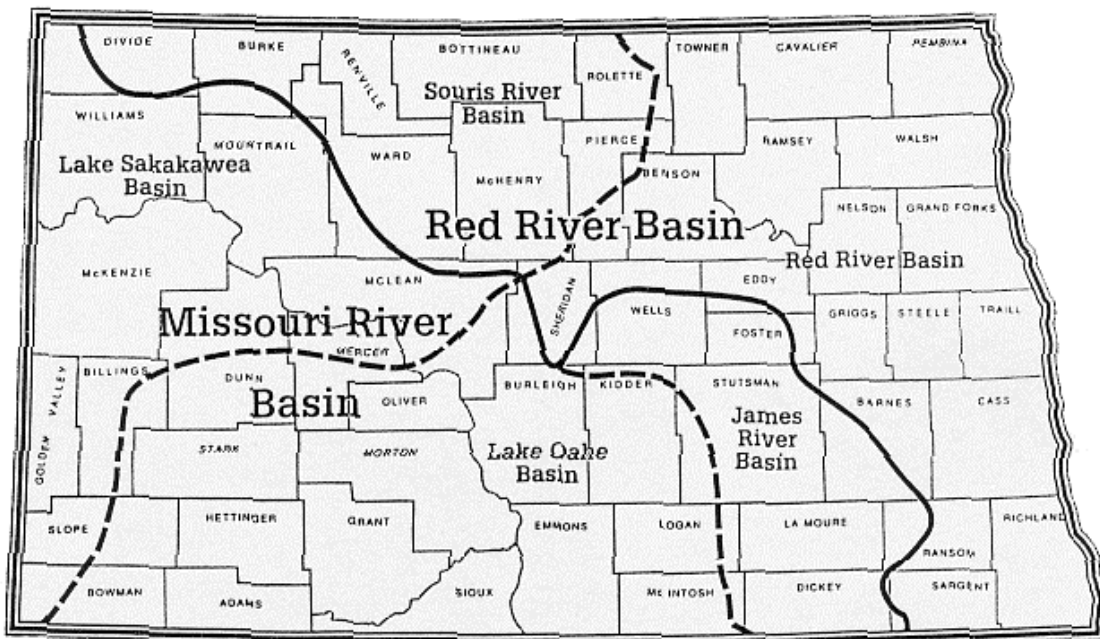


NORTH DAKOTA

UNIFIED WATERSHED ASSESSMENT

FY 1999



North Dakota
Department of Health

USDA
Natural Resources
Conservation Service

September 25, 1998

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	BACKGROUND.....	1
III.	ASSESSMENT METHODOLOGY	2
IV.	PUBLIC PARTICIPATION.....	7
V.	RESULTS AND CONCLUSIONS	7

EXHIBITS

APPENDICES

- APPENDIX A - Extent of the Resource
- APPENDIX B - Natural Resource Stressors
- APPENDIX C - Natural Resource Management Stressors
- APPENDIX D - Water Quality Assessment Data - Rivers and Streams
- APPENDIX E - Water Quality Assessment Data - Lakes and Reservoirs
- APPENDIX F - Unified Watershed Assessment - Scoring Summary

Acknowledgements

This Unified Watershed Assessment (UWA) would not have been possible without the assistance of Henry Bogusch, Natural Resources Conservation Service (NRCS), Ft. Worth, Texas. His knowledge of the National Resources Inventory (NRI) data made it possible to develop the UWA in North Dakota.

The cooperative efforts of the North Dakota Department of Health (NDDH), Division of Water Quality; Surface Water Quality Staff; and the NRCS Natural Resources Planning Staff were critical in developing this assessment.

UNIFIED WATERSHED ASSESSMENT

NORTH DAKOTA

SEPTEMBER 25, 1998

I. INTRODUCTION

This document is the Unified Watershed Assessment (UWA) for North Dakota, as called for by the Clean Water Action Plan (CWAP). This document was prepared by the North Dakota Department of Health (NDDH), Water Quality Division, and North Dakota Natural Resources Conservation Service (NRCS).

The CWAP provides a blueprint for restoring and protecting the nation's precious water resources. The action plan calls for the creation of a UWA that identifies watersheds that do not meet clean water and other natural resource goals. The assessment was prepared through a collaborative effort which involved review with many of the State's natural resource agencies and groups. The NRCS's State Conservationist and NDDH's Chief of Environmental Health Section jointly convened the UWA process in April.

II. BACKGROUND

The UWA is a key action item of the CWAP. The CWAP anticipates additional Federal funds will be provided in FY 1999 (starting October 1, 1998) for implementation of watershed restoration priorities and continued water quality assessments. The UWA is meant to act as a first step in developing watershed restoration strategies.

The UWA utilized a variety of water quality and natural resource condition assessment tools into a singular unified assessment. The Clean Water Act (CWA), Section 303(d) and 305(b) reports for North Dakota, the NRCS National Resources Inventory (NRI), and North Dakota Agricultural Statistics were the primary data utilized to develop the assessment.

Upon the completion of the assessment, the State's 8-digit watersheds were classified into four watershed categories.

Category I - Watersheds in need of restoration
Category II - Watersheds meeting goals, but needing action to sustain water quality
Category III - Watersheds with pristine or sensitive aquatic systems on lands administered by Federal, State, or Tribal lands
Category IV - Watersheds with insufficient data to make an assessment

Watershed restoration priorities, particularly those watersheds designated as Category I, will receive the majority of the new federal funding being proposed in the CWAP. The watersheds designated as Category IV will be given high consideration for FY 1999 funding to adequately assess these watersheds.

III. ASSESSMENT METHODOLOGY

A. Assessment Tools

To address the UWA, North Dakota utilized the following tools and criteria to determine where to focus efforts over the next two years.

1. Watersheds with high priority segments on the 303(d) list.
2. Watersheds with loss of one or more beneficial uses (aquatic life, recreation, drinking water, and fish consumption) as outlined in 305(b) report.
3. The 1992 NRI data on the State's 50 8-digit Hydrologic Unit Areas (HUAs).
4. North Dakota Livestock Inventory from the North Dakota Agricultural Statistics Service Publication No. 66.
5. Other public domain Geographic Information System data (e.g. River Reach File 3, roads digital line graph file).

North Dakota is made-up of parts of 50 8-digit HUAs (see Figure 1 and Table 1, under Exhibits section). All the inventory data collected and utilized in the assessment was converted to these 50 HUAs.

B. Levels of Assessment Data

Nineteen data elements were utilized to categorize and rank each of the 50 HUAs in the state. The 50 HUAs were divided into four levels. The following is a brief description of each data element and resources in each HUA, as well as other important resource concerns in the state. In order to provide consistent comparisons among HUAs, all data elements were expressed as percentages, or as density rather than as absolute numbers.

1. Extent of the Resource (Appendix A)

This data level is intended to capture the extent of water resources in each HUA, as well as other related resources in the state.

- a. Stream Density - expressed as miles of streams per square mile for each HUA. Based on data provided in the River Reach File Version 3.
- b. Lake Acres - expressed as the percent of the HUA covered by lakes (both natural and manmade). For purposes of this data layer, lake acres were obtained from the NDDH Waterbody Tracking System (WBS). The WBS includes an inventory of 220 "significant publicly owned lakes" as defined in 305(b) report.
- c. Groundwater - expressed as the percent of a HUA underlain by the major glacial drift aquifers in the state as delineated by the ND State Water Commission.
- d. Paulusterine Wetlands - expressed as the percent of the HUA covered by paulusterine wetlands. Data was collected by NRCS in the 1992 NRI using the Cowardin wetland classification system.
- e. Prime Farmland - expressed as the percentage of a HUA which is classified as prime farmland. Data was obtained from 1992 NRI.
- f. Rangeland - expressed as the percentage of a HUA classified as rangeland. Based on definition used in 1992 NRI.
- g. Forestland - expressed as the percentage of a HUA which is forestland. Based on definition of forestland used in 1992 NRI.

2. Natural Resource Stressors (Appendix B)

This data level is intended to capture the extent of water resource stressors in each HUA, as well as other related natural resource stressors in the state.

a. Animal Unit (AU) Density - expressed as the density of livestock animal units per square mile in each HUA. This data layer was synthesized from the data compiled from the ND Agricultural Statistics Service Livestock Inventory. The inventory included all cattle, milk cows, sheep, and hogs. A 5-year county average (1993-1997) was used for each livestock category. Each livestock category was converted to AU based on NDDH livestock waste guidelines and summed as total AUs by county.

AU densities for each HUA were estimated by computing a weighted average density for each HUA based on the percent area each county represented in the HUA.

b. Pasture and Rangeland Needing Forage Improvement - this data was derived from the 1992 NRI, and is expressed as a percentage of the pasture and rangeland needing management for forage improvement within the HUA.

c. Land Needing Erosion Control - assessment data was derived from the 1992 NRI. It is expressed as a percentage of all the land in the HUA requiring erosion control (wind and water).

d. Average Wind Erosion Rate on Cropland - based on 1992 NRI. Computed using the Wind Erosion Equation (WEQ).

e. Average USLE on All Land - based on the Universal Soil Loss Equation (USLE). The average USLE rate on all land cover/types in the HUA.

3. Natural Resource Management Stressors (Appendix C)

This data level is intended to capture the extent of significant manmade or man induced water resource stressors in each HUA.

a. Urban and Built-up Areas - expressed as the percentage of the HUA covered by small and large urban areas. Data was derived from 1992 NRI and based on the NRI definition.

b. Cropland Systems - expressed as the percentage of the HUA, which is either cultivated or uncultivated cropland. Data was derived from the 1992 NRI.

c. Irrigated Cropland - based on 1992 NRI. Is an estimate of the percent of all cropland in the HUA, which is under some form of irrigation.

d. Farmed Wetlands - expressed as a percent of the Farm Services Agency's (FSA) wetlands which are farmed, converted, or prior converted in the HUA. The data is based on the 1992 NRI. The Food Security Act definition of wetlands was utilized.

e. Road Density - expressed as the miles of roads per square mile for each HUA. Data was obtained from the roads digital line graph file (1:24000) scale and computed using GIS.

4. Water Quality Assessment (Appendices D and E)

a. 1998 CWA Section 303(d) priority waterbody list (TMDL). The extent of water quality limited rivers and streams expressed as a percentage of all river and stream miles in the HUA. This data is computed from the NDDH WBS database.

b. 1998 CWA Section 303(d) priority waterbody list (TMDL). The extent of water quality limited lakes and reservoirs expressed as a percentage of all lake and reservoir acres in the HUA. This data is computed from the NDDH WBS database.

Water quality limited is defined as "where a water body (lake, reservoir, or specific segment of a river or stream) is not or only partially supporting one or more of its designated uses (e.g. aquatic life, recreation, or drinking water) as defined by North Dakota State Water Quality Standards."

C. Scoring Methodology

Three different scoring methods were evaluated for their applicability and effectiveness in ranking each data element for the states 50 HUAs.

1. The first, and simplest method, was to rank all data element scores for each HUA from 1 to 50. Using this scoring methodology for each data element, the HUA with the highest score received a score of 50 and the lowest a score of 1.

2. The second method assigns a point system of (5,3,1) based on natural breaks in the ranking for each of the data elements. An example of this scoring method is presented in Figure 2, in the Exhibit section.

3. The third method assigns a point system of (5,4,3,2,1) based on the statistical distribution of values in each data element. Using this scoring criteria, the data element for each HUA is assigned a point value of 5 if the data element value is greater than or equal to the 80th percentile of value in the distribution. A point value of 4 was used if the data element value was between the 79th and 60th percentile, 3 points if between 59th and 40th percentile, 2 points if between 39th and 20th percentile, and 1 point if less than 20th percentile of value in the distribution.

Method (3) was selected as the most viable and accurate option to score and rank the HUA. It allowed more equitable scoring and ranking of the 19 data elements.

A total maximum score of 150 points was used in the ranking process. The total score for each of the HUA was weighted towards the two data elements pertaining to water quality assessment data. The first 17 data elements pertaining to Extent of the Resource, Natural Resource Stressors, and Resource Management Stressors were indexed to a maximum of 100 points, or 2/3 of the total score. The data elements pertaining to water quality limited streams and lakes were each indexed to a maximum score of 25 points each. These two water quality assessment scores comprised a 1/3 of the total score. The scoring summary for each HUA is provided in Appendix F.

D. Categorical Ranking

Early in the evaluation phase, it was apparent there were no 8-digit HUAs in North Dakota that met all the goals of the CWA and have sustained water quality. The primary reason for this determination was due to the large size of an 8-digit HUA. There maybe smaller watersheds (11 and/or 14 digit HUAs) within the 8-digit HUA that likely would be classified as Category II.

A joint meeting was held on September 1, 1998, with the Water Quality Specialist from the Native American Tribes located in North Dakota. The UWA process used was reviewed with the meeting participants. It was determined the tribes may address pristine and sensitive aquatic systems on their lands. No evaluation by the NRCS or NDDH is being done on Tribal lands or other Federal lands. Because the NRI data is only accurate to the 8-digit HUA, it is very difficult to assess the Native American Tribal lands using this process. More Primary Sampling Units (PSU) would need to be inventoried to be accurate on an 11 or 14 digit HUA.

Upon completion of the resource gathering and assessment process, all 50 8-digit HUAs were classified into either Category I or IV. An agreed upon rational for Category IV was used. When a HUA, with insufficient data to make an assessment, had less than 10 percent of the river and stream miles, or lake and reservoir acres were assessed for water quality, the HUA was considered as Category IV.

Based on this rational, eight HUAs were considered Category IV (Table 2, see under Exhibit section). There were also some HUAs in which the NRI estimates for the data elements had high standard of deviation errors. The statistical accuracy of these data elements were not considered when assessing a HUA as a Category IV, but may be used in future assessments. This could be accomplished by increasing the number of PSUs sampled in these HUAs with high standard error estimates. This data could be collected through a special NRI study if the need was properly documented and justified.

The remaining 42 HUAs were considered Category I for this assessment. These HUAs were prioritized with the top 14 HUAs considered high priority watersheds, the second 14 HUAs as medium priority watersheds, and the bottom 14 HUAs identified as low priority watersheds. There is a certain degree of variability between the highest and lowest ranked Category I watersheds. Some of these watersheds have only minor restoration concerns or needs, while others have

multiple water quality and natural resource concerns and restoration needs. Future funding of the CWAP, and prioritization of watershed restoration projects will be based on the point scoring and rank of the Category I watersheds.

IV. PUBLIC PARTICIPATION

This UWA was reviewed by both the North Dakota Non-Point Source (NPS) Taskforce, and North Dakota State Technical Committee (STC) in its draft form. The draft resource data was also shared with the water quality specialists from the Native American Tribes represented at the September 1, 1998, meeting. Both the NPS Taskforce and STC meetings were public meetings with outside participation encouraged and welcomed. Over 30 private, governmental, and tribal agencies and groups are represented on the NPS Taskforce and STC.

As with any resource information and planning document, this resource information and assessment will need to be updated. This assessment process and public participation will assist both the NRCS and NDDH in identifying future water quality and natural resource inventory needs.

V. RESULTS AND CONCLUSIONS

Forty-two of the 50 HUAs were designated as Category I watersheds. The other 8 HUAs were designated as Category IV. No HUAs were categorized as II or III.

Table 3 (under Exhibits section), lists each Category I watershed by its total score and rank.

Figure 3 (under Exhibits section), shows a map of North Dakota with the Category I and IV watersheds. The 42 Category I HUAs were broken into three rankings (low, medium, high). These are noted by shading on the attached map in the Exhibits section.

Using this UWA, and the ranking criteria found in it, watershed restoration strategies will be developed in FY 1999 and 2000. These strategies will be utilized to target future Federal CWAP water quality assistance.

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EXHIBITS

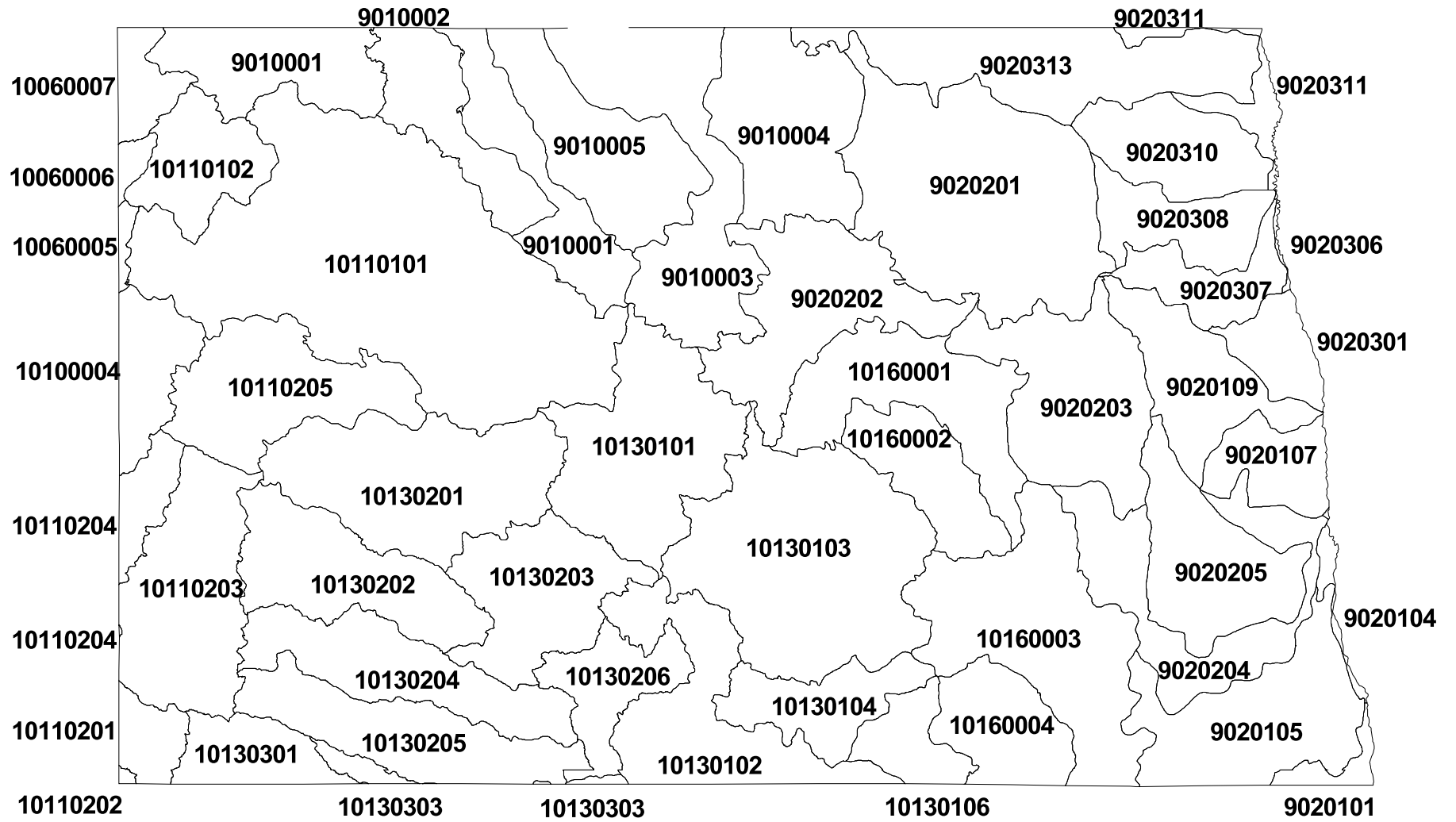


Figure 1. Eight Digit Hydrologic Units (HUA's) In North Dakota

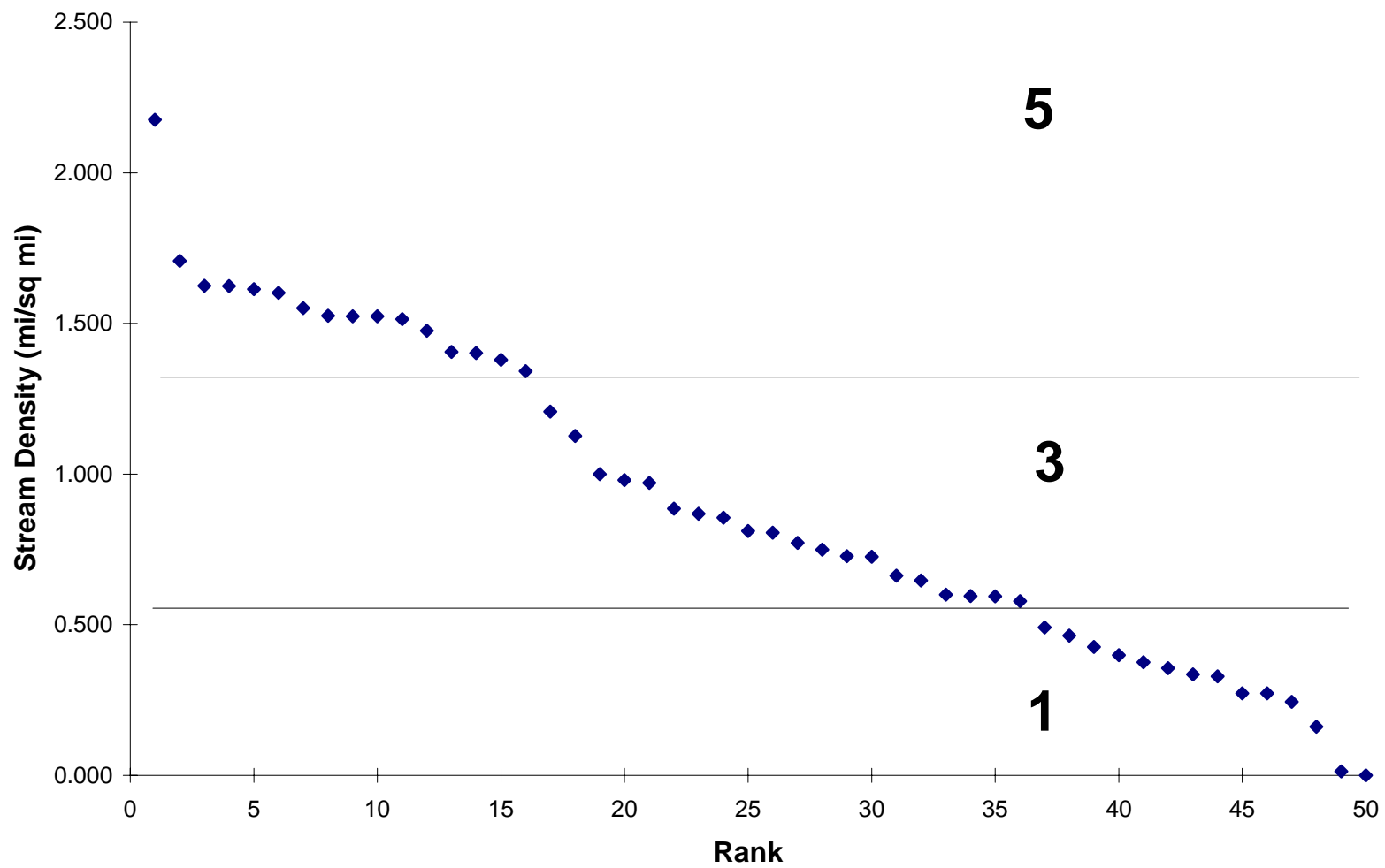


Figure 2. Example of a 5, 3, 1 scoring criteria based on natural data breaks.

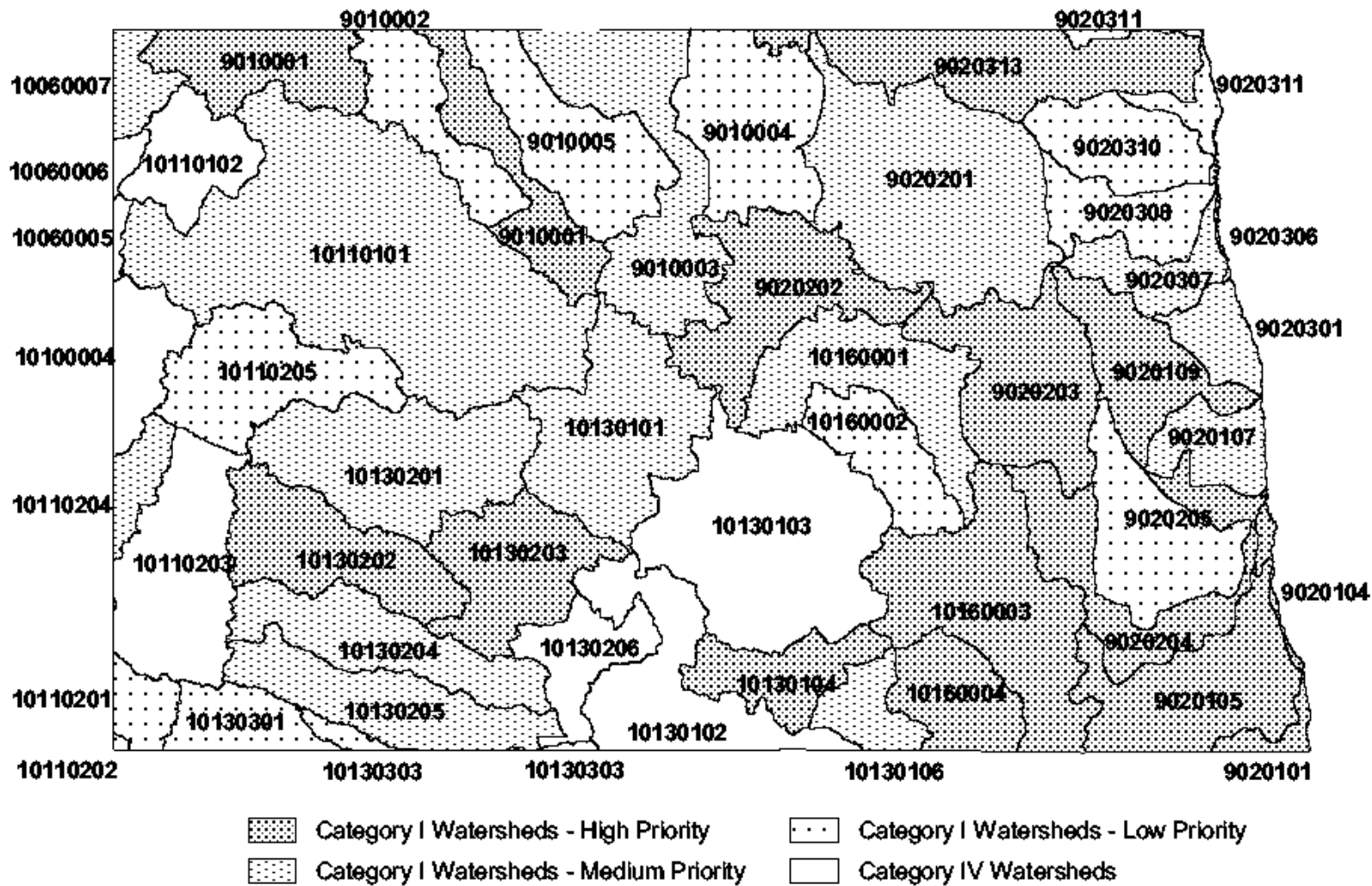


Figure 3. North Dakota 1998 Unified Watershed Assessment Hydrologic Unit Categories and Ranking.

Table 1. Hydrologic Units in North Dakota.

<u>Hydrologic Unit Number</u>	<u>Hydrologic Unit Name</u>
09010001	Upper Souris River
09010002	Des Lacs River
09010003	Lower Souris River
09010004	Willow Creek
09010005	Deep River
09020101	Bois De Sioux River
09020104	Upper Red River
09020105	Western Wild Rice River
09020107	Elm-Marsh River
09020109	Goose River
09020201	Devils Lake
09020202	Upper Sheyenne River
09020203	Middle Sheyenne River
09020204	Lower Sheyenne River
09020205	Maple River
09020301	Sandhill-Wilson River
09020306	Grand Marais-Red River
09020307	Turtle River
09020308	Forest River
09020310	Park River
09020311	Lower Red River
09020313	Pembina River
10060005	Charlie-Little Muddy Creek
10060006	Big Muddy Creek
10060007	Brush Lake Closed Basin
10100004	Lower Yellowstone River
10110101	Lake Sakakawea
10110102	Little Muddy River
10110201	Upper Little Missouri River
10110202	Boxelder Creek
10110203	Middle Little Missouri River
10110204	Beaver Creek (Little Missouri River)
10110205	Lower Little Missouri River
10130101	Painted Woods-Square Butte Creek
10130102	Upper Lake Oahe
10130103	Apple Creek/Long Lake
10130104	Beaver Creek (Lake Oahe)
10130106	West Missouri Coteau
10130201	Knife River
10130202	Upper Heart River
10130203	Lower Heart River
10130204	Upper Cannonball River
10130205	Cedar Creek
10130206	Lower Cannonball River
10130301	North Fork Grand River
10130303	Grand River
10160001	James River Headwaters
10160002	Pipestem River
10160003	Upper James River
10160004	Elm-Maple River

Table 2. Category IV HUAs in North Dakota.

<u>Hydrologic Unit Number</u>	<u>Hydrologic Unit Name</u>
10130103	Apple Creek/Long Lake
10130102	Upper Lake Oahe
10110203	Middle Little Missouri River
10100004	Lower Yellowstone River
10130206	Lower Cannonball River
10060005	Charlie-Little Muddy Creek
10060006	Big Muddy Creek
10110102	Little Muddy River

Table 3. North Dakota Category I HUAs and Priority Rankings.

<u>Hydrologic Unit Number</u>	<u>Hydrologic Unit Name</u>	<u>Rank</u>	<u>Total</u>	
			<u>Score</u>	<u>Priority</u>
09020203	Middle Sheyenne River	1	114.7	High
09020204	Lower Sheyenne River	2	113.2	High
09020105	Western Wild Rice River	3	111.8	High
09020109	Goose River	4	107.1	High
10130202	Upper Heart River	5	105.9	High
10160003	Upper James River	6	103.2	High
09020101	Bois De Sioux River	7	99.4	High
10130203	Lower Heart River	8	98.8	High
09020313	Pembina River	9	97.4	High
09020104	Upper Red River	10	97.1	High
09020202	Upper Sheyenne River	11	96.8	High
10130104	Beaver Creek (Lake Oahe)	12	95.6	High
09010001	Upper Souris River	13	95.0	High
10160004	Elm-Maple River	14	94.4	High
10130101	Painted Woods-Square Butte Creek	15	93.5	Medium
10110101	Lake Sakakawea	16	92.6	Medium
10130106	West Missouri Coteau	17	92.1	Medium
09010003	Lower Souris River	18	91.8	Medium
09020201	Devils Lake	19	91.2	Medium
10160001	James River Headwaters	20	90.0	Medium
10130204	Upper Cannonball River	21	89.4	Medium
09020107	Elm-Marsh River	22	88.5	Medium
09020301	Sandhill-Wilson River	23	88.2	Medium
10130205	Cedar Creek	23	88.2	Medium
09020307	Turtle River	25	87.1	Medium
10130201	Knife River	26	86.2	Medium
10060007	Brush Lake Closed Basin	27	85.3	Medium
10110204	Beaver Creek (Little Missouri River)	27	85.3	Medium
09010002	Des Lacs River	29	84.1	Low
10130301	North Fork Grand River	29	84.1	Low
09010005	Deep River	31	81.8	Low
09020205	Maple River	31	81.8	Low
10130303	Grand River	31	81.8	Low
09020308	Forest River	34	81.2	Low
09020310	Park River	34	81.2	Low
10110201	Upper Little Missouri River	36	80.6	Low
09010004	Willow Creek	37	77.6	Low
09020311	Lower Red River	38	72.4	Low
09020306	Grand Marais-Red River	39	70.0	Low
10160002	Pipestem Creek	40	68.8	Low
10110205	Lower Little Missouri River	41	64.7	Low
10110202	Boxelder Creek	42	50.0	Low

APPENDICES

APPENDIX A - Extent of the Resource

APPENDIX B - Natural Resource Stressors

APPENDIX C - Natural Resource Management Stressors

APPENDIX D - Water Quality Assessment Data - Rivers and Streams

APPENDIX E - Water Quality Assessment Data - Lakes and Reservoirs

APPENDIX F - Unified Watershed Assessment Scoring Summary

APPENDIX A

EXTENT OF THE RESOURCE

Appendix A. Extent of Resource.

	HUC	HUC	Rank	80,60,40	Stream	Assess	Rank	80,60,40,		Assess	Rank	80,60,40,	Percent
	Area	Area	(Stream	20 Perc.	Density	Score	(Percent	20 Perc.	Percent	Score	Percent	20 Perc.	Ground
HUC	(acres)	(sq mi)	Density)	Values	(mi/sq mi)		Lake Acres)	Values	Lake Acres		(Ground Water)	Values	Water
09010001-Upper Souris	1535572.94	2399.3	39	1.516	0.426	2.000	5	0.29922224	0.625	5.000	21	24.606	13.03
09010002-Des Lacs	697652.69	1090.1	33	0.9742	0.600	2.000	33	0.07641362	0.025	2.000	40	13.074	3.85
09010003-Lower Souris	1493475.58	2333.6	43	0.7006	0.335	1.000	24	0.0338558	0.067	3.000	15	7.776	19.49
09010004-Willow	1212925.22	1895.2	46	0.394	0.272	1.000	13	0.00599834	0.252	4.000	32	3.668	7.3
09010005-Deep	1078735.81	1685.5	40		0.399	2.000	17		0.129	4.000	28		9.98
09020101-Bois De Sioux	122051.36	190.7	34		0.595	2.000	42		0.000	1.000	4		38.88
09020104-Upper Red	79893.49	124.8	2		1.708	5.000	42		0.000	1.000	3		40.35
09020105-Western Wild Rice	1238549.68	1935.2	37		0.491	2.000	15		0.175	4.000	1		46.1
09020107-Elm-Marsh	459390.46	717.8	29		0.727	3.000	38		0.009	2.000	12		20.39
09020109-Goose	806939.82	1260.8	23		0.868	3.000	20		0.081	4.000	6		30.53
09020201-Devils Lake	2419720.03	3780.8	49		0.013	1.000	3		3.371	5.000	14		19.94
09020202-Upper Sheyenne	1252379.11	1956.8	47		0.244	1.000	28		0.048	3.000	16		18.9
09020203-Middle Sheyenne	1298020.56	2028.2	41		0.375	1.000	8		0.460	5.000	5		35.53
09020204-Lower Sheyenne	1043122.58	1629.9	35		0.594	2.000	30		0.038	3.000	8		28.89
09020205-Maple	998741.97	1560.5	28		0.749	3.000	40		0.007	2.000	27		10.15
09020301-Sandhill-Wilson	348132.54	544.0	36		0.578	2.000	42		0.000	1.000	22		12.94
09020306-Grand Marais-Red	24050.8	37.6	1		2.176	5.000	42		0.000	1.000	38		4.64
09020307-Turtle	448462.57	700.7	24		0.856	3.000	34		0.024	2.000	13		19.98
09020308-Forest	581192.62	908.1	25		0.811	3.000	18		0.091	4.000	33		6.63
09020310-Park	708843.17	1107.6	22		0.886	3.000	32		0.027	2.000	37		4.69
09020311-Lower Red	226544.15	354.0	26		0.805	3.000	42		0.000	1.000	39		4.05
09020313-Pembina	1356543.47	2119.6	31		0.663	2.000	14		0.200	4.000	18		16.23
10060005-Charlie-Little Muddy	53330.4	83.3	18		1.126	4.000	42		0.000	1.000	36		4.97
10060006-Big Muddy	74611.56	116.6	20		0.980	4.000	42		0.000	1.000	41		2.94
10060007-Brush Lake Closed...	268105.89	418.9	50		0.000	1.000	36		0.015	2.000	2		43.56
10100004-Lower Yellowstone	491328.47	767.7	11		1.514	4.000	39		0.007	2.000	23		12.58
10110101-Lake Sakakawea	4360655.79	6813.5	32		0.647	2.000	2		8.977	5.000	30		7.94
10110102-Little Muddy	626008.08	978.1	21		0.970	3.000	23		0.069	3.000	9		27.36
10110201-Upper Little Missouri	251448.14	392.9	5		1.613	5.000	37		0.015	2.000	47		0
10110202-Boxelder	11531.01	18.0	14		1.401	4.000	42		0.000	1.000	47		0
10110203-Middle Little...	1306508.53	2041.4	3		1.625	5.000	35		0.020	2.000	46		0.01
10110204-Beaver	262519.88	410.2	8		1.525	5.000	29		0.041	3.000	44		0.42
10110205-Lower Little Missouri	1135524.25	1774.3	13		1.405	4.000	42		0.000	1.000	34		6.26
10130101-Painted Woods-Squ...	1498900.59	2342.0	27		0.772	3.000	11		0.299	4.000	17		18.5
10130102-Upper Lake Oahe	1200136.75	1875.2	17		1.207	4.000	1		9.480	5.000	25		11.1
10130103-Apple	2300698.5	3594.8	45		0.273	1.000	4		0.819	5.000	10		26.35
10130104-Beaver	598667.79	935.4	15		1.379	4.000	16		0.159	4.000	26		10.27
10130106-West Missouri Coteau	359302.89	561.4	48		0.162	1.000	7		0.512	5.000	11		24.17
10130201-Knife	1583894.48	2474.8	16		1.342	4.000	19		0.085	4.000	24		11.47
10130202-Upper Heart	1069664.56	1671.4	7		1.551	5.000	6		0.583	5.000	45		0.2
10130203-Lower Heart	1013573.54	1583.7	12		1.476	4.000	26		0.054	3.000	31		7.53
10130204-Upper Cannonball	1006882.17	1573.3	10		1.524	5.000	27		0.051	3.000	43		1.45
10130205-Cedar	1010841.55	1579.4	6		1.602	5.000	31		0.028	2.000	42		1.54
10130206-Lower Cannonball	551239.39	861.3	4		1.624	5.000	41		0.003	1.000	20		13.14
10130301-North Fork Grand	458420.32	716.3	9		1.524	5.000	9		0.426	5.000	47		0
10130303-Grand	108909.92	170.2	19		1.000	4.000	25		0.058	3.000	47		0
10160001-James Headwaters	1134725.34	1773.0	44		0.329	1.000	12		0.259	4.000	19		14.99
10160002-Pipestem	651809.96	1018.5	38		0.463	2.000	10		0.301	5.000	29		8.75
10160003-Upper James	1738753.54	2716.8	42		0.355	1.000	21		0.073	3.000	7		28.95
10160004-Elm	645085.55	1007.9	30		0.726	3.000	22		0.070	3.000	35		5.01

Appendix A (cont.). Extent of Resource.

	Rank	80,60,40,	Percent	Assess	Rank	80,60,40,	Percent	Assess	Rank	80,60,40,	Percent	Assess	Rank	80,60,40,	Percent	Assess
	Percent	20 Perc.	Palustrine	Score	Percent	20 Perc.	Prime	Score	Percent	20 Perc.	Range-	Score	Percent	20 Perc.	Forest	Score
HUC	Palus. Wet	Values	Wetlands		Prime Farm	Values	Farmland		Rangeland	Values	land		Forest	Values	Land	
09010001-Upper Souris	8	10.302651	12.09	5.000	25	56.8661508	20.79	3.000	26	45.38296	20.96	3.000	35	1.2855	0.08	2.000
09010002-Des Lacs	12	6.8289135	9.83	4.000	27	35.4475996	10.23	3.000	25	29.32904	20.98	3.000	29	0.6301	0.23	3.000
09010003-Lower Souris	4	4.7277561	14.20	5.000	13	5.15862349	54.09	4.000	37	15.96456	7.74	2.000	36	0.216	0.00	1.000
09010004-Willow	2	1.7946265	16.04	5.000	24	1.46915206	29.18	3.000	29	5.569393	16.40	3.000	2	0	8.89	5.000
09010005-Deep	5		13.54	5.000	14		52.68	4.000	33		12.90	2.000	36		0.00	1.000
09020101-Bois De Sioux	18		8.36	4.000	5		72.93	5.000	45		2.41	1.000	36		0.00	1.000
09020104-Upper Red	47		0.50	1.000	3		80.65	5.000	47		0.38	1.000	17		0.98	4.000
09020105-Western Wild Rice	22		6.45	3.000	8		62.51	5.000	36		9.02	2.000	27		0.33	3.000
09020107-Elm-Marsh	30		4.77	3.000	2		82.57	5.000	48		0.11	1.000	25		0.46	3.000
09020109-Goose	19		7.62	4.000	6		66.11	5.000	44		2.76	1.000	15		1.10	4.000
09020201-Devils Lake	1		19.23	5.000	16		44.12	4.000	38		7.00	2.000	16		1.00	4.000
09020202-Upper Sheyenne	9		10.89	5.000	17		42.84	4.000	24		21.86	3.000	32		0.18	2.000
09020203-Middle Sheyenne	3		14.52	5.000	19		38.32	4.000	35		9.81	2.000	19		0.72	4.000
09020204-Lower Sheyenne	26		5.50	3.000	9		61.49	5.000	40		5.78	2.000	10		1.50	5.000
09020205-Maple	32		4.12	2.000	4		75.04	5.000	43		2.93	1.000	36		0.00	1.000
09020301-Sandhill-Wilson	23		6.05	3.000	7		63.42	5.000	49		0.00	1.000	9		1.82	5.000
09020306-Grand Marais-Red	50		0.03	1.000	1		86.48	5.000	49		0.00	1.000	6		4.25	5.000
09020307-Turtle	6		13.06	5.000	22		33.39	3.000	34		9.99	2.000	20		0.66	4.000
09020308-Forest	17		8.56	4.000	10		58.91	5.000	39		5.90	2.000	28		0.33	3.000
09020310-Park	27		5.40	3.000	11		56.35	4.000	41		4.74	1.000	3		5.12	5.000
09020311-Lower Red	20		7.01	4.000	12		54.90	4.000	46		0.48	1.000	1		11.84	5.000
09020313-Pembina	7		12.80	5.000	20		37.05	4.000	42		4.03	1.000	5		4.36	5.000
10060005-Charlie-Little Muddy	39		1.85	2.000	47		0.28	1.000	12		44.38	4.000	31		0.21	2.000
10060006-Big Muddy	34		2.94	2.000	49		0.00	1.000	20		30.81	4.000	36		0.00	1.000
10060007-Brush Lake Closed...	14		9.36	4.000	40		1.49	2.000	31		15.79	2.000	36		0.00	1.000
10100004-Lower Yellowstone	49		0.10	1.000	46		1.11	1.000	5		58.97	5.000	23		0.59	3.000
10110101-Lake Sakakawea	29		5.20	3.000	32		3.43	2.000	18		32.95	4.000	24		0.55	3.000
10110102-Little Muddy	24		5.62	3.000	38		1.79	2.000	27		19.43	3.000	36		0.00	1.000
10110201-Upper Little Missouri	46		0.66	1.000	48		0.12	1.000	2		72.08	5.000	11		1.23	4.000
10110202-Boxelder	48		0.11	1.000	49		0.00	1.000	1		79.06	5.000	7		2.61	5.000
10110203-Middle Little...	45		0.70	1.000	43		1.21	1.000	7		53.77	5.000	13		1.16	4.000
10110204-Beaver	44		1.07	1.000	44		1.15	1.000	16		35.49	4.000	30		0.22	3.000
10110205-Lower Little Missouri	43		1.18	1.000	41		1.38	1.000	3		70.68	5.000	4		4.83	5.000
10130101-Painted Woods-Squ...	25		5.57	3.000	26		12.85	3.000	19		31.42	4.000	8		2.05	5.000
10130102-Upper Lake Oahe	37		1.96	2.000	34		2.98	2.000	8		53.01	5.000	12		1.16	4.000
10130103-Apple	11		10.22	4.000	28		8.34	3.000	15		36.85	4.000	34		0.11	2.000
10130104-Beaver	28		5.21	3.000	29		6.35	3.000	14		37.24	4.000	36		0.00	1.000
10130106-West Missouri Coteau	16		8.58	4.000	33		3.33	2.000	13		39.12	4.000	33		0.12	2.000
10130201-Knife	38		1.86	2.000	31		4.38	2.000	11		44.99	4.000	22		0.60	3.000
10130202-Upper Heart	33		3.45	2.000	30		5.68	3.000	22		28.22	3.000	36		0.00	1.000
10130203-Lower Heart	41		1.72	1.000	39		1.55	2.000	10		46.94	5.000	14		1.11	4.000
10130204-Upper Cannonball	31		4.66	2.000	36		2.15	2.000	21		28.34	3.000	36		0.00	1.000
10130205-Cedar	35		2.27	2.000	35		2.69	2.000	17		35.09	4.000	21		0.61	3.000
10130206-Lower Cannonball	36		2.10	2.000	37		2.06	2.000	6		57.13	5.000	36		0.00	1.000
10130301-North Fork Grand	42		1.20	1.000	45		1.12	1.000	9		48.58	5.000	36		0.00	1.000
10130303-Grand	40		1.81	2.000	42		1.26	1.000	4		65.19	5.000	36		0.00	1.000
10160001-James Headwaters	10		10.65	5.000	15		51.12	4.000	32		13.47	2.000	36		0.00	1.000
10160002-Pipestem	15		9.18	4.000	21		34.38	3.000	30		16.08	3.000	26		0.36	3.000
10160003-Upper James	13		9.48	4.000	18		40.68	4.000	28		17.53	3.000	18		0.74	4.000
10160004-Elm	21		6.71	3.000	23		30.28	3.000	23		22.11	3.000	36		0.00	1.000

APPENDIX B

NATURAL RESOURCE STRESSORS

Appendix B. Natural Resource Stressors.

	Rank	80,60,40,	Percent	Assess	Rank	80,60,40,	Percent	Assess	Rank	80,60,40,	Percent	Assess
	Percent Urban	20 Perc.	Urban (Small	Score	Percent	20 Perc.	Percent	Score	Percent	20 Perc.	Irrigated	Assess
HUC	(Small and Large)	Values	and Large)	Score	Cropland	Values	Cropland	Score	Irr. Cropland	Values	Cropland	Score
09010001-Upper Souris	6	0.89927	1.036	5.000	18	74.8543	66.41	4.000	26	1.80518653	0	1.000
09010002-Des Lacs	31	0.34212	0.180	2.000	20	64.1923	64.61	4.000	26	0.84791366	0.00	1.000
09010003-Lower Souris	45	0.18672	0.000	1.000	10	48.9042	76.02	5.000	26	0	0.00	1.000
09010004-Willow	17	0.03046	0.578	4.000	28	36.8424	52.40	3.000	24	0	0.28	3.000
09010005-Deep	5		1.418	5.000	19		65.95	4.000	26		0.00	1.000
09020101-Bois De Sioux	30		0.191	3.000	6		81.95	5.000	15		1.11	4.000
09020104-Upper Red	1		4.790	5.000	4		83.01	5.000	26		0.00	1.000
09020105-Western Wild Rice	20		0.361	4.000	12		74.37	4.000	18		1.06	4.000
09020107-Elm-Marsh	16		0.587	4.000	3		85.00	5.000	26		0.00	1.000
09020109-Goose	32		0.179	2.000	7		81.74	5.000	20		0.92	4.000
09020201-Devils Lake	18		0.510	4.000	11		74.56	4.000	22		0.44	3.000
09020202-Upper Sheyenne	26		0.255	3.000	24		60.51	3.000	26		0.00	1.000
09020203-Middle Sheyenne	29		0.203	3.000	17		67.09	4.000	13		1.58	4.000
09020204-Lower Sheyenne	4		1.457	5.000	14		72.73	4.000	19		1.02	4.000
09020205-Maple	28		0.204	3.000	1		87.92	5.000	26		0.00	1.000
09020301-Sandhill-Wilson	3		1.750	5.000	8		80.74	5.000	9		2.30	5.000
09020306-Grand Marais-Red	40		0.032	2.000	2		85.52	5.000	26		0.00	1.000
09020307-Turtle	2		1.844	5.000	22		62.68	3.000	6		3.54	5.000
09020308-Forest	36		0.098	2.000	13		73.72	4.000	12		1.63	4.000
09020310-Park	14		0.694	4.000	9		80.63	5.000	26		0.00	1.000
09020311-Lower Red	8		0.981	5.000	16		68.80	4.000	26		0.00	1.000
09020313-Pembina	27		0.204	3.000	5		82.99	5.000	26		0.00	1.000
10060005-Charlie-Little Muddy	15		0.587	4.000	40		36.93	2.000	7		3.41	5.000
10060006-Big Muddy	24		0.270	3.000	30		49.71	3.000	23		0.29	3.000
10060007-Brush Lake Closed...	41		0.024	1.000	35		42.27	2.000	3		5.21	5.000
10100004-Lower Yellowstone	22		0.303	3.000	44		27.56	1.000	1		13.04	5.000
10110101-Lake Sakakawea	25		0.262	3.000	33		45.14	2.000	16		1.09	4.000
10110102-Little Muddy	39		0.042	2.000	21		63.91	3.000	17		1.07	4.000
10110201-Upper Little Missouri	44		0.006	1.000	48		11.92	1.000	5		3.73	5.000
10110202-Boxelder	45		0.000	1.000	49		8.66	1.000	26		0.00	1.000
10110203-Middle Little...	23		0.284	3.000	46		27.24	1.000	26		0.00	1.000
10110204-Beaver	19		0.402	4.000	38		38.33	2.000	26		0.00	1.000
10110205-Lower Little Missouri	45		0.000	1.000	50		5.64	1.000	26		0.00	1.000
10130101-Painted Woods-Squ...	10		0.930	5.000	34		43.19	2.000	2		5.40	5.000
10130102-Upper Lake Oahe	12		0.714	4.000	43		28.63	1.000	4		3.92	5.000
10130103-Apple	9		0.949	5.000	41		36.49	1.000	11		1.72	4.000
10130104-Beaver	38		0.077	2.000	31		47.69	2.000	26		0.00	1.000
10130106-West Missouri Coteau	35		0.100	2.000	36		40.26	2.000	8		2.62	5.000
10130201-Knife	13		0.707	4.000	37		38.83	2.000	25		0.27	3.000
10130202-Upper Heart	11		0.891	4.000	27		55.68	3.000	26		0.00	1.000
10130203-Lower Heart	45		0.000	1.000	39		38.02	2.000	14		1.16	4.000
10130204-Upper Cannonball	42		0.010	1.000	25		57.24	3.000	26		0.00	1.000
10130205-Cedar	43		0.006	1.000	32		45.25	2.000	26		0.00	1.000
10130206-Lower Cannonball	45		0.000	1.000	45		27.35	1.000	26		0.00	1.000
10130301-North Fork Grand	33		0.126	2.000	42		31.09	1.000	26		0.00	1.000
10130303-Grand	37		0.081	2.000	47		18.20	1.000	26		0.00	1.000
10160001-James Headwaters	21		0.330	3.000	15		69.54	4.000	21		0.80	3.000
10160002-Pipestem	45		0.000	1.000	26		56.36	3.000	26		0.00	1.000
10160003-Upper James	7		0.989	5.000	23		61.40	3.000	10		2.16	5.000
10160004-Elm	34		0.108	2.000	29		52.31	3.000	26		0.00	1.000

Appendix B (cont.). Natural Resource Stressors.

	Rank	80,60,40,	Percent	Assess	Rank	80,60,40,	Road	Assess
	Percent Farmed	20 Perc.	Farmed and	Score	Road Densi	20 Perc.	Density	Score
HUC	and PC Wetlands	Values	PC Wetlands		(mi/sq mi)	Values	(mi/sq mi)	
09010001-Upper Souris	19	13.894302	5.45	4.000	21	1.9954935	1.82	3.000
09010002-Des Lacs	20	4.562297606	4.88	4.000	22	1.8217725	1.82	3.000
09010003-Lower Souris	16	0	6.83	4.000	17	1.6821283	1.86	4.000
09010004-Willow	24	0	2.28	3.000	28	1.5252486	1.75	3.000
09010005-Deep	27		1.25	3.000	12		1.97	4.000
09020101-Bois De Sioux	5		68.06	5.000	8		2.03	5.000
09020104-Upper Red	2		98.49	5.000	1		4.33	5.000
09020105-Western Wild Rice	17		5.51	4.000	10		2.02	5.000
09020107-Elm-Marsh	3		90.62	5.000	3		2.18	5.000
09020109-Goose	21		4.35	3.000	14		1.96	4.000
09020201-Devils Lake	11		13.56	4.000	35		1.63	2.000
09020202-Upper Sheyenne	25		1.49	3.000	27		1.77	3.000
09020203-Middle Sheyenne	28		0.00	1.000	24		1.79	3.000
09020204-Lower Sheyenne	22		3.20	3.000	13		1.97	4.000
09020205-Maple	18		5.45	4.000	9		2.02	5.000
09020301-Sandhill-Wilson	4		84.61	5.000	2		2.35	5.000
09020306-Grand Marais-Red	1		99.95	5.000	4		2.15	5.000
09020307-Turtle	10		15.22	5.000	5		2.09	5.000
09020308-Forest	7		44.41	5.000	11		1.99	4.000
09020310-Park	6		64.26	5.000	6		2.06	5.000
09020311-Lower Red	8		44.34	5.000	7		2.04	5.000
09020313-Pembina	9		26.72	5.000	29		1.72	3.000
10060005-Charlie-Little Muddy	28		0.00	1.000	38		1.57	2.000
10060006-Big Muddy	12		12.35	4.000	41		1.52	1.000
10060007-Brush Lake Closed...	28		0.00	1.000	25		1.78	3.000
10100004-Lower Yellowstone	28		0.00	1.000	44		1.44	1.000
10110101-Lake Sakakawea	13		11.73	4.000	46		1.38	1.000
10110102-Little Muddy	28		0.00	1.000	20		1.82	4.000
10110201-Upper Little Missouri	28		0.00	1.000	34		1.64	2.000
10110202-Boxelder	28		0.00	1.000	49		1.18	1.000
10110203-Middle Little...	28		0.00	1.000	43		1.44	1.000
10110204-Beaver	28		0.00	1.000	32		1.65	2.000
10110205-Lower Little Missouri	28		0.00	1.000	50		1.05	1.000
10130101-Painted Woods-Squ...	28		0.00	1.000	36		1.59	2.000
10130102-Upper Lake Oahe	28		0.00	1.000	47		1.31	1.000
10130103-Apple	28		0.00	1.000	45		1.41	1.000
10130104-Beaver	28		0.00	1.000	33		1.64	2.000
10130106-West Missouri Coteau	26		1.35	3.000	30		1.69	3.000
10130201-Knife	28		0.00	1.000	40		1.53	2.000
10130202-Upper Heart	28		0.00	1.000	16		1.88	4.000
10130203-Lower Heart	28		0.00	1.000	37		1.58	2.000
10130204-Upper Cannonball	28		0.00	1.000	31		1.66	2.000
10130205-Cedar	28		0.00	1.000	42		1.52	1.000
10130206-Lower Cannonball	28		0.00	1.000	48		1.29	1.000
10130301-North Fork Grand	28		0.00	1.000	26		1.78	3.000
10130303-Grand	28		0.00	1.000	18		1.82	4.000
10160001-James Headwaters	14		7.77	4.000	15		1.90	4.000
10160002-Pipestem	15		7.20	4.000	39		1.57	2.000
10160003-Upper James	23		2.54	3.000	19		1.82	4.000
10160004-Elm	28		0.00	1.000	23		1.79	3.000

APPENDIX C

NATURAL RESOURCE MANAGEMENT STRESSORS

Appendix C. Natural Resource Management Stressors.

	Rank	80,60,40,	Animal Unit	Assess	Rank	80,60,40,	Percent	Assess	Rank	80,60,40,	Percent LC	Assess
HUC	AU Density	20 Perc.	Density	Score	% Past. and Range	20 Perc.	Past. and Range	Score	% LC Need	20 Perc.	Needing	Score
	(AUs/sq mi)	Values	(AUs/sq mi)		Need For. Improve.	Values	Need For. Improve.		Erosion Control	Values	Erosion Control	
09010001-Upper Souris	40	36.9793949	14.04	2.000	27	3.309837682	0.00	1.000	30	27.38315932	14.26	3.000
09010002-Des Lacs	36	29.2196113	14.87	2.000	27	1.003040552	0.00	1.000	19	18.38308544	18.66	4.000
09010003-Lower Souris	29	22.233938	23.88	3.000	27	0	0.00	1.000	33	14.22548003	11.98	2.000
09010004-Willow	30	13.6544544	22.84	3.000	11	0	3.21	4.000	47	10.4780891	6.32	1.000
09010005-Deep	32		20.91	2.000	27		0.00	1.000	45		6.72	1.000
09020101-Bois De Sioux	24		27.72	3.000	27		0.00	1.000	3		64.82	5.000
09020104-Upper Red	34		19.43	2.000	27		0.00	1.000	2		66.90	5.000
09020105-Western Wild Rice	15		33.62	4.000	8		4.02	5.000	26		15.69	3.000
09020107-Elm-Marsh	44		11.68	1.000	27		0.00	1.000	6		36.98	5.000
09020109-Goose	47		10.08	1.000	27		0.00	1.000	12		26.47	4.000
09020201-Devils Lake	45		11.32	1.000	27		0.00	1.000	27		15.52	3.000
09020202-Upper Sheyenne	26		26.41	3.000	27		0.00	1.000	36		11.52	2.000
09020203-Middle Sheyenne	28		25.53	3.000	14		2.45	4.000	24		16.63	3.000
09020204-Lower Sheyenne	19		30.30	4.000	1		19.49	5.000	39		10.57	2.000
09020205-Maple	31		21.33	2.000	27		0.00	1.000	31		14.17	2.000
09020301-Sandhill-Wilson	46		10.25	1.000	27		0.00	1.000	5		53.32	5.000
09020306-Grand Marais-Red	43		11.85	1.000	27		0.00	1.000	1		75.84	5.000
09020307-Turtle	41		12.11	1.000	27		0.00	1.000	11		27.27	4.000
09020308-Forest	42		12.10	1.000	27		0.00	1.000	17		19.60	4.000
09020310-Park	48		10.06	1.000	27		0.00	1.000	13		25.90	4.000
09020311-Lower Red	49		9.76	1.000	27		0.00	1.000	4		54.15	5.000
09020313-Pembina	50		7.58	1.000	27		0.00	1.000	20		18.47	4.000
10060005-Charlie-Little Muddy	35		15.48	2.000	17		1.99	4.000	8		32.68	5.000
10060006-Big Muddy	37		14.71	2.000	10		3.70	5.000	7		36.79	5.000
10060007-Brush Lake Closed...	39		14.19	2.000	27		0.00	1.000	9		29.61	5.000
10100004-Lower Yellowstone	27		25.66	3.000	22		0.78	3.000	21		18.32	3.000
10110101-Lake Sakakawea	33		20.27	2.000	24		0.75	3.000	32		12.17	2.000
10110102-Little Muddy	38		14.65	2.000	27		0.00	1.000	16		20.86	4.000
10110201-Upper Little Missouri	22		29.09	3.000	4		7.28	5.000	49		5.46	1.000
10110202-Boxelder	21		29.22	3.000	19		1.49	4.000	48		5.96	1.000
10110203-Middle Little...	23		28.65	3.000	25		0.60	3.000	35		11.81	2.000
10110204-Beaver	25		26.74	3.000	23		0.78	3.000	15		24.31	4.000
10110205-Lower Little Missouri	14		34.84	4.000	21		0.81	3.000	50		1.23	1.000
10130101-Painted Woods-Squ...	17		31.69	4.000	26		0.36	3.000	44		7.84	1.000
10130102-Upper Lake Oahe	8		48.10	5.000	20		1.30	4.000	41		10.33	1.000
10130103-Apple	7		48.57	5.000	5		6.22	5.000	46		6.64	1.000
10130104-Beaver	3		56.45	5.000	27		0.00	1.000	43		9.83	1.000
10130106-West Missouri Coteau	2		57.05	5.000	9		3.78	5.000	18		18.87	4.000
10130201-Knife	9		46.44	5.000	18		1.82	4.000	25		16.44	3.000
10130202-Upper Heart	6		48.68	5.000	16		2.04	4.000	10		27.85	5.000
10130203-Lower Heart	1		57.86	5.000	13		2.64	4.000	28		14.87	3.000
10130204-Upper Cannonball	13		35.48	4.000	27		0.00	1.000	14		25.18	4.000
10130205-Cedar	12		35.54	4.000	27		0.00	1.000	23		16.89	3.000
10130206-Lower Cannonball	4		51.43	5.000	7		4.16	5.000	42		10.20	1.000
10130301-North Fork Grand	18		30.39	4.000	6		5.18	5.000	22		18.01	3.000
10130303-Grand	11		36.02	4.000	15		2.22	4.000	34		11.86	2.000
10160001-James Headwaters	20		29.22	4.000	27		0.00	1.000	29		14.50	3.000
10160002-Pipestem	16		32.85	4.000	3		7.34	5.000	38		10.94	2.000
10160003-Upper James	10		40.80	5.000	12		2.91	4.000	37		11.24	2.000
10160004-Elm	5		50.56	5.000	2		7.40	5.000	40		10.51	2.000

Appendix C (cont). Natural Resource Management Stressors.

	Rank	80,60,40,	Ave. Wind	Assess	Rank	80,60,40,	Ave USLE	Assess
	Ave. Wind	20 Perc.	Erosion Rate	Score	Ave USLE	20 Perc.	on Cultivated	Score
HUC	Erosion (Crop)	Values	on Cropland		on Total Area	Values	Total Area	
09010001-Upper Souris	35	4.54	1.7	2.000	23	1.5	0.9	3.000
09010002-Des Lacs	28	2.88	2.1	3.000	21	1.04	1	3.000
09010003-Lower Souris	49	1.9	0.6	1.000	29	0.8	0.8	2.000
09010004-Willow	42	1.5	1.4	1.000	45	0.7	0.5	1.000
09010005-Deep	42		1.4	1.000	47		0.4	1.000
09020101-Bois De Sioux	5		8.2	5.000	17		1.1	4.000
09020104-Upper Red	1		12.4	5.000	37		0.7	1.000
09020105-Western Wild Rice	26		2.3	3.000	37		0.7	1.000
09020107-Elm-Marsh	10		4.7	5.000	47		0.4	1.000
09020109-Goose	20		3.0	4.000	23		0.9	3.000
09020201-Devils Lake	34		1.8	2.000	23		0.9	3.000
09020202-Upper Sheyenne	42		1.4	1.000	29		0.8	2.000
09020203-Middle Sheyenne	30		1.9	2.000	29		0.8	2.000
09020204-Lower Sheyenne	39		1.5	1.000	37		0.7	1.000
09020205-Maple	39		1.5	1.000	23		0.9	3.000
09020301-Sandhill-Wilson	9		6.3	5.000	37		0.7	1.000
09020306-Grand Marais-Red	3		9.6	5.000	45		0.5	1.000
09020307-Turtle	16		3.6	4.000	37		0.7	1.000
09020308-Forest	25		2.4	3.000	37		0.7	1.000
09020310-Park	19		3.1	4.000	29		0.8	2.000
09020311-Lower Red	2		11.6	5.000	47		0.4	1.000
09020313-Pembina	28		2.1	3.000	29		0.8	2.000
10060005-Charlie-Little Muddy	4		8.4	5.000	2		2.4	5.000
10060006-Big Muddy	8		6.7	5.000	4		1.8	5.000
10060007-Brush Lake Closed...	5		8.2	5.000	5		1.7	5.000
10100004-Lower Yellowstone	7		6.8	5.000	21		1	3.000
10110101-Lake Sakakawea	30		1.9	2.000	10		1.5	4.000
10110102-Little Muddy	21		2.8	3.000	13		1.4	4.000
10110201-Upper Little Missouri	11		4.5	4.000	44		0.6	1.000
10110202-Boxelder	36		1.6	2.000	47		0.4	1.000
10110203-Middle Little...	12		4.2	4.000	8		1.6	5.000
10110204-Beaver	15		3.8	4.000	8		1.6	5.000
10110205-Lower Little Missouri	50		0.0	1.000	1		9.9	5.000
10130101-Painted Woods-Squ...	48		1.0	1.000	17		1.1	4.000
10130102-Upper Lake Oahe	26		2.3	3.000	15		1.2	4.000
10130103-Apple	39		1.5	1.000	29		0.8	2.000
10130104-Beaver	36		1.6	2.000	17		1.1	4.000
10130106-West Missouri Coteau	23		2.7	3.000	23		0.9	3.000
10130201-Knife	30		1.9	2.000	10		1.5	4.000
10130202-Upper Heart	13		4.0	4.000	3		2	5.000
10130203-Lower Heart	36		1.6	2.000	5		1.7	5.000
10130204-Upper Cannonball	23		2.7	3.000	5		1.7	5.000
10130205-Cedar	16		3.6	4.000	10		1.5	4.000
10130206-Lower Cannonball	21		2.8	3.000	15		1.2	4.000
10130301-North Fork Grand	14		3.9	4.000	23		0.9	3.000
10130303-Grand	18		3.2	4.000	13		1.4	4.000
10160001-James Headwaters	30		1.9	2.000	29		0.8	2.000
10160002-Pipestem	42		1.4	1.000	17		1.1	4.000
10160003-Upper James	42		1.4	1.000	29		0.8	2.000
10160004-Elm	47		1.1	1.000	37		0.7	1.000

APPENDIX D

WATER QUALITY ASSESSMENT DATA

RIVERS AND STREAMS

Appendix D. Water Quality Assessment Data - Rivers and Streams

		Number of	Stream	Percent	Miles of	Number of Water	Rank	80,60,40,	Percent	Assess
		Stream	Miles Not	Miles	Water Quality	Quality Limited	WQ Lim.	20 Perc.	WQ limited	Score
HUC	Stream Miles	Waterbodies	Assessed	Assessed	Limited Streams	Stream Waterbodies	Streams	Values	Streams	
09010001-Upper Souris	1021.8	19	674.80	34.0	105.6	2	16	17.06478802	10.33	4.000
09010002-Des Lacs	654	17	582.90	10.9	0	0	34	9.82898311	0.00	1.000
09010003-Lower Souris	781.4	10	169.70	78.3	323.8	3	2	1.817065286	41.44	5.000
09010004-Willow	515.7	12	335.20	35.0	0	0	34	0	0.00	1.000
09010005-Deep	672.1	10	282.40	58.0	0	0	34		0.00	1.000
09020101-Bois De Sioux	113.56	4	85.76	24.5	27.8	2	8		24.48	5.000
09020104-Upper Red	213.16	8	83.17	61.0	57.35	3	4		26.90	5.000
09020105-Western Wild Rice	949.52	22	627.74	33.9	245.95	5	6		25.90	5.000
09020107-Elm-Marsh	522.03	19	367.04	29.7	83.79	3	12		16.05	4.000
09020109-Goose	1094.39	36	948.01	13.4	112.71	4	17		10.30	4.000
09020201-Devils Lake	48.78	2	48.78	0.0	0	0	34		0.00	1.000
09020202-Upper Sheyenne	477.64	18	318.37	33.3	264.53	8	1		55.38	5.000
09020203-Middle Sheyenne	760.92	24	252.92	66.8	187.42	4	7		24.63	5.000
09020204-Lower Sheyenne	968.04	44	598.86	38.1	259.23	11	5		26.78	5.000
09020205-Maple	1168.81	25	933.91	20.1	234.9	7	10		20.10	5.000
09020301-Sandhill-Wilson	314.44	14	229.42	27.0	20.55	3	24		6.54	3.000
09020306-Grand Marais-Red	81.78	6	6.55	92.0	0	0	34		0.00	1.000
09020307-Turtle	599.57	43	465.59	22.3	56.28	3	23		9.39	3.000
09020308-Forest	736.4	37	550.82	25.2	25.02	2	28		3.40	3.000
09020310-Park	980.79	48	672.28	31.5	36.57	3	27		3.73	3.000
09020311-Lower Red	285.06	9	214.75	24.7	0	0	34		0.00	1.000
09020313-Pembina	1404.82	48	1056.59	24.8	137.43	8	21		9.78	3.000
10060005-Charlie-Little Muddy	93.84	4	93.84	0.0	0	0	34		0.00	1.000
10060006-Big Muddy	114.22	3	114.22	0.0	0	0	34		0.00	1.000
10060007-Brush Lake Closed...	0	0	0.00	0.0	0	0	34		0.00	1.000
10100004-Lower Yellowstone	1162.31	26	1140.69	1.9	21.62	1	30		1.86	3.000
10110101-Lake Sakakawea	4407.32	82	3726.48	15.4	444.42	8	19		10.08	4.000
10110102-Little Muddy	949.24	20	925.24	2.5	0	0	34		0.00	1.000
10110201-Upper Little Missouri	633.86	16	500.74	21.0	0	0	34		0.00	1.000
10110202-Boxelder	25.25	3	19.15	24.2	0	0	34		0.00	1.000
10110203-Middle Little...	3317.49	83	3100.08	6.6	58.14	2	31		1.75	2.000
10110204-Beaver	625.61	18	479.68	23.3	0	0	34		0.00	1.000
10110205-Lower Little Missouri	2493.54	72	2207.10	11.5	236.81	5	22		9.50	3.000
10130101-Painted Woods-Squ...	1807.7	33	1386.59	23.3	39.94	2	29		2.21	3.000
10130102-Upper Lake Oahe	2264.09	34	2214.29	2.2	0	0	34		0.00	1.000
10130103-Apple	980.05	15	904.40	7.7	15.78	1	32		1.61	2.000
10130104-Beaver	1290.02	16	744.51	42.3	120.05	3	18		10.16	4.000
10130106-West Missouri Coteau	90.71	2	0.00	100.0	0	0	34		0.00	1.000
10130201-Knife	3320.14	79	2593.98	21.9	325.29	12	20		9.90	4.000
10130202-Upper Heart	2592.69	69	1839.56	29.0	111.12	6	26		4.29	3.000
10130203-Lower Heart	2337.68	63	1838.49	21.4	269.5	7	15		11.53	4.000
10130204-Upper Cannonball	2397.47	54	2079.41	13.3	318.06	8	14		13.27	4.000
10130205-Cedar	2529.6	47	1927.14	23.8	398.59	8	13		15.76	4.000
10130206-Lower Cannonball	1398.96	33	1333.46	4.7	65.5	3	25		4.68	3.000
10130301-North Fork Grand	1091.7	31	478.90	56.1	0	0	34		0.00	1.000
10130303-Grand	170.2	4	87.27	48.7	58.82	2	3		34.56	5.000
10160001-James Headwaters	583.34	39	457.46	21.6	1.48	1	33		0.25	2.000
10160002-Pipestem	471.97	17	365.74	22.5	0	0	34		0.00	1.000
10160003-Upper James	965.68	37	654.54	32.2	157.47	3	11		16.31	4.000
10160004-Elm	731.66	30	524.70	28.3	150.3	7	9		20.54	5.000

APPENDIX E

WATER QUALITY ASSESSMENT DATA

LAKES AND RESERVOIRS

Appendix E. Water Quality Assessment Data - Lakes and Reservoirs

		Number of	Lake Acres	Percent	Acres of	Number of Water	Rank	80,60,40,	Percent	Assess
HUC	Lake Acres	Lake	Not	Assessed	Water Quality	Quality Limited	WQ Limited	20 Perc.	WQ Limited	Score
		Waterbodies	Assessed	Assessed	Limited Lakes	Lake Waterbodies	Lakes	Values	Lakes	
09010001-Upper Souris	9602.8	4	9.7	99.9	96.3	1	28	84.0203933	1.00	3.000
09010002-Des Lacs	175.3	3	24.5	86.0	150.8	1	10	41.4452567	86.02	5.000
09010003-Lower Souris	998	4	788.0	21.0	210	2	23	0.01487152	21.04	3.000
09010004-Willow	3052	9	892.6	70.8	443.2	3	25	0	14.52	3.000
09010005-Deep	1388.3	2	0.0	100.0	1381.8	1	6		99.53	5.000
09020101-Bois De Sioux	0	0	0.0	na	0	0	31		0.00	1.000
09020104-Upper Red	0	0	0.0	na	0	0	31		0.00	1.000
09020105-Western Wild Rice	2170.2	8	1714.7	21.0	455.5	3	24		20.99	3.000
09020107-Elm-Marsh	41.2	1	41.2	0.0	0	0	31		0.00	1.000
09020109-Goose	655	3	50.0	92.4	281.5	1	20		42.98	4.000
09020201-Devils Lake	81572.3	9	6766.5	91.7	74726	2	8		91.61	5.000
09020202-Upper Sheyenne	603.7	4	160.0	73.5	443.7	3	13		73.50	4.000
09020203-Middle Sheyenne	5976.2	8	230.8	96.1	5745.4	4	7		96.14	5.000
09020204-Lower Sheyenne	397	5	98.2	75.3	252	2	17		63.48	4.000
09020205-Maple	68	3	68.0	0.0	0	0	31		0.00	1.000
09020301-Sandhill-Wilson	0	0		na	0	0	31		0.00	1.000
09020306-Grand Marais-Red	0	0		na	0	0	31		0.00	1.000
09020307-Turtle	108.6	4	32.6	70.0	0	0	31		0.00	1.000
09020308-Forest	530	4	60.0	88.7	0	0	31		0.00	1.000
09020310-Park	194	1	0.0	100.0	0	0	31		0.00	1.000
09020311-Lower Red	0	0		na	0	0	31		0.00	1.000
09020313-Pembina	2313	11	312.0	86.5	1664	7	14		71.94	4.000
10060005-Charlie-Little Muddy	0	0		na	0	0	31		0.00	1.000
10060006-Big Muddy	0	0		na	0	0	31		0.00	1.000
10060007-Brush Lake Closed...	40.3	1	0.0	100.0	40.3	1	1		100.00	5.000
10100004-Lower Yellowstone	35	1	35.0	0.0	0	0	31		0.00	1.000
10110101-Lake Sakakawea	391469	21	2105.2	99.5	837	7	29		0.21	3.000
10110102-Little Muddy	431.5	3	271.5	37.1	0	0	31		0.00	1.000
10110201-Upper Little Missouri	37.3	1	0.0	100.0	37.3	1	1		100.00	5.000
10110202-Boxelder	0	0		na	0	0	31		0.00	1.000
10110203-Middle Little...	256.7	6	241.9	5.8	14.8	1	26		5.77	3.000
10110204-Beaver	108	1	0.0	100.0	108	1	1		100.00	5.000
10110205-Lower Little Missouri	0	0		na	0	0	31		0.00	1.000
10130101-Painted Woods-Squ...	4476.8	21	439.9	90.2	1397.8	5	22		31.22	3.000
10130102-Upper Lake Oahe	113774.5	6	7.9	100.0	28.2	1	30		0.02	3.000
10130103-Apple	18851.5	16	16881.2	10.5	875.2	2	27		4.64	3.000
10130104-Beaver	953.1	1	0.0	100.0	953.1	1	1		100.00	5.000
10130106-West Missouri Coteau	1840.7	5	418.6	77.3	1422.1	2	12		77.26	4.000
10130201-Knife	1343.5	2	35.5	97.4	0	0	31		0.00	1.000
10130202-Upper Heart	6238.1	4	7.1	99.9	6231	3	5		99.89	5.000
10130203-Lower Heart	546.1	7	33.5	93.9	456.1	4	11		83.52	4.000
10130204-Upper Cannonball	518.1	7	211.7	59.1	306.4	2	18		59.14	4.000
10130205-Cedar	278.5	3	25.0	91.0	198.5	1	15		71.27	4.000
10130206-Lower Cannonball	15.2	1	15.2	0.0	0	0	31		0.00	1.000
10130301-North Fork Grand	1953.3	3	203.3	89.6	1750	1	9		89.59	5.000
10130303-Grand	63.3	1	0.0	100.0	0	0	31		0.00	1.000
10160001-James Headwaters	2936	2	850.0	71.0	2086	1	16		71.05	4.000
10160002-Pipestem	1964.7	6	1017.8	48.2	0	0	31		0.00	1.000
10160003-Upper James	1273.5	10	335.3	73.7	514.8	3	21		40.42	3.000
10160004-Elm	451.8	8	122.0	73.0	260.8	2	19		57.72	4.000

APPENDIX F

UNIFIED WATERSHED ASSESSMENT

SCORING SUMMARY

Appendix F. Unified Watershed Assessment Scoring Summary.

HUC	Total	Total	Total	Total	Percent	WQ Assessment	Assessment	WQ Assessment	Assessment	Total	Rank
	Appendix A	Appendix B	Appendix C	Appendices A-C	Assessment	Score for	Score for	Score for	Score for	Assessment	Total Assessment
	Assess Score	Assess Score	Assess Score	Assess Score	Score (1,2,3)	WQ Limited Streams	WQL Streams (x5)	WQ Limited Lakes	WQL Lakes (x5)	Score	Score
09010001-Upper Souris	23	17	11	51	60.0	4	20	3	15	95.0	13
09010002-Des Lacs	19	14	13	46	54.1	1	5	5	25	84.1	29
09010003-Lower Souris	20	15	9	44	51.8	5	25	3	15	91.8	18
09010004-Willow	23	16	10	49	57.6	1	5	3	15	77.6	39
09010005-Deep	21	17	6	44	51.8	1	5	5	25	81.8	33
09020101-Bois De Sioux	19	22	18	59	69.4	5	25	1	5	99.4	7
09020104-Upper Red	22	21	14	57	67.1	5	25	1	5	97.1	10
09020105-Western Wild Rice	24	21	16	61	71.8	5	25	3	15	111.8	3
09020107-Elm-Marsh	21	20	13	54	63.5	4	20	1	5	88.5	22
09020109-Goose	26	18	13	57	67.1	4	20	4	20	107.1	4
09020201-Devils Lake	25	17	10	52	61.2	1	5	5	25	91.2	19
09020202-Upper Sheyenne	22	13	9	44	51.8	5	25	4	20	96.8	11
09020203-Middle Sheyenne	26	15	14	55	64.7	5	25	5	25	114.7	1
09020204-Lower Sheyenne	25	20	13	58	68.2	5	25	4	20	113.2	2
09020205-Maple	17	18	9	44	51.8	5	25	1	5	81.8	33
09020301-Sandhill-Wilson	20	25	13	58	68.2	3	15	1	5	88.2	23
09020306-Grand Marais-Red	20	18	13	51	60.0	1	5	1	5	70.0	44
09020307-Turtle	23	23	11	57	67.1	3	15	1	5	87.1	25
09020308-Forest	23	19	10	52	61.2	3	15	1	5	81.2	36
09020310-Park	20	20	12	52	61.2	3	15	1	5	81.2	36
09020311-Lower Red	20	20	13	53	62.4	1	5	1	5	72.4	42
09020313-Pembina	25	17	11	53	62.4	3	15	4	20	97.4	9
10060005-Charlie-Little Muddy	16	14	21	51	60.0	1	5	1	5	70.0	44
10060006-Big Muddy	14	14	22	50	58.8	1	5	1	5	68.8	46
10060007-Brush Lake Closed...	17	12	18	47	55.3	1	5	5	25	85.3	27
10100004-Lower Yellowstone	19	11	17	47	55.3	3	15	1	5	75.3	41
10110101-Lake Sakakawea	22	14	13	49	57.6	4	20	3	15	92.6	16
10110102-Little Muddy	20	14	14	48	56.5	1	5	1	5	66.5	48
10110201-Upper Little Missouri	19	10	14	43	50.6	1	5	5	25	80.6	38
10110202-Boxelder	18	5	11	34	40.0	1	5	1	5	50.0	50
10110203-Middle Little...	19	7	17	43	50.6	2	10	3	15	75.6	40
10110204-Beaver	18	10	19	47	55.3	1	5	5	25	85.3	27
10110205-Lower Little Missouri	19	5	14	38	44.7	3	15	1	5	64.7	49
10130101-Painted Woods-Squ...	26	15	13	54	63.5	3	15	3	15	93.5	15
10130102-Upper Lake Oahe	25	12	17	54	63.5	1	5	3	15	83.5	32
10130103-Apple	24	12	14	50	58.8	2	10	3	15	83.8	31
10130104-Beaver	22	8	13	43	50.6	4	20	5	25	95.6	12
10130106-West Missouri Coteau	22	15	20	57	67.1	1	5	4	20	92.1	17
10130201-Knife	22	12	18	52	61.2	4	20	1	5	86.2	26
10130202-Upper Heart	20	13	23	56	65.9	3	15	5	25	105.9	5
10130203-Lower Heart	21	10	19	50	58.8	4	20	4	20	98.8	8
10130204-Upper Cannonball	17	8	17	42	49.4	4	20	4	20	89.4	21
10130205-Cedar	19	6	16	41	48.2	4	20	4	20	88.2	23
10130206-Lower Cannonball	20	5	18	43	50.6	3	15	1	5	70.6	43
10130301-North Fork Grand	19	8	19	46	54.1	1	5	5	25	84.1	29
10130303-Grand	17	9	18	44	51.8	5	25	1	5	81.8	33
10160001-James Headwaters	21	18	12	51	60.0	2	10	4	20	90.0	20
10160002-Pipestem	23	11	16	50	58.8	1	5	1	5	68.8	46
10160003-Upper James	24	20	14	58	68.2	4	20	3	15	103.2	6
10160004-Elm	18	10	14	42	49.4	5	25	4	20	94.4	14