

**2008 Lichen Studies in the Mississippi National River
and Recreation Area, Minnesota**

Clifford M. Wetmore
University of Minnesota
St. Paul, MN

January 12, 2009

2008 Lichen Studies in the Mississippi National River and Recreation Area, Minnesota

Clifford M. Wetmore
University of Minnesota
St. Paul, MN

January 12, 2009

Abstract

The lichen flora of Mississippi National River and Recreation Area, Minnesota, was studied by sampling 37 localities along the 110 kilometer long park, resulting in 76 species, which are thought to represent 80% of the complete flora.

Introduction

The Mississippi National River and Recreation Area (MISS) has been the only upper Great Lakes National Park without a lichen study. This project was designed to remedy this by collecting lichens at many localities within the park boundaries along the length of the park. An attempt was also made to find collections for lichen elemental analysis but sufficient material of *Punctelia rudecta* (the selected species, also studied in the St. Croix National Scenic Riverway (Bennett & Wetmore 2004a & b)) was not found.

The park extends into parts of five counties from northwest to southeast for about 110 kilometers along the Mississippi River from the Crow River southeast of Elk River in the northwest to near Hastings in the southeast. The 22,000 hectares within the park's boundaries include many county, city, and regional parks as well as a large amount of private holdings.

NPLichen, the online listing of lichens of the National Parks, listed 126 lichen species in these counties but few of these species were known to be collected within the

park boundaries (NPLichen 2008). The list in *NPLichen* was compiled from specimens in the University of Minnesota Herbarium. The oldest collections were by E. P. Sheldon in 1891. Bruce Fink collected in the area in 1896 (Fink 1897) but the localities given for these are “Minneapolis” and that could be far from the park. Fink (1897) said they were collected “on the outskirts of Minneapolis, or within six miles of Minneapolis”. A few students have collected around St. Paul and Minneapolis between 1976 and 1992 and some of these studies were within present park boundaries. All of these collections are in the University of Minnesota Herbarium and the identifications verified or corrected.

Methods

During June and July, 2008, 511 lichen specimens were collected at 37 localities within the park (Fig. 1 and Appendix 1). There were 13 additional potential localities that were not searched because access was not possible. At each locality a search was made of trees, rocks and the ground for lichens and collections of each species found were made. A GPS waypoint was taken of the area searched using a Garmin Map 76 with WGS 84 map datum. The lichens were returned to the lab for identification and preparation for the herbarium. All vouchers were deposited in the University of Minnesota Herbarium.

Results

There were 76 lichen species found in this study (Table 1). Of the 126 species for the park in *NPLichen*, only 19 were actually in the park and all but one of these (*Leptorhaphis epidermidis*) were found in this study. In the past 100 years it is likely that

many of the old habitats have been destroyed by the metropolitan growth and development, which might explain not being able to find this species.

Most of the localities were in hardwood forests that are very shady with few lichens on the lower trunks of the trees. Occasionally a large fallen tree or fallen branches were found that provided additional species. The open parks usually allowed enough sunlight on the lower trunks and had many lichens. Rocks were found occasionally in the southern part of the study but few were found in the north so the distribution of saxicolous species was affected by availability of substrates.

Discussion

Three of the localities are unusual in the high number of species or the number of singleton species (Table 2) . Anoka Regional Park (Locality 31) was the only site with jack pines and open sandy ground and had several species unique to the park (*Cladonia cristatella*, *Cladonia turgida*, *Diploschistes muscorum*, *Peltigera rufescens*). Coon Rapids (Locality 29) had a brush pile of tree and bushes with many species. Hidden Falls Park (Locality 18) had a fallen large old cottonwood that provided access to the tree top with many species.

No state or national rare, endangered or threatened species were found in this study.

Conclusions

The lichen flora of the Mississippi National River and Recreation Area is typical of the lichen flora of this part of Minnesota (www.tc.umn.edu/~wetmore/Herbarium/)

HERBHOME.htm). The total number of species, 76, is lower than other national parks in the upper Great Lakes region, and significantly lower than the 308 for Saint Croix National Scenic River. The latter park, however, is four times longer and contains much more habitat than MISS. Considering these facts we estimate the completeness of this list to be 80%.

This park, however, is unusual in having an urban area in the center, possibly resulting in decreased lichen diversity. Of note also is the occurrence of only one cyanolichen in the entire park, as compared to over 30 in Saint Croix. These two facts suggest that air quality is a factor, as lichens and particularly cyanolichens are very sensitive to urban air pollutants like sulfur dioxide. Of course there may be other factors affecting lichen diversity in the Twin Cities which need further study. We recommend a more detailed study of a possible air quality relationship with the lichens of this park be undertaken.

Acknowledgements

I thank James Bennett of the Biological Resource Division of the U. S. Geological Survey, Madison, Wisconsin for funding (Purchase Order No. 08NWSA0037) that made this project possible. I also wish to thank the personnel of the park for their encouragement and cooperation especially Nancy Duncan for assistance with permits and to Jim Von Haden for providing the map of the park with the collection localities.

Literature cited

- Bennett, J. P. & Wetmore, C. M. 2004a. 2003 Lichen Studies in St. Croix National Scenic Riverway, Final Report. St. Croix National Scenic Riverway, St. Croix Falls, Wisconsin. 37 pp.
- Bennett, J. P. & Wetmore, C. M. 2004b. Element changes in *Punctelia rudecta* in St. Croix National Scenic Riverway over 13 years. Abstract. National Park Service Western Great Lakes Research Conference, St. Paul, MN.
- Fink, B. 1897. Contributions to a knowledge of the lichens of Minnesota – II. Lichens of Minneapolis and vicinity. Minnesota Botanical Studies 1:703-725.
- NPLichen, A Database of Lichens in the U. S. National Parks. 2008. Version 4.5. U. S. Geological Survey. <http://www.ies.wisc.edu/nplichen>. Accessed Feb. 2008.

Table 1. Lichen species of Mississippi National River and Recreation Area

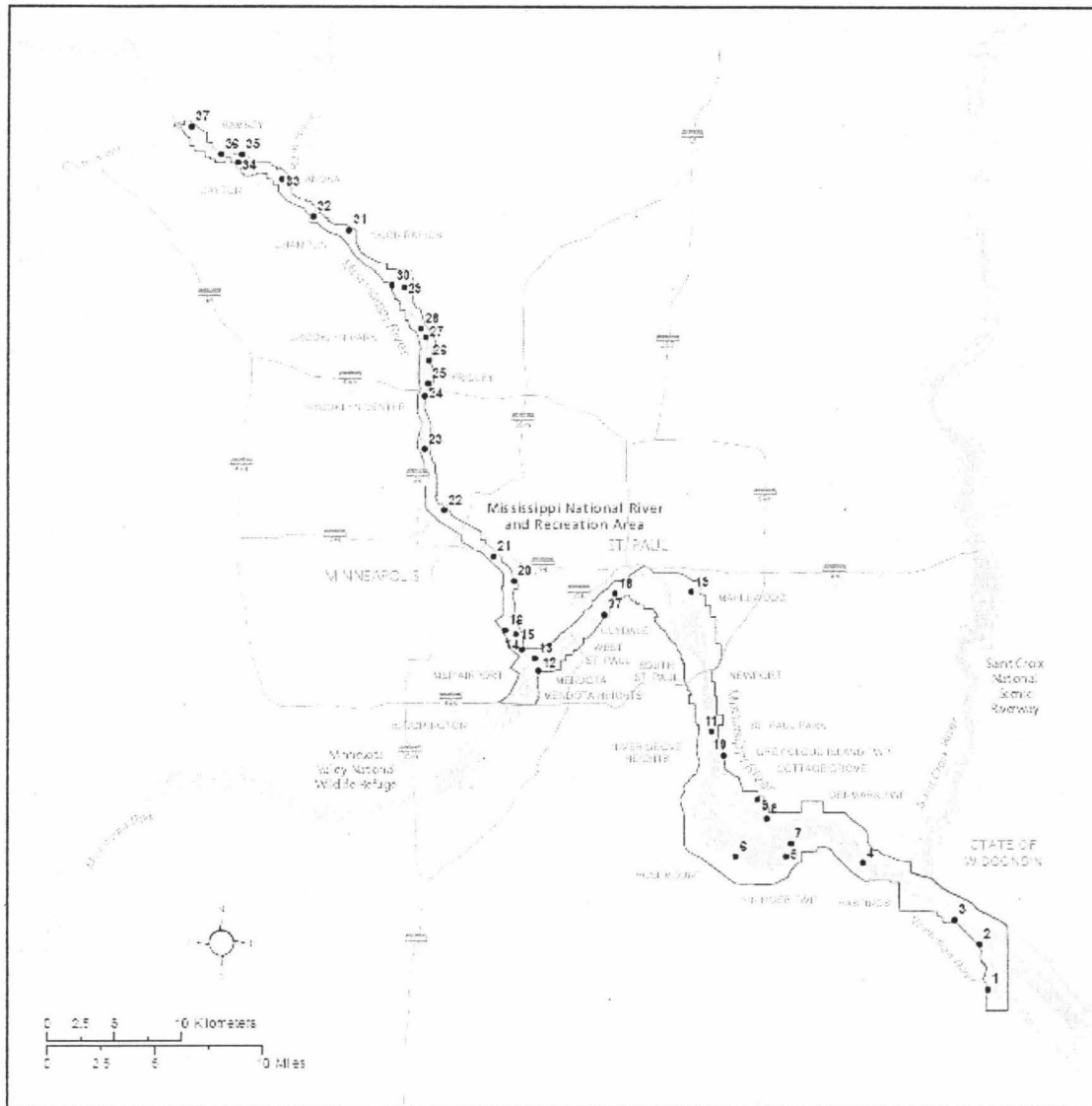
Acrocordia cavata (Ach.) Harris
Amandinea dakotensis (Magn.) P. May & Sheard
Amandinea punctata (Hoffm.) Coppins & Scheid.
Amandinea polyspora (Willey) E. Lay & P. May
Arthonia caesia (Flotow) Körber
Arthonia dispersa (Schrader) Nyl.
Arthonia radiata (Pers.) Ach.
Arthopyrenia punctiformis (Per.) Massal.
Arthrosporium populorum Massal.
Caloplaca cerina (Ehrh. ex Hedwig) Th. Fr.
Caloplaca citrina (Hoffm.) Th. Fr.
Caloplaca chrysophthalma Degel.
Caloplaca crenulatella (Nyl.) Oliv.
Caloplaca flavorubescens (Hudson) Laund.
Caloplaca flavovirescens (Wulfen) Dalla Torre & Sarnth.
Caloplaca holocarpa (Hoffm. ex Ach.) Wade
Caloplaca microphyllina (Tuck.) Hasse
Caloplaca pyracea (Ach.) Th. Fr.
Candelaria concolor (Dickson) Stein
Candelariella aurella (Hoffm.) Zahlbr.
Cladonia chlorophaea (Flörke ex Sommerf.) Sprengel
Cladonia coniocraea (Flörke) Sprengel
Cladonia cristatella Tuck.
Cladonia ochrochlora Flörke
Cladonia polycarpoides Nyl.
Cladonia pyxidata (L.) Hoffm.
Cladonia rei Schaerer
Cladonia turgida Hoffm.
Diploschistes muscorum (Scop.) R. Sant.
Flavoparmelia caperata (L.) Hale
Flavopunctelia flaventior (Stirton) Hale
Flavopunctelia soledica (Nyl.) Hale
Graphis scripta (L.) Ach.
Hyperphyscia adglutinata (Flörke) Mayrh. & Poelt
Hyperphyscia syncolla (Tuck. ex Nyl.) Kalb
Julella sericea (Massal.) Coppins
Lecanora allophana Nyl.
Lecanora dispersa (Pers.) Sommerf.
Lecanora strobilina (Sprengel) Kieffer
Lecanora symmicta (Ach.) Ach.
Lecanora thysanophora Harris in Harris & Tonsb.
Lecidella euphorea (Flörke) Hertel
Lecidella stigmatea (Ach.) Hertel & Leuckert

Lepraria lobificans Nyl.
Myelochroa aurulenta (Tuck.) Elix & Hale
Opegrapha varia Pers.
Parmelia sulcata Taylor
Peltigera rufescens (Weiss) Humb.
Phaeophyscia adiastrata (Essl.) Essl.
Phaeophyscia cernohorskyi (Nadv.) Essl.
Phaeophyscia chloantha (Ach.) Moberg
Phaeophyscia ciliata (Hoffm.) Moberg
Phaeophyscia hirsuta (Mereschk.) Essl.
Phaeophyscia hirtella Essl.
Phaeophyscia melanchra (Hue) Hale
Phaeophyscia orbicularis (Necker) Moberg
Phaeophyscia pusilloides (Zahlbr.) Essl.
Phaeophyscia rubropulchra (Degel.) Essl.
Physcia adscendens (Fr.) H. Olivier
Physcia aipolia (Ehrh. ex Humb.) Fűrnr.
Physcia americana G. Merr.
Physcia millegrana Degel.
Physcia stellaris (L.) Nyl.
Physconia leucoleiptes (Tuck.) Essl.
Placynthiella dasaea (Stirton) Tønsberg
Punctelia bolliana (Müll. Arg.) Krog
Punctelia rudecta (Ach.) Krog
Pyrenula pseudobufonia (Rehm) Harris
Ramalina americana Hale
Trapeliopsis flexuosa (Fr.) Coppins & James
Verrucaria muralis Ach.
Verrucaria nigrescens Pers. ——— *V. glaucovirens*
Xanthomendoza fallax (Hepp) Søchting et al.
Xanthomendoza fulva (Hoffm.) Søchting et al.
Xanthomendoza hasseana (Räs.) Søchting et al.
Xanthomendoza ulophyllodes (Räs.) Søchting et al.

Table 2. Species only occurring once in the park, by geographic third of the park.

North	Middle	South
<i>Arthonia dispersa</i>	<i>Caloplaca flavorubescens</i>	<i>Arthonia radiata</i>
<i>Caloplaca holocarpa</i>	<i>Julella sericea</i>	<i>Caloplaca microphyllina</i>
<i>Cladonia cristatella</i>	<i>Physcia americana</i>	<i>Cladonia coniocraea</i>
<i>Cladonia polycarpoides</i>		<i>Cladonia ochrochlora</i>
<i>Cladonia pyxidata</i>		<i>Myelochroa aurulenta</i>
<i>Cladonia rei</i>		<i>Phaeophyscia adiastola</i>
<i>Cladonia turgida</i>		<i>Phaeophyscia hirtella</i>
<i>Diploschistes muscorum</i>		<i>Placynthiella dasaea</i>
<i>Lecanora allophana</i>		<i>Verrucaria nigrescens</i>
<i>Lecanora dispersa</i>		
<i>Lecanora symmicta</i>		
<i>Lecidella stigmatea</i>		
<i>Peltigera rufescens</i>		
<i>Pyrenula pseudobufonia</i>		
<i>Ramalina americana</i>		
<i>Trapeliopsis flexuosa</i>		
Total: 16	3	9
Localities: 24-37	12-23	1-11

Figure 1 – Map of 2008 lichen collection localities along the Mississippi National River and Recreation Area



Appendix 1. Collection localities

Localities are listed in order by latitude from south to north. The numbers at the beginning of each locality refer to the localities in Fig. 1. The numbers at the end of each locality are the collection numbers of C. Wetmore.

- 1: Dakota Co., Mississippi River National River, 6 mi SE of Hastings along hwy 54 above Vermillion River. Ridge and gully with oak, elm, and hackberry, elev. 770 ft. Sec. 16, T114N, R16W. 7 June 2008. 44°40'19"N 92°45'01"W. 96878-96898
- 2: Dakota Co., Mississippi River National River, River access along Vermillion River (5.5 mi SE of Hastings). Floodplain with cottonwood, silver maple, elm, and boxelder, elev. 675 ft. Sec. 8, T114N, R16W. 7 June 2008. 44°42'07"N, 92°45'28"W 96899-96907
- 3: Dakota Co., Mississippi River National River, Along Vermillion River 3 mi E of Hastings. Floodplain forest with silver maple and boxelder, elev. 680 ft. Sec. 36, T115N, R17W. 7 June 2008. 44°43'05"N, 92°46'53"W 96908-96914
- 4: Dakota Co., Mississippi River National River, NE edge of Hastings at Lock and Dam #2 on Mississippi River. Parkland by river with cottonwood, elm, and silver maple, elev. 680 ft. Sec. 21, T115N, R17W. 7 June 2008. 44°45'22"N, 92°52'01"W 96915-96927
- 5: Washington Co., Mississippi River National River, 3 mi S of Cottage Grove along Mississippi River. West facing hillside to river with boxelder, oak, cherry, and basswood, elev. 720 ft. Sec. 32, T27N, R18W. 10 June 2008, 44°47'09"N, 92°57'23"W. 96928-96943
- 6: Washington Co., Mississippi River National River, Grey Cloud Sci. Nat. Area (2 mi SW of Cottage Grove). Prairie on rolling hills with scattered green ash, elm, and boxelder, elev. 810 ft. Sec. 29, T27N, R21W. 10 June 2008. 44°47'54"N, 92°57'53"W. 96944-96962
- 7: Washington Co., Mississippi River National River, SW edge of St. Paul Park. Old fence around abandoned stockyards, elev. 740 ft. Sec. 13, T27N, R22W. 10 June 2008. 44°49'40"N, 92°59'49"W 96963-96968
- 8: Washington Co., Mississippi River National River, Lion's Levee Park in St. Paul Park on Mississippi River. Park area with open cottonwood and silver maple, elev. 690 ft. Sec. 11, T27N, R22W. 10 June 2008. 44°50'37"N, 93°00'30"W 96969-96974
- 9: Dakota Co., Mississippi River National River, Spring Lake Park at Schaars Bluff. Park area and woods on bluff with basswood, oak, and *Celtis*, elev. 820 ft. Sec. 14, T115N, R18W. 16 June 2008. 44°46'08"N, 92°56'01"W 96975-96987

- 10:** Dakota Co., Mississippi River National River, River access on Spring Lake SE of Lower Grey Cloud Isl. River banks below cliffs with rocks and hardwoods, elev. 740 ft. Sec. 23, T115N, R18W. 16 June 2008. 44°45'37"N, 92°56'17"W 96988-96993
- 11:** Dakota Co., Mississippi River National River, Spring Lake Park at archery range S of Lower Grey Cloud Isl. N facing hillside and river banks with oak, hickory, and basswood, elev. 700 ft. Sec. 21, T115N, R18W. 16 June 2008. 44°45'37"N, 92°59'08"W. 96994-97008
- 12:** Ramsey Co., Mississippi River National River, Battle Creek Park in St. Paul. Gully with stream and hillside with green ash, oak, and cottonwood, elev. 750 ft. Sec. 3, T28N, R22W. 16 June 2008. 44°56'10"N, 93°01'40"W. 97009-97020
- 13:** Ramsey Co., Mississippi River National River, St. Paul at SW end of Harriet Isl. near Kelleys Landing. Lowland forest with cottonwood, green ash, and elm, elev. 690 ft., Sec. 6, T28N, R22W. 18 June 2008. 44°56'05"N, 93°06'01"W. 97021-97026
- 14:** Ramsey Co., Mississippi River National River, Lilydale Bluffs S of St. Paul. Level ledge below bluffs with scattered young cottonwood, green ash, and elm, elev. 790 ft. Sec. 12, T28N, R22W. 18 June 2008. 44°55'14"N, 93°06'39"W. 97027-97046
- 15:** Dakota Co., Mississippi River National River, Fort Snelling State Park in St. Paul along Mississippi River S of Pike Isl. Lowland with cottonwood, boxelder, and silver maple, elev. 800 ft. Sec. 28, T28N, R23W. 18 June 2008. 44°53'01"N, 93°10'21"W. 97047-97055
- 16:** Ramsey Co., Mississippi River National River, Fort Snelling State Park in St. Paul on Pike Isl. Opening in hardwood forest with green ash and elm, elev. 700 ft. Sec. 21, T28N, R23W. 18 June 2008. 44°53'29"N, 93°10'33"W. 97056-97067
- 17:** Ramsey Co., Mississippi River National River, St. Paul, S end of Hidden Falls Park N of Fort Snelling. Lowland in open area with cottonwood, elev. 700 ft. Sec. 20, T28N, R23W. 21 June 2008. 44°53'50"N, 93°11'17"W. 97068-97079
- 18:** Ramsey Co., Mississippi River National River, St. Paul, upper end of Hidden Falls **Park** across river from Minnehaha Park. Swamp area in hardwood forest with cottonwood, silver maple, and green ash, elev. 700 ft. Sec. 17, T28N, R33W. 21 June 2008. 44°54'27"N, 93°11'37"W. 97080-97100
- 19:** Hennepin Co., Mississippi River National River, Minneapolis, Minnehaha Park. Along Minnehaha creek in gully with basswood, green ash, willow, and *Celtis*, elev. 720 ft. Sec. 17, T28N, R23W. 21 June 2008. 44°54'36"N, 93°12'14"W 97101-97113
- 20:** Ramsey Co., Mississippi River National River, Shadow Falls at W end of Summit Ave. Deep ravine with stream and sugar maple, elev. 820 ft. Sec. 5, T28N, R23W. 21 June 2008. 44°56'34"N, 93°11'44"W. 97114-97115

- 21:** Hennepin Co., Mississippi River National River, Minneapolis, park area on Mississippi River S of Franklin Ave. River flats with cottonwood, green ash, and elm, elev. 730 ft. Sec. 31, T29N, R23W. 23 June 2008. 44°57'34"N, 93°12'55"W. 97116-97135
- 22:** Hennepin Co., Mississippi River National River, Minneapolis, near river N of Nicollet Isl. Abandoned factory with cottonwood and elm, elev. 810 ft. Sec. 23, T29N, R24W. 23 June 2008. 44°59'24"N, 93°15'44"W. 97136-97140
- 23:** Hennepin Co., Mississippi River National River, Minneapolis, along river S of St. Anthony Parkway S of bridge. Open parkway with green ash, cottonwood, and boxelder, elev. 850 ft. Sec. 3, T29N, R24W. 23 June 2008. 45°01'51"N, 93°16'52"W. 97141-97146
- 24:** Anoka Co., Mississippi River National River, Fridley, county park just S of I694. Park land along river with cottonwood, green ash, and boxelder, elev. 840 ft. Sec. 22, T30N, R24W. 23 June 2008. 45°03'58"N, 93°16'52"W. 97147-97156
- 25:** Anoka Co., Mississippi River National River, Fridley, Chase Isl. Park. Low island in Mississippi River with open woods with cottonwood, silver maple, boxelder, and green ash, elev. 810 ft. Sec. 22, T30N, R24W. 23 June 2008. 45°04'29"N, 93°16'41"W. 97157-97170
- 26:** Anoka Co., Mississippi River National River, Fridley, Manomen Park near Locke Lake. Park in dense forest with green ash, cottonwood, and boxelder, elev. 830 ft. Sec. 15, T30N, R24W. 29 June 2008. 45°05'24"N, 93°16'39"W. 97171-97183
- 27:** Anoka Co., Mississippi River National River, Fridley, Riverview Heights Park. Park area with silver maple, cottonwood, and green ash, elev. 830 ft. Sec. 3, T30N, R24W. 29 June 2008. 45°06'38"N, 93°17'06"W. 97184-97195
- 28:** Anoka Co., Mississippi River National River, Coon Rapids Dam Park in Coon Rapids. Abandoned, overgrown gravel pits with cottonwood, basswood, green ash, and silver maple, elev. 825 ft. Sec. 35, T31N, R24W. 29 June 2008. 45°08'17"N, 93°18'05"W. 97196-97206
- 29:** Anoka Co., Mississippi River National River, Nature preserve in NW Coon Rapids near Anoka-Ramsey State Junior College. Mixed hardwoods along river, elev. 850 ft. Sec. 17, T31N, R24W. 29 June 2008. 45°10'32"N, 93°21'16"W. 97207-97232
- 30:** Anoka Co., Mississippi River National River, Anoka, Mississippi River Park in NW Anoka. Along river and park area with silver maple, elm, and green ash, elev. 840 ft. Sec. 2, T31N, R25W. 9 July 2008. 45°12'33"N, 93°25'07"W. 97233-97251

31: Anoka Co., Mississippi River National River, Mississippi River Regional Park in NW Anoka N of Cloquet Isl. Sandy area with jack pine, quaking aspen, and elm, elev. 870 ft. Sec. 33, T32N, R25W. 9 July 2008. 45°13'33"N, 93°27'25"W. 97252-97286

32: Anoka Co., Mississippi River National River, 5 mi NW of Anoka. Riverside with silver maple, green ash, willow, and cottonwood, elev. 850 ft. Sec. 32, T32N, R25W. 9 July 2008. 45°13'34"N, 93°28'37"W. 97287-97293

33: Anoka Co., Mississippi River National River, Western edge of county at US10 wayside rest stop. Open park area with bur oak, pin oak, and green ash. elev. 860 ft. Sec. 19, T121N, R25W. 9 July 2008. 45°14'40"N, 93°30'19"W. 97294-97312

34: Hennepin Co., Mississippi River National River, Brooklyn Park, River Park. Open parkland with cottonwood, green ash, willow, and elm, elev. 810 ft. Sec. 24, T119N, R24W. 12 July 2008. 45°06'17"N, 93°16'50"W. 97313,97334

35: Hennepin Co., Mississippi River National River, Brooklyn Park, Coon Rapids Dam Park. Forest edge with green ash, elm, cottonwood, and sumac, elev. 820 ft. Sec. 2, T119N, R21W. 12 July 2008. 45°08'22"N, 93°18'46"W. 97335-97353

36: Hennepin Co., Mississippi River National River, Champlin, Mississippi Point Park. Open parkland along river with cottonwood, green ash, and willow, elev. 850 ft. Sec. 19, T120N, R21W. 12 July 2008. 45°11'05"N, 93°23'18"W. 97354-97375

37: Hennepin Co., Mississippi River National River, NW of Champlin at Cloquet Overlook Park. Along river with silver maple, green ash, boxelder, and juniper, elev. 850 ft. Sec. 10, T120N, R25W. 12 July 2008. 45°13'14"N, 93°27'38"W. 97376-97388

