958) speculates that this species may be present as a rare mammal in northeastern Iowa but found more in Winneshiek or Allamakee counties. Its preferred habitat, ungrazed, grassy slopes on loess bluffs and sandy open areas, would seem to be present at Volga River in section 11.

4. Black Bear - Since 1965 several bear sightings have been reported in northeastern Iowa. Bowles (1975) reports sightings from Winneshiek, Allamakee, Fayette, Buchanan, and Delaware Counties. Many of these reports are by competent observers and in at least one case hair samples and plaster of paris casts of footprints were collected. A proposed explanation is that bears captured in Minnesota and released in Missouri or Arkansas are "homeing" back to Minnesota after completing the long journey home. The hardwood forests and wooded river valleys at Volga River would seem to be ideal habitat for bears but their presence at Volga River, other than for accidental wandering, seems extremely unlikely.

5. Ermine - Status listed as undetermined by Roosa (1977). Distribution and natural history not well known in Iowa. A single specimen has been reported from Dubuque County but none from Fayette, Winneshiek, Allamakee or Clayton Counties. Range map for this species by Bowles (1975) includes Fayette County. It seems very unlikely that this weasel is present at Volga River.

6. Long-tailed Weasel - Roosa (1977) lists status of this weasel as undetermined. It appears (Bowles 1975) that two subspecies occur in northeastern

Iowa. Species has been recorded in Fayette, Winneshiek and Allamakee Counties. Species frequents bushy areas in willow-maple associations along rivers and adequate habitat appears to be present at Volga River. Species is very likely present at Volga River.

7. Spotted Skunk - Status listed as undetermined by Roosa (1977). Literature records exist for Allamakee, Winneshiek and Fayette Counties. (Hoslett, 1965 and Bowles, 1975). This species prefers open and broken country to heavily forested areas. Hoslett (1965) reported capturing a specimen in a lowland field. Ripple (1972) states spotted skunk occurs in all areas in northeast Iowa away from dense timber. This species is probably present at Volga River. Limited agricultural activities in lowland areas probably benefit this species.

8. River Otter - Status in Iowa listed as threatened by Roosa (1977). Literature records exist from Allamakee, Dubuque and Delaware Counties. Hoslett (1965) states that individuals have been reported occasionally from rivers of eastern Iowa and the Upper Mississippi Valley in general. No Fayette County records exist for this species. The presence of River Otter in the Volga River in Fayette County is unlikely but not impossible. Ripple (1972) indicates species may occur in eastern Fayette County.

9. Bobcat - Status listed as endangered in Iowa by Roosa (1977). Bowles (1975) claims species is fairly common in northeastern part of Iowa. Ripple (1972) reports species as rare in all areas of northeast Iowa. Published records exist for Allamakee, Clayton, Dubuque and Delaware Counties. Cat "screams" and cat sign are occasionally reported by hikers and hunters in northeastern Iowa. Its preferred habitat, wooded river bottoms, are available at Volga River and the Bobcat may be present. If additional studies confirm its presence all precaution should be taken to assure its survival at Volga River.

C. Common mammals.

A brief natural history of the most common intermediate and large mammals

is presented below. It is hoped this information is of value in designing interpretive material if an education or public information function evolves as a part of the Volga River Recreation Area development plan. A brief status summary of each species is presented in Table 18. The reader should consult Knutson's vegetation report for locations of the preferred habitats listed below for each species.

1. Opossum (Didelphis virginiana). A species becoming more numerous in northeastern Iowa. Preferred habitats are willow-maple associations along the Volga River and Frog Hollow Creek and the edges of oak-hickory associations. Opossums also are found in vicinity of agricultural and residential buildings. Human disturbance of the environment probably make conditions more suitable for opossums. Hollow trees, brush piles, old burrows and buildings are favorite home sites. This is a southern adapted species and specimens observed in northeast Iowa often have portions of the ears and tail frozen. Food is no problem for the opossum at Volga River since its diet includes carrion, fruit, nuts insects, birds, small mammals and about anything else that is available. No opossums were observed at Volga River during routine field work but they are secretive and should still be considered common in the area.

2. Little Brown Bat (Myotis lucifugus). This bat is a common resident in summer at Volga River and in northeastern Iowa. The preferred habitats are hollow trees, beneath loose bark, in caves and around buildings especially near the Volga River and Frog Hollow Creek. This bat is found regularly in most Mississippi River area caves during winter and often in summer. It is commonly observed at dusk flying overhead at the Albany campground at Volga River.

3. Big Brown Bat (Eptesicus fuscus). A common resident at Volga River. This and the Little Brown Bat are the two most common bats in the area and in northeastern Iowa. This bat prefers residences in hollow trees, caves or crevices in limestone cliffs, but also is a fairly common resident of buildings,

in attics of houses or peaks of barns.

4. Cottontail (Sylvilagus floridanus). A common species at Volga River although populations fluctuate from year to year. Rabbits are found in many habitats including weed patches on the Volga River and Frog Hollow flood plain, beneath juniper mats on prairie ridges, in weedy thickets on the upland prairies and broken deciduous forests and in pine areas on hillsides. At Volga River this species favors weed patches and brushy areas occurring on the flood plains and on the lower portions of valley slopes. During winter cottontails may be very destructive to tree plantings because they eat twigs and bark, but in summer they prefer green vegetation. The Cottontail is the most important single game species in the United States and also is an important source of food for the Red Fox and Great-horned owl.

5. Woodchuck (Marmota manax). A common species at Volga River on farmland as well at edges of clearings. Occasionally observed in rather heavy deciduous woodland, prairie areas and prairie thickets. Its requirements seem to include land high enough to prevent flooding of its burrows and at least some brushy growth for protective cover; however, Hoslett (1965) found several burrows in bottomland willow-soft maple associations. Its habitat must be open enough for the growth of grass, clover and other plants used for food. The rocky and wooded slopes bordering area rivers and streams are favorite habitats. This species is also found in sink holes which have some concealing vegetation. Woodchucks are mammals worth emphasizing in displays and educational brochures because they are more active during the daytime than at night and people see them and speculate about their identification and habits. This is the largest member of the squirrel family at Volga River.

6. Thirteen-lined Ground Squirrel (Spermophilus tridecemlineatus). A common species along roadsides, open areas, pasture and grasslands areas at Volga River. It occurs infrequently along the borders of open woods and thickets adjacent to grassy areas. Species is usually not found in valley flood plains

subject to frequent inundation. This species hibernates from about mid October to late March in shallow simple burrows which it digs. This is an omnivorous rodent which feeds on road kills and animals as well as vegetation. It is a good species to feature in educational displays because it is common, easily observed during daylight hours and displays interesting behavior patterns.

7. Eastern Chipmunk (Tamias striatus). A common species in the mixed hardwood forests in summer at Volga River where it lives on nuts and berries. Species favors locations having rocky ledges and also "deep" woods having a thick layer of humus and numerous fallen logs. The chirping sounds of the chipmunk are often mistaken for bird calls by those unfamiliar with its voice. A good species to feature in outdoor education displays because it is common, active during daylight hours, and highly visible to anyone moving carefully along a woodland trail. Individuals tend to put on a "good show" for observers and people are naturally attracted to these "cute little animals" of the woods.

8. Gray Squirrel (Sciurus carolinensis). A common species at Volga River in its preferred habitat of rugged, unbroken deciduous woodland. Species eats buds, seeds, acorns and nuts. It builds a conspicuous leaf nest or lives in a hollow within the main trunk of a tree. Hoslett (1965) reported this species in bottomland willow-maple associations in northeastern Iowa, but they appear to be more at home in upland oak-hickory associations. A fine game animal which can stand considerable hunting pressure at Volga River. The total squirrel population (Gray and Fox) at Volga River is hard to determine, but my gross estimate based on observed density and available habitat is between 2000 and 3000 animals. Hunting of this species should be encouraged at Volga River if it is to be managed as a multiple-use recreation area.

9. Fox Squirrel (Sciurus niger). Common residents of willow-maple, sedge-meadow, oak-hickory and hard maple associations at Volga River. Habitats on valley slopes and uplands are preferred. This species does not require large

areas of woods and seems to prefer woodlots, a single tree near a cornfield or open upland groves of oak and hickory. Campers at the Albany area at Volga River in June 1978 and 1979 seemed to enjoy the fox squirrels making themselves right-at-home in the campground area. A highly visible species in the central valley at Volga and an ideal species to feature in educational material. Many Iowans call this the "red" squirrel and confuse it with the more northern Tamiasciurus. Some education is needed. If an education center is part of the plan at Volga River a display featuring the common ground and tree squirrels would be valuable. This is a valuable game species and the population at Volga River can stand fair hunting pressure. The interspersed agricultural areas, grass seedings and woodland at Volga River make it ideal for both Fox and Gray squirrels.

10. Southern Flying Squirrel (Glaucomys volans). This species prefers the dense woods of the oak-hickory association, but is also found in more open habitats if hollow trees are present. Species has also adapted to dwellings and Hoslett (1965) reported collecting 15 specimens from an attic. Species may be on increase in northeastern Iowa since several have been collected during 1978 and 1979. Bowles (1975) states that species is common in forests of eastern Iowa. Species is nocturnal and specimens are rarely seen except when nest tree is disturbed.

11. Pocket Gopher (Geomys bursarius). A resident of both valley and upland associations at Volga River. Seems to prefer dark colored soils which are not firmly packed. At Volga River its mounds are most common in meadows, cultivated field borders, and on upland openings. It is traditionally considered a grassland species, but it has responded positively to agriculture. From an educational standpoint this species is an excellent example of how "sign" can be used to determine an animal's presence in an area. Activity centers are predictable enough so that nature trails can be planned to pass nearby. Some

agricultural activity at Volga River no doubt benefits this species.

12. Beaver (Castor canadensis). A locally common resident of river and stream areas at Volga River if an adequate supply of food is present. Favorite foods are bark of aspen, willow and to a lesser extent hardwoods. Many herbaceous plants, underwater tubers and rhizomes are also eaten. Volga River beavers make their homes in stream bank dens rather than in the traditional deep water lodge. Beavers along Frog Hollow Creek build numerous dams to conserve their water supply. During June 1978 a beaver dam measuring 30 meters in length blocked Frog Hollow Creek in the extreme east central area of section 4. Several dams (parts of 17) were removed from Frog Hollow during construction. Small beaver dams were found during September 1978 along the lower reaches of Frog Hollow in sections 11 and 14. Nature trails should be located to offer Volga River visitors a chance to view the remarkable selection of site and material necessary to construct a beaver dam. The stability of water levels will probably determine the future of beaver colonies in the upper reaches of the new Volga Lake. Substitute habitats are available and no real dislocation problems are anticipated by lake construction. Our largest rodent is an ideal "education species" and interpretive material should be incorporated into any displays which are ultimately constructed at Volga River.

13. Muskrat (Ondatra zibethicus). A common resident of the semiaquatic associations at Volga River. A lack of suitable standing ponds with their characteristic vegetation forces Volga River muskrats to den in river and stream banks rather than in constructed huts. Some authors (Gunderson and Beer 1953) feel muskrats actually prefer bank dens over huts. If the observer exercises a bit of patience muskrats can be seen almost anywhere along Frog Hollow or the Volga River if suitable den sites and some emergent or nearby vegetation is present. Favorite foods are the stems, leaves, rhizomes or tubers of aquatic plants although occasionally freshwater clams and terrestrial plants are also eaten. Species is Iowa's most valuable fur-bearer. The muskrat is a good

"education species" because it is common, highly visible, and easily recognized. If education is a priority at the Volga River Area the muskrat should be a featured species.

14. Coyote (Canis latrans). At present only occasional coyotes are seen in northeastern Iowa. Several newspaper accounts have reported coyotes from Allamakee, Winneshiek and Fayette Counties during recent years (1970-1976). No evidence of coyotes were obtained during my study, but it is probable coyotes are present at Volga River from time to time. Ripple (1972) states that the coyote ranges over all of northeastern Iowa.

15. Red Fox (Vulpes vulpes). A common resident of Fayette County and the Volga River Area. Ripple (1972) indicates the species is most abundant in the western half of Fayette County with moderate populations in the east central part of the county. Species prefers rolling farmland mixed with streams, wooded areas and marshes. Hoslett (1965) reported several red foxes in oak-hickory woods in Winneshiek County. Dens are often found in protected rock heaps or on open slopes under ledges in wooded areas. This species is most active at night, but may be seen hunting or traveling at any time of day. Fresh meat makes up the bulk of the diet, but berries, fruits, and nuts are also eaten, Rabbits and mice are preferred food and the Red Fox is much hailed for its skill as a mouse-catcher. When pursued this species prefers to stay above ground and make its moves while the related Gray Fox takes refuge in a tree, den, or crevice. Many activity areas and frequent sightings occurred in the NE 1/4, Sec. 15, and SW 1/4, Sec. 14 during summer 1978.

The great public misunderstanding of the role of predators in natural ecosystems makes this an ideal species to feature at nature centers or in educational wildlife brochures.

16. Gray Fox (Urocyon cinereoargenteus). Habitat and food habits much like Red Fox with similar abundance. Animal seems to prefer brush country and avoids rolling farmland. It invariably selects an area fairly heavily covered

with woods or rocky brushland to dig its home. Several dens were discovered in dense brush within oak-hickory associations at Volga River. It also may den in hollow trees, in sandy ground, or caverns in rocks. Rippel (1972) reports species has its highest density in the eastern half of Fayette County. This species is shy, most active at night and thus is seldom seen. It has the same education potential as the Red Fox listed above.

17. Raccoon (Procyon lotor) The most common medium-sized mammal at Volga River. It is impossible to walk 100 feet along any watercourse at Volga and not observe flat-footed tracks of the Raccoon. Species is very partial to stream banks and lowlands near water, but is also active in the upland oak-hickory associations. It eats fish, crayfish, frogs, insects, eggs, fruits and vegetables. During August it feeds heavily on field corn if it is available close to its favorite habitats. Prefers to den in hollow trees, but also uses ground dens. This is an important game species at Volga River. "Coon hunting" is a very popular recreational activity in northeast Iowa and the raccoon population at Volga River can support significant hunting and trapping pressure. The raccoons nocturnal habits prevent many recreationists from enjoying it; however, it is a widely recognized species and should be a featured species in any educational program. It would be almost impossible to design a nature trail at Volga which doesn't bring a hiker into raccoon habitat at some point.

18. Mink (Mustela vison). Locally common at Volga River at preferred stream habitats and in other amphibious locations. The mink is an opportunist and feeds on animals most readily available. Crayfish, frogs, fish and mice probably make up the bulk of the diet. Most dens are found in stream bank burrows, rock crevices or in hollow trees. Old muskrat holes and log jams along water courses are frequently used by mink. The mink is secretive and travels mainly at night so it is seldom observed by casual visitors at Volga River.

19. Badger (Taxidea taxus). A fairly common resident in suitable open country at Volga River. This species avoids heavily wooded areas and is not considered abundant in northeast Iowa. It seems to prefer habitats which are also suitable for ground squirrels and pocket gophers. Badgers dig extensively for their favorite foods; ground-dwelling rodents. They also dig burrows for use as homesites. Badgers are not often observed; however, their excavating activity is obvious. The best area for seeing badgers at Volga River is in the sandy-woodland border areas of section 11. The last sighting during our field study was in early June, 1979.

20. Striped Skunk (Mephitis mephitis). A common species at Volga River. It seems to prefer brush areas and rough lands to heavily forested areas or prairies. Hoslett (1965) reported capturing specimens in sedge-meadows, oak-hickory woodlands and bottomland associations. Ripple (1972) states that species is common over all areas of northeast Iowa and that is preferred habitat is loosely defined. During June 1978 this species was a persistent predator on numerous clutches of turtle eggs at a sand slope area in the NW 1/4, Sec. 11.

21. White-tailed Deer (Odocoileus virginianus). Common at Volga River. Seems to prefer habitats where cropland, grassland and second growth woodlands are well distributed. Several time-area and pellet counts were attempted to measure population density at Volga River but all proved ineffective. A number of 20 minute line transectwalks along stream valleys were undertaken and all deer tracks crossing the survey line were counted. An average of seven sets of tracks per transect was recorded. Extrapolation to an area the size of Volga River is difficult but I would estimate a deer herd of from 50 to 70 animals on the area throughout the year. At least one animal was observed on nearly every visit to Volga River during June 1978 and 1979. Several fawn were observed during the third week of June, 1978. No recreation survey was attempted but the number of tree stands observed in the flood plain woodlands and along forest draws indicates heavy hunting pressure on deer at Volga River. The

Table 18. Mammal species that occur or which may occur at the Volga River State Recreation Area.^{1,2,3}

Common name	Scientific name	Status at Volga River
Virginia Opossum ⁴	<u>Didelphis virginiana virginiana</u>	Common
Masked Shrew	<u>Sorex cinereus haydeni</u>	Common
Short-tailed Shrew	<u>Blarina brevicauda brevicauda</u>	Common
Least Shrew	<u>Cryptotis parva parva</u>	Not observed. No Fayette County records. Presence unlikely.
Eastern Mole	<u>Scalopus aquaticus machrinoides</u>	Common
Keens Myotis	<u>Myotis keenii septentrionalis</u>	Not observed. No Fayette County records. May be present.
Little Brown Bat	<u>Myotis lucifugus lucifugus</u>	Common
Indiana Bat	<u>Myotis sodalis</u>	Not observed. No Fayette County records. Presence unlikely.
Silver-haired Bat	<u>Lasionycteris noctivagans</u>	Not observed. Probable summer resident.
Eastern Pipistrelle Bat	<u>Pipistrellus subflavus subflavus</u>	Not observed. Reported in Fayette Co. May be present.
Big Brown Bat	<u>Eptesicus fuscus fuscus</u>	Common
Red Bat	<u>Lasiurus borealis borealis</u>	Not observed. May be present in summer.
Hoary Bat	<u>Lasiurus cinereus cinereus</u>	Not observed. May be present in summer.
Eastern Cottontail ⁴	<u>Sylvilagus floridanus mearnsii</u>	Common
White-tailed Jack Rabbit	<u>Lepus townsendii campanius</u>	Not observed. Reported in Fayette Co. May be present.
Eastern Chipmunk	<u>Tamias striatus grieseus</u>	Common to abundant

Table 18. (continued)

Common name	Scientific name	Status at Volga River
Woodchuck ⁴	<u>Marmota monax monax</u>	Common
Franklin's Ground Squirrel	<u>Spermophilus franklinii</u>	Not observed. No Fayette County records. Presence unlikely.
Thirteen-lined Ground Squirrel	<u>Spermophilus tridecemlineatus tridecemlineatus</u>	Common to abundant
Gray Squirrel ⁴	<u>Sciurus carolinensis pennsylvanicus</u>	Common
Fox Squirrel ⁴	<u>Sciurus niger rufiventer</u>	Common
Red Squirrel	<u>Tamiasciurus hudsonicus minnesota</u>	Not observed. No Fayette County records. Presence unlikely.
Southern Flying Squirrel	<u>Glaucomys volans volans</u>	Common.
Plains Pocket Gopher	<u>Geomys bursarius majusculus</u>	Common to abundant
Plains Pocket Mouse	<u>Perognathus flavescens perniger</u>	Not observed. No Fayette County records. Presence unlikely.
Beaver ⁴	<u>Castor canadensis missouriensis</u>	Common
Western Harvest Mouse	<u>Reithrodontomys megalotis dychei</u>	Not observed. No Fayette County records. May be present.
White-footed Mouse	<u>Peromyscus leucopus noveboracensis</u>	Common
Deer Mouse	<u>Peromyscus maniculatus bairdii</u>	Common
Southern Bog Lemming	<u>Synaptomys cooperi gossii</u>	Not observed. No Fayette County records. Presence unlikely.
Prairie Vole	<u>Microtus ochrogaster ochrogaster</u>	Not observed. No Fayette Co. records. May be present
Meadow Vole	<u>Microtus pennsylvanicus pennsylvanicus</u>	Common

Table 18. (continued)

<u>Common name</u>	<u>Scientific name</u>	<u>Status at Volga River</u>
Woodland Vole	<u>Microtus pinetorum nemoralis</u>	Not observed. No Fayette County records. May be present.
Muskrat ⁴	<u>Ondatra zibethicus zibethicus</u>	Common
Meadow Jumping Mouse	<u>Zapus hudsonius intermedius</u>	Uncommon
Coyote	<u>Canis latrans thomasi</u>	Uncommon
Red Fox ⁴	<u>Vulpes vulpes regalis</u>	Common
Gray Fox ⁴	<u>Urocyon cinereoargenteus ocythous</u>	Common
Black Bear	<u>Ursus americanus americanus</u>	Absent
Raccoon ⁴	<u>Procyon lotor hirtus</u>	Abundant
Ermine	<u>Mustela erminea bangsi</u>	Not observed. Presence unlikely.
Long-tailed Weasel	<u>Mustela frenata</u>	Not observed. Published Fayette County record. May be present.
Least Weasel	<u>Mustela nivalis campestris</u>	Not observed. Published Fayette County record. Probably present.
Mink ⁴	<u>Mustela vison letifera</u>	Common
Badger ⁴	<u>Taxidea taxus taxus</u>	Common
Spotted Skunk	<u>Spilogale putorius interrupta</u>	Not observed. Published Fayette County record. May be present.
Striped Skunk ⁴	<u>Mephitis mephitis hudsonica</u>	Common
River Otter	<u>Lutra canadensis canadensis</u>	Not observed. Presence unlikely.
Bobcat	<u>Lynx rufus rufus</u>	Not observed. May be present.

Table 18. (continued)

Common name	Scientific name	Status at Volga River
White-tailed Deer ⁴	<u>Odocoileus virginianus macrourus</u>	Abundant
Introduced Mammals House Mouse	<u>Mus musculus</u>	Common
Norway Rat	<u>Rattus norvegicus</u>	Common

1. Subspecies names from Bowles, 1975.

2. Code for status rankings

Abundant - specimens or sign obvious on each visit to Volga River during June 1978 even if specific search was not undertaken.

Common - specimens or sign could be located on most visits during June 1978 or from literature records on species occurrence and population levels in N.E. Iowa.

Uncommon - specimens or sign almost never observed during June 1978 or from literature records on species occurrence and population levels in N.E. Iowa.

Not observed - specimens or sign not observed during present study.

Presence unlikely - species probably absent based on lack of visual sightings, lack of published distribution maps and absence of specimens from Fayette County in collections.

May be present - species not observed on area but published distribution maps and presence of specimens from Fayette County in collections indicate species is probably present.

Reported in Fayette Co. - actual specimen from county exist in museum collections.

No Fayette Co. Records - no specimens exist from county in museum collections.

3. References used to determine status in addition to direct observation.

Bowles - 1975, Gunderson and Beer - 1953, Hoslett - 1965, Ripple - 1972, Scott - 1937

4. Denotes a common Volga River Area game species.

habitat seems adequate to support a moderate deer population even with heavy hunting pressure. The habitat could be improved by clear cutting some small areas in larger woodlands and planting permanent grass-legume mixtures along field borders and headlands. The deer is an important educational, recreational and esthetic species at Volga River. Featuring this species in displays, nature centers and brochures is a must.

D. Attitudes of recreationists toward mammals.

A subjective interest inventory for Volga River Area mammals is presented in table 19. It must be emphasized that information in this table is not gathered from field users, but rather a summary of my own interpretations about how people feel about mammals. While my data may be lacking my gut feelings are based on the following: (1) lifelong Iowa residence, (2) professional education in wildlife biology, (3) educator, (4) member of several sportsman and conservation organizations, (5) extensive interaction with eastern Iowans for nearly 20 years. I have tried to be honest in my ratings. If I think a species is perceived as having little value I have rated it esthetically low. The ratings do not necessarily reflect my own feelings. The protectionist would rate all species high in esthetic value, while the sportsman would rate all game species high in the hunting and trapping categories. I suspect most people would much rather learn about white-tailed deer than about masked shrews and so on. The "perfect world" would have all users as true conservationists giving each species a high rating in each category, but this is beyond the scope of reality at Volga Lake, eastern Iowa, or anywhere.

If users set priorities at the Volga River Area I believe the most important mammal species are the ones which receive the most consistently high ratings in the table. These may not be the species of greatest biological significance at Volga River. It strikes me that some of the most biologically significant

Table 19. Estimated interest levels of the user public in the common mammals at the Volga River State Recreation Area.

Species	Interest level for ¹				
	Hunting	Trapping	Education	Photography	Esthetics
Opossum	0	L	M	M	L
Masked Shrew	0	0	L	L	L
Short-tailed Shrew	0	0	L	L	L
Eastern Mole	0	0	M	L	L
Little Brown Bat	0	0	M	M	L
Big Brown Bat	0	0	M	M	L
Cottontail	H	0	H	M	M
Eastern Chipmunk	0	0	M	M	M
Woodchuck	L	0	M	M	M
Thirteen-lined Ground Squirrel	0	0	M	M	M
Gray Squirrel	H	0	H	M	H
Fox Squirrel	H	0	H	M	H
Pocket Gopher	0	M	H	L	L
Beaver	0	M	H	H	M
White-footed Mouse	0	0	M	L	L
Deer Mouse	0	0	M	L	L
Meadow Vole	0	0	M	L	L
Muskrat	0	H	H	M	M
Jumping Mouse	0	0	H	L	L
Coyote	M	M	H	H	L
Red Fox	M	M	H	H	L
Gray Fox	M	M	H	H	L
Raccoon	H	M	H	H	M
Mink	0	H	H	L	M

Table 19, (continued)

Species	Interest level for ¹				
	Hunting	Trapping	Education	Photography	Esthetics
Badger	0	L	H	M	M
Striped Skunk	0	L	M	M	L
White-tailed Deer	H	0	H	H	H

1. Code for interest level

H = High

M = Moderate

L = Low

0 = does not apply

species - Spotted Skunk, Meadow Jumping Mouse, Long-tailed Weasel - will be of little interest to most users. An overall development plan at Volga River must balance the needs of human users with the habitat requirements of the many unique and interesting wild species residing on the area. A state owned area the size of the Volga River Area in northesat Iowa is as important for its role in protecting unique habitats and species as it is for providing recreational, educational and esthic benefits to its users. An imaginative management plan will be required to properly balance all the expressed interests of users with the unexpressed interests of the largely silent wild species residing on the area.

E. Recommendations and management aspects for mammals.

Recommendations and management implications for a number of mammalian species are presented in other sections of this report. I have tried to list preferred habitats for most mammalian species as they were discussed in portions A, B and C of this section. If the Iowa Conservation Commission develops species specific goals at Volga River then specific habitat management must be undertaken to encourage any favored species. Most habitat alterations benefit some species at the expense of others. It is beyond the scope of this study to suggest what the overall goals at Volga River should be and which species should be encouraged at the expense of others. My own preference is for balanced natural ecosystems with enough management to maintain maximum habitat diversity.

The following recommendations are presented in addition to suggestions within the text of this report.

1. The probability of endangered or threatened mammals occurring at Volga River is fairly high even though none were encountered in this study. The Iowa State Conservation Commission should encourage research projects, study reports and incidental observations on the mammals at Volga River to uncover more in-

formation and documentation on threatened or endangered mammals.

2. The modification or elimination of normal agricultural practices will have long term effects on wildlife. Short term effects of land abandonment will increase some forms of wildlife. As areas advance in successional stages both number and species diversity will probably decrease. Most wildlife species benefit from controlled agricultural practices. Removing agricultural practices will have deleterious effects upon many wildlife species by reducing edge, lowering habitat diversity, and eliminating food and cover. It is recommended that moderate amounts of farming subject to good soil conservation practices be continued at Volga River when it can be demonstrated that wildlife will benefit from it.

3. Adopt management practices which will maximize edge or ecotone habitats.

4. Increase beneficial vegetation plantings for wildlife (cover and food)

5. Encourage willow to become established in upper reaches of Volga Lake for beaver and muskrat.

6. Encourage and maintain grassland areas. Controlled burning in several areas will encourage native prairie species (See Knutson report).

7. Control human influences at times of wildlife mating, nesting, and brood development. This might entail closing some trails or particularly crucial areas from time to time.

8. Limit snowmobiles and other recreational vehicles to established trails at all times. ISCC wildlife biologist should be consulted when planning vehicle trails in order to minimize disturbance to prime wildlife habitats.

9. Limit most construction type development (docks, boat landing facilities, campgrounds, nature center etc.) to the central valley area at Volga River. This will afford maximum protection to the best wildlife habitats along valley edges, slopes, ridges, draws, watercourses and uplands.

10. Place intensive development along as small a fraction of lake shoreline as possible.

11. Leave dead trees standing except in areas developed for intensive human use. Dead elms in particular are important for den and nest trees.

12. Establish brush and log piles where appropriate by cutting some downed dead trees. This might be especially important to encourage several species of weasels at Volga River if brush piles were sited along watercourses and marsh areas.

13. Maintain a 30-40 foot grassland border around the new lake. Protect this strip from fire and mowing during the breeding season.

14. Manage several natural seep areas to increase marsh habitat. Area along gravel road in S 1/2 of section 2 might be a good place to try some management.

15. Continue to prohibit grazing by domestic livestock.

16. Encourage nut tree crops by selective tree thinning.

17. Control game harvests if necessary to maintain desired population levels. This might be most important for deer and turkey if hunting pressure and harvest levels become excessive.

18. Create openings in some dense timber stands to encourage wildlife. This should not be done in woodland areas which are important type localities for mature plant associations.

19. Incorporate wildlife material into all trail guides, leaflets, and booklets to be used by the public at Volga River.

20. If an education-nature center function develops at Volga River wildlife materials should be at the heart of the educational enterprise. Section C of this report emphasizes mammalian species which are excellent for outdoor education.

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