APPENDIX A

STATE SOIL GEOGRAPHIC DATABASE (STATSGO) DATA FOR MONTANA SOILS

Source: U.S. Department of Agriculture, Natural Resource Conservation Service (USDA NRSC). 1996 (1998). The State Soils Geographic Database (STATSGO) (for Montana). Acquired from the Internet: http://www.ftw.nrcs.usda.gov/stat_data.html.

?? Exhibit A-1: STATSGO Soils Types, Billings RMP Area

?? Exhibit A-2: Areal Extent of Soil Map Units for Billings RMP Area

?? Exhibit A-3: Soil Series Characteristics for Billings RMP Area

?? Exhibit A-4: STATSGO Soils Types, Powder River RMP Area

?? Exhibit A-5: Areal Extent of Soil Map Units for Powder River RMP Area

?? Exhibit A-6: Soil Series Characteristics for Powder River RMP Area

?? Exhibit A-7: Mean Soil K-factor by STATSGO Map Unit, Billings RMP Area

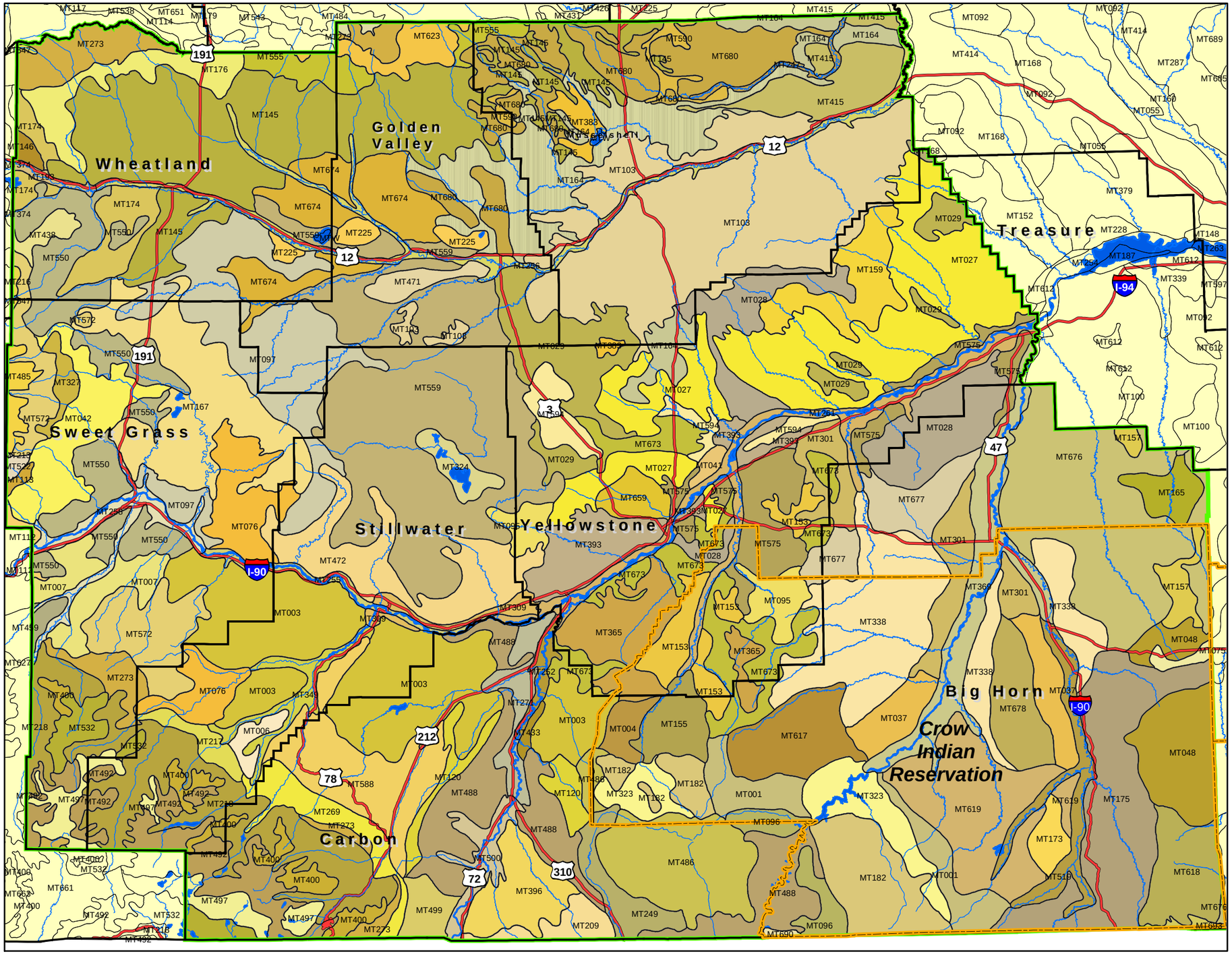
?? Exhibit A-8: Mean Soil K-factor by STATSGO Map Unit, Powder River RMP Area

?? Exhibit A-9: Mean Soil Salinity by STATSGO Map Unit, Billings RMP Area

?? Exhibit A-10: Mean Soil Salinity by STATSGO Map Unit, Powder River RMP Area

?? Exhibit A-11: Statewide Maximum Soil SAR by STATSGO Map Unit

Exhibit A-1: STATSGO Soils Types Billings RMP Area

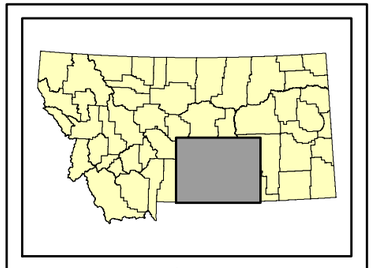


Legend

- Rivers
- Highways
- Billings RMP Area
- Native American Reservations

Map Unit

MT001, MT003, MT004, MT006, MT007, MT027, MT028, MT029, MT037, MT041, MT042, MT048, MT075, MT076, MT092, MT095, MT096, MT100, MT103, MT112, MT113, MT114, MT120, MT145, MT146, MT152, MT153, MT155, MT157, MT159, MT164, MT165, MT167, MT168, MT173, MT174, MT175, MT176, MT182, MT193, MT209, MT214, MT217, MT218, MT225, MT247, MT249, MT252, MT255, MT256, MT258, MT261, MT269, MT271, MT273, MT301, MT309, MT323, MT324, MT327, MT338, MT349, MT365, MT369, MT374, MT383, MT393, MT396, MT400, MT415, MT433, MT438, MT459, MT471, MT472, MT484, MT485, MT486, MT488, MT492, MT497, MT499, MT500, MT501, MT502, MT509, MT519, MT522, MT532, MT538, MT547, MT550, MT555, MT559, MT572, MT575, MT588, MT590, MT594, MT596, MT597, MT617, MT618, MT619, MT623, MT659, MT661, MT673, MT674, MT676, MT677, MT678, MT680, MT690, MT693, MTW



Location Map

Date Prepared: April 2, 2001

Prepared by: J. Patton

Project Mgr.: D. Arthur

N W E S

1:850,000

20 10 0 20 Miles

20,000 10,000 0 20,000 40,000 Meters

DATA SOURCES

Counties: 1:100,000 scale, counties, Montana State Library/NRIS, Helena, Montana
Highways: 1:100,000 scale, roads, Montana State Library/NRIS, Helena, Montana.
Reservations: 1:100,000 scale, reservations, Montana State Library/NRIS, Helena, Montana.
Rivers: 1:100,000 scale, rivers, Montana State Library/NRIS, Helena, Montana.
Soils: 1:250,000 scale, USDA NRCS, STATSGO Database for Montana.

EXHIBIT A-2

AREAL EXTENT OF SOIL MAP UNITS FOR BILLINGS RMA

STATSGO Map Unit	Acres	% Area	STATSGO Map Unit	Acres	% Area	STATSGO Map Unit	Acres	% Area
MT001	93,754	0.87	MT176	73,711	0.68	MT472	149,344	1.38
MT003	436,268	4.04	MT182	147,700	1.37	MT484	3,611	0.03
MT004	23,322	0.22	MT193	8,546	0.08	MT485	21,066	0.20
MT006	15,901	0.15	MT209	31,675	0.29	MT486	159,584	1.48
MT007	70,560	0.65	MT213	298	<0.01	MT488	236,799	2.19
MT027	424,075	3.93	MT216	2,132	0.02	MT492	127,770	1.18
MT028	205,254	1.90	MT217	22,544	0.21	MT497	68,075	0.63
MT029	171,071	1.59	MT218	257,150	2.38	MT499	28,655	0.27
MT037	83,773	0.78	MT225	26,205	0.24	MT500	40,683	0.38
MT041	8,032	0.07	MT247	10,450	0.10	MT519	68,982	0.64
MT042	107,565	1.00	MT249	48,815	0.45	MT522	4,497	0.04
MT048	123,830	1.15	MT252	16,832	0.16	MT532	48,413	0.45
MT075	9,025	0.08	MT255	25,454	0.24	MT538	25	<0.01
MT076	121,597	1.13	MT256	88,473	0.82	MT547	1,244	0.01
MT092	10	<0.01	MT258	50,431	0.47	MT550	227,202	2.11
MT095	57,076	0.53	MT261	111,403	1.03	MT555	53,564	0.50
MT096	43,281	0.40	MT269	58,449	0.54	MT559	567,531	5.26
MT097	283,471	2.63	MT271	43,967	0.41	MT572	142,349	1.32
MT100	846	0.01	MT273	126,307	1.17	MT575	140,714	1.30
MT103	577,016	5.35	MT301	112,102	1.04	MT588	149,865	1.39
MT112	5,667	0.05	MT309	23,490	0.22	MT590	22,004	0.20
MT113	4,089	0.04	MT323	104,714	0.97	MT594	60,705	0.56
MT114	3	<0.01	MT324	28,542	0.26	MT617	91,333	0.85
MT120	47,803	0.44	MT327	17,866	0.17	MT618	78,598	0.73
MT145	545,006	5.05	MT338	303,030	2.81	MT619	186,591	1.73
MT146	7,046	0.07	MT349	39,683	0.37	MT623	41,880	0.39
MT152	12	<0.01	MT365	116,071	1.08	MT659	29,616	0.27
MT153	72,675	0.67	MT369	141,367	1.31	MT661	3,050	0.03
MT155	49,063	0.45	MT374	7	<0.01	MT673	179,618	1.66
MT157	30,028	0.28	MT383	23,594	0.22	MT674	147,969	1.37
MT159	84,373	0.78	MT393	103,536	0.96	MT676	325,430	3.02
MT164	278,907	2.58	MT396	76,447	0.71	MT677	82,348	0.76
MT165	33,440	0.31	MT400	56,548	0.52	MT678	70,647	0.65
MT167	216,026	2.00	MT415	93,856	0.87	MT680	214,696	1.99
MT168	2,477	0.02	MT433	5,480	0.05	MT690	2,718	0.03
MT173	22,680	0.21	MT438	16,109	0.15	MT693	5,734	0.05
MT174	72,377	0.67	MT459	9,292	0.09	MTW	2,525	0.02
MT175	230,386	2.14	MT471	24,662	0.23			

* Acreages are approximate - taken from 1:250,000 STATSGO Maps

EXHIBIT A-3

SOIL SERIES CHARACTERISTICS FOR BILLINGS RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT103	CABBART	loam	0.37	3	6-45	0-4	
(5.4 %)	DELPOINT	loam	0.37	3	15-35	0-4	
	CABBART	loam	0.37	3	6-45	0-4	
	YAMAC	loam	0.37	5	2-8		
	HAVRE	loam	0.37	8	0-2	0-2	
	HAVRE	loam	0.37	10	0-2	0-2	
	HARLEM	silty clay	0.32	10	0-2	2-4	
	TWILIGHT	fine sandy loam	0.2	4	2-15		
MT559	TANNA	clay loam	0.37	6	2-8		
(5.3 %)	RENTSAC	channery-loam	0.2	7	4-15		
	YAWDIM	clay loam	0.37	3	25-60		
	TANNA	clay loam	0.37	6	8-15		
	LAMBETH	silt loam	0.43	4	15-45		
	ABSHER	silty clay loam	0.43	5	0-6	4-8	1-5
	BIRNEY	channery-loam	0.2	5	25-45	0-2	
	BEENOM	loam	0.37	7	4-8		
	LARDELL	clay loam	0.37	8	0-2	16-16	8-50
	BONFRI	loam	0.37	7	2-8		
	LAMBETH	silt loam	0.43	4	2-8		
	ASSINNIBOINE	fine sandy loam	0.24	6	2-15		
MT145	CRAGO	loam	0.37	4	0-4		
(5.1%)	MUSSELSHELL	loam	0.37	3	0-2		
	CRAGO	gravelly-loam	0.2	4	0-4		
	ATTEWAN	loam	0.37	6	0-2		
	YAWDIM	silty clay	0.32	3	4-35		
	VERSON	clay loam	0.37	4	0-4		
	CRAGO	gravelly-loam	0.2	4	4-35		
	EVANSTON	loam	0.37	8	0-2		
	ETHRIDGE	clay loam	0.37	6	0-2		
	CABBART	loam	0.37	3	8-35	0-4	
	DELPOINT	loam	0.37	3	8-15	0-4	
MT003	ABSAROKEE	clay loam	0.32	8	2-8	0-2	
(4.0 %)	ABSAROKEE	clay loam	0.32	8	8-15	0-2	
	WAYDEN	clay loam	0.37	6	15-50	0-4	
	ABSAROKEE	clay loam	0.32	8	15-50	0-2	
	CASTNER	channery-loam	0.2	6	15-50		
	SINNIGAM	clay loam	0.37	6	2-15		
	SINNIGAM	clay loam	0.37	6	15-50		
	WORK	loam	0.37	6	4-8		
	HILGER	channery-sandy loam	0.15	5	25-60		
	CASTNER	stony-loam	0.2	6	25-60		
	WINKLER	gravelly-sandy loam	0.15	8	25-60		
	REEDER	loam	0.32	8	15-35		
	FARNUF	loam	0.37	7	4-8		
	WORK	loam	0.37	6	8-15		
	AMHERST	loam	0.37	5	4-15		
	CASTNER	loam	0.32	6	4-15		
	USTIC TORRIFLUVENTS	loam	0.37	7	0-4	0-2	
	GRAIL	clay loam	0.32	10	4-8	0-2	

Note: Only the top 15 Map Units based on total acreage are included (% in parnthesis). This represents 48% of the soils in the study area.

EXHIBIT A-3

SOIL SERIES CHARACTERISTICS FOR BILLINGS RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT027	BAINVILLE	loam	0.37	4	2-15		
(3.9 %)	CABBART	clay loam	0.32	3	4-35	0-4	
	MCRAE	loam	0.37	5	7-15	0-2	
	BAINVILLE	loam	0.37	4	7-30		
	TRAVESSILLA FAMILY	loam	0.32	2	4-15		
	MCRAE	loam	0.37	5	0-7	0-2	
	YAWDIM	clay loam	0.37	3	4-25		
	DAST	fine sandy loam	0.2	3	2-15		
	CUSHMAN	loam	0.37	7	1-7	0-2	
	LOTHAIR	silty clay loam	0.37	3	3-15	0-4	
	ABOR	clay loam	0.43	6	2-7	0-4	
	HAVRE	silty clay loam	0.32	8	0-4	0-2	
	LOTHAIR	silty clay loam	0.37	3	0-35	0-4	
	HARLEM	silty clay loam	0.37	10	0-4	0-4	0-4
	HAVRE	loam	0.37	8	0-4	8-16	0-4
	VANANDA	silty clay	0.37	3	1-7	4-8	1-12
MT676	YAWDIM	silty clay loam	0.37	3	8-35		
(3.3 %)	DELPOINT	loam	0.37	3	15-35	0-4	
	DELPOINT	loam	0.37	3	8-15	0-4	
	THURLOW	silty clay loam	0.32	4	0-8		
	MCRAE	loam	0.37	5	1-8	0-2	
	DELPOINT FAMILY	stony-loam	0.24	2	15-70		
	FORELLE	loam	0.37	4	8-15		
	DAST	fine sandy loam	0.2	3	2-15		
	HARLEM	silty clay loam	0.37	10	0-4	2-4	
	ABOR	clay	0.37	6	0-15	0-4	
	VANDA	clay	0.37	4	1-8	2-8	20-30
	GERDRUM	clay	0.37	4	0-8	0-2	
	VANDA FAMILY	clay loam	0.37	6	0-4	8-16	20-30
	TRAVESSILLA FAMILY	loam	0.32	2	2-15		
MT338	LISAM	clay	0.37	3	4-35	0-2	
(2.8 %)	ABOR	clay	0.37	6	4-15	0-4	
	VANDA	clay	0.37	4	0-8	2-8	20-30
	MARIAS	silty clay	0.37	6	0-8	0-4	1-4
	ABOR	clay	0.37	6	25-45	0-4	
	GERDRUM	clay	0.37	4	0-8	0-2	
	KEISER	silty clay loam	0.28	3	2-8		
	HYDRO	silty clay loam	0.32	7	0-8		
	LAMBETH	silt loam	0.43	4	8-15		
	HAVRE	loam	0.37	8	0-4	0-2	
MT097	CABBART	loam	0.37	3	8-35	0-4	
(2.6 %)	RENTSAC	channery-loam	0.2	7	8-35		
	DELPOINT	loam	0.37	3	8-15	0-4	
	TRAVESSILLA FAMILY	fine sandy loam	0.2	2	8-35		
	YAWDIM	clay loam	0.37	3	15-35		
	EVANSTON	loam	0.37	8	0-4		
	DELPOINT	loam	0.37	3	2-8	0-4	
	CAMBETH	silt loam	0.37	6	2-8		
	KOBAR	clay	0.32	6	2-4	0-2	1-5
	YAMAC	loam	0.37	5	2-8		
	ETHRIDGE	clay loam	0.37	6	2-8		
	CAMBETH	silt loam	0.37	6	8-15		

Note: Only the top 15 Map Units based on total acreage are included (% in parnthesis). This represents 48% of the soils in the study area.

EXHIBIT A-3

SOIL SERIES CHARACTERISTICS FOR BILLINGS RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
	MARMARTH	fine sandy loam	0.2	7	2-8		

Note: Only the top 15 Map Units based on total acreage are included (% in parnthesis). This represents 48% of the soils in the study area.

EXHIBIT A-3

SOIL SERIES CHARACTERISTICS FOR BILLINGS RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT164	DELPOINT	loam	0.37	3	2-15	0-4	
(2.6 %)	CABBART	loam	0.37	3	2-15	0-4	
	CABBART	loam	0.37	3	15-35	0-4	
	YAMAC	loam	0.37	5	2-15		
	HARLEM	silty clay	0.32	10	0-2	2-4	
	TWILIGHT	fine sandy loam	0.2	4	2-15		
	HAVRE	loam	0.37	8	0-2	0-2	
	GERDRUM	clay loam	0.43	4	1-8	0-2	
	BLACKHALL	fine sandy loam	0.2	7	15-35		
	EVANSTON	loam	0.37	8	2-8		
	CRAGO	gravelly-loam	0.2	4	0-2		
MT218	SHADOW	stony-loam	0.1	3	25-60		
(2.4 %)	MACFARLANE	very stony-loam	0.05	18	25-50		
	GARLET	stony-loam	0.2	4	25-60		
	PEELER	stony-sandy loam	0.17	20	25-60		
	COWOOD	very channery-loam	0.15	4	15-60		
	CHEADLE	channery-loam	0.2	4	15-60		
	GARLET	channery-loam	0.2	4	25-60		
	SEBUD	stony-loam	0.2	4	15-45		
	SHADOW	stony-loam	0.1	3	25-60		
	WOROCK	stony-loam	0.24	18	15-55		
MT488	MIDWAY	silty clay loam	0.43	3	15-45	2-4	
(2.2 %)	TRAVESSILLA FAMILY	silt loam	0.32	2	15-70		
	MCRAE	loam	0.37	5	25-35	0-2	
	BOWBAC	loam	0.37	5	8-15		
	LISMAS FAMILY	clay	0.37	2	8-15	0-8	
	SHINGLE	loam	0.32	4	15-45	0-2	
	RENTSAC	loam	0.32	7	25-40		
	ALLENTINE	clay loam	0.37	10	2-4		
	TOLUCA	clay loam	0.32	5	4-8	0-2	
	TRAVESSILLA FAMILY	silt loam	0.32	2	4-8		
	CUSHMAN	loam	0.37	7	25-35	0-2	
	HAVERSON	silty clay loam	0.28	6	0-4	0-8	
	NELSON	fine sandy loam	0.2	9	15-30	0-2	
MT175	DONEY	loam	0.37	4	8-15	0-2	
(2.1 %)	DONEY	loam	0.37	4	8-70	0-2	
	WAYDEN	silty clay loam	0.37	6	8-35	0-4	
	SHAAK	clay loam	0.37	6	2-15		
	SHAAK	clay loam	0.37	6	1-8		
	EVANSTON	loam	0.37	8	4-8		
	FARNUF FAMILY	loam	0.32	11	2-15		
	REEDER FAMILY	loam	0.32	5	3-15		
	DAST	sandy loam	0.2	3	8-15		
	KORCHEA FAMILY	loam	0.37	7	0-4		
	DAST	sandy loam	0.2	3	25-50		
MT550	SWEETGRASS	cobbly-	0.17	4	0-4		
(2.1 %)	HILGER	cobbly-loam	0.2	5	2-4		
	FAIRFIELD	gravelly-clay	0.17	7	2-4		
	MARTINSDALE	loam	0.37	6	2-4		
	HILGER	stony-loam	0.15	5	2-25		
	WORK	clay loam	0.32	6	2-8		
	TURNER	loam	0.37	7	2-4		

Note: Only the top 15 Map Units based on total acreage are included (% in parnthesis). This represents 48% of the soils in the study area.

EXHIBIT A-3

SOIL SERIES CHARACTERISTICS FOR BILLINGS RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
	BEAVERTON	gravelly-loam	0.2	7	2-8		
	BIG TIMBER	clay loam	0.32	6	8-15	0-2	
	CASTNER	stony-loam	0.2	6	2-25		

Note: Only the top 15 Map Units based on total acreage are included (% in parnthesis). This represents 48% of the soils in the study area.

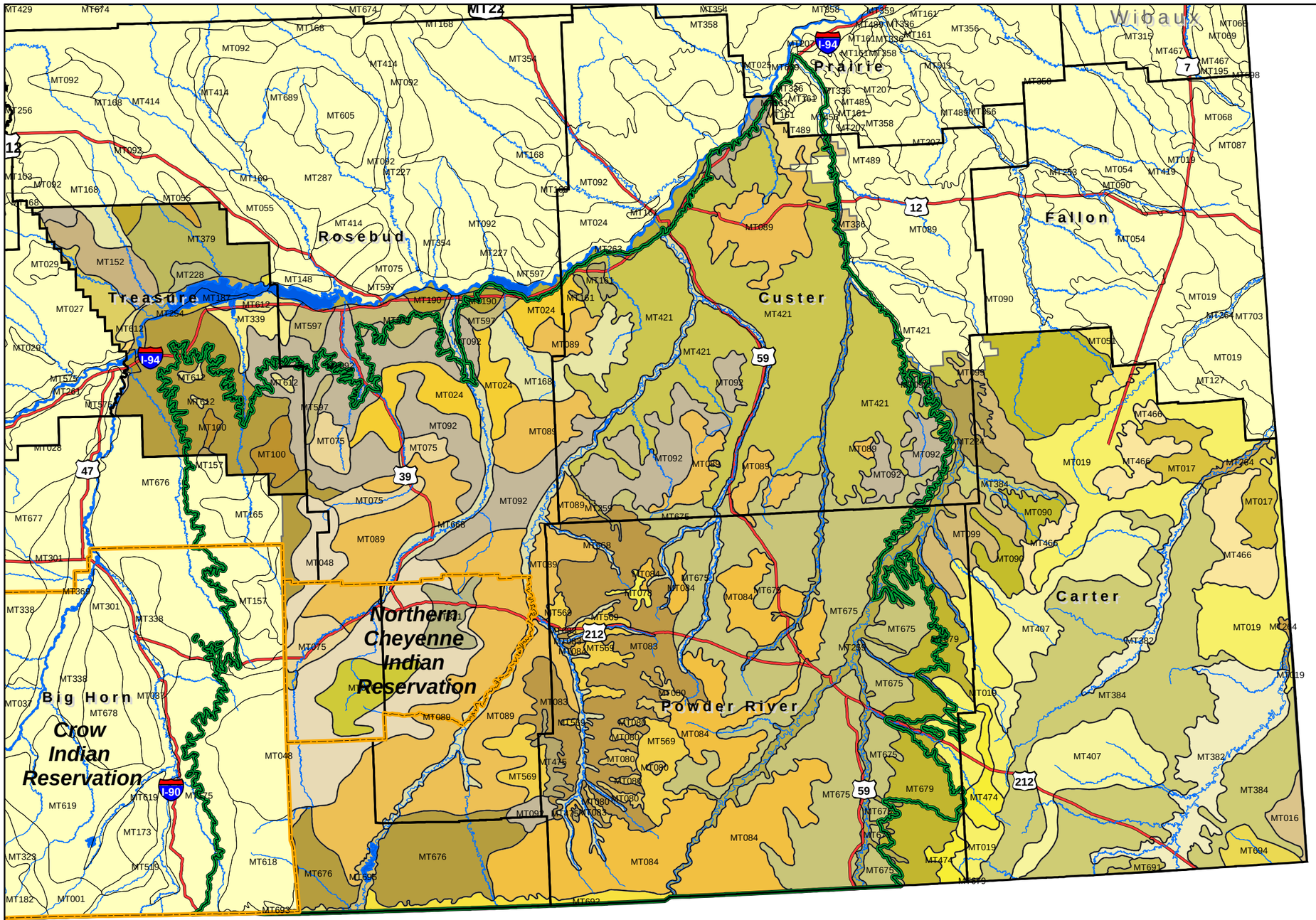
EXHIBIT A-3

SOIL SERIES CHARACTERISTICS FOR BILLINGS RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT167	TRAVESSILLA FAMILY	fine sandy loam	0.2	2	8-35		
(2.0 %)	DELPOINT	loam	0.37	3	8-15	0-4	
	CABBART	loam	0.37	3	8-35	0-4	
	RENTSAC	channery-loam	0.2	7	8-35		
	MARMARTH	loam	0.37	7	4-15		
	YAWDIM	clay loam	0.37	3	8-35		
	CAMBETH	silt loam	0.37	6	4-15		
	TANNA	clay loam	0.37	6	4-15		
	DELPOINT	loam	0.37	3	4-8	0-4	
	FLOWEREE	silty clay loam	0.32	6	0-4	0-2	
	EVANSTON	loam	0.37	8	4-8		
MT680	YAWDIM	silty clay	0.32	3	4-15		
(2.0 %)	ORINOCO	silty clay	0.28	7	4-15		
	AMHERST	clay loam	0.32	5	1-15		
	GERDRUM	clay loam	0.43	4	1-6	0-2	
	ETHRIDGE	clay loam	0.37	6	2-8		
	ZATOVILLE	silty clay loam	0.37	3	1-6	0-2	
	HARLEM	silty clay	0.32	10	0-2	2-4	
	TEIGEN	silty clay loam	0.37	4	1-6		
	WEINGART	silty clay loam	0.43	7	1-8	0-2	10-20
	AMHERST	clay loam	0.32	5	15-25		
	JULIN	silty clay loam	0.37	7	4-10		
	VOLBORG	silty clay	0.32	3	4-25	0-4	
	CRAGO	gravely-loam	0.2	4	15-35		

Note: Only the top 15 Map Units based on total acreage are included (% in parnthesis). This represents 48% of the soils in the study area.

Exhibit A-4: STATSGO Soils Types Powder River RMP Area



Legend

- Highways
- Rivers
- Powder River Geologic Basin Boundary
- Native American Reservations

Map Unit

MT016	MT148	MT407
MT017	MT152	MT414
MT019	MT157	MT421
MT024	MT161	MT456
MT027	MT168	MT466
MT029	MT175	MT474
MT048	MT187	MT475
MT051	MT190	MT489
MT054	MT224	MT569
MT055	MT228	MT575
MT070	MT254	MT597
MT075	MT259	MT612
MT078	MT261	MT618
MT080	MT263	MT668
MT083	MT264	MT669
MT084	MT321	MT675
MT089	MT336	MT676
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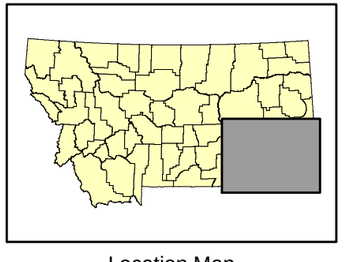
MT127	MT384	MT694
		MT695



Location Map

Date Prepared: April 2, 2001
Prepared by: J. Patton
Project Mgr.: D. Arthur

N W E S

1:980,000

20 10 0 20 Miles
20,000 10,000 0 20,000 40,000 Meters

DATA SOURCES

Counties: 1:100,000 scale, counties, Montana State Library/NRIS, Helena, Montana
Highways: 1:100,000 scale, roads, Montana State Library/NRIS, Helena, Montana.
Reservations: 1:100,000 scale, reservations, Montana State Library/NRIS, Helena, Montana.
Rivers: 1:100,000 scale, rivers, Montana State Library/NRIS, Helena, Montana.
Soils: 1:250,000 scale, USDA NRCS, STATSGO Database for Montana.

EXHIBIT A-5

AREAL EXTENT OF SOIL MAP UNITS FOR POWDER RIVER RMA

STATSGO Map Unit	Acres	% Area	STATSGO Map Unit	Acres	% Area
MT016	21,332	0.25	MT259	173,933	2.03
MT017	78,323	0.91	MT261	3,146	0.04
MT019	459,121	5.36	MT263	47,424	0.55
MT024	129,347	1.51	MT264	10,938	0.13
MT027	29,864	0.35	MT321	35,383	0.41
MT029	565	0.01	MT336	5,762	0.07
MT048	304,837	3.56	MT339	28,331	0.33
MT051	21,144	0.25	MT369	2,414	0.03
MT054	2	<0.01	MT379	97,192	1.14
MT055	3,927	0.05	MT382	200,503	2.34
MT070	56,522	0.66	MT384	677,263	7.91
MT075	95,847	1.12	MT407	253,541	2.96
MT078	6,969	0.08	MT414	7,787	0.09
MT080	38,170	0.45	MT421	829,387	9.69
MT083	300,378	3.51	MT456	4,780	0.06
MT084	493,159	5.76	MT466	136,554	1.60
MT089	827,152	9.66	MT474	42,375	0.49
MT090	183,942	2.15	MT475	16,537	0.19
MT092	552,851	6.46	MT489	17,571	0.21
MT099	116,567	1.36	MT569	116,568	1.36
MT100	30,892	0.36	MT575	1,160	0.01
MT127	6	<0.01	MT597	72,598	0.85
MT148	1,072	0.01	MT612	30,042	0.35
MT152	54,694	0.64	MT618	3,515	0.04
MT157	1,109	0.01	MT668	211,006	2.46
MT161	10,319	0.12	MT669	22,214	0.26
MT168	103,294	1.21	MT675	758,425	8.86
MT175	2,526	0.03	MT676	445,328	5.20
MT187	9,089	0.11	MT679	189,351	2.21
MT190	19,800	0.23	MT691	7,403	0.09
MT224	38,201	0.45	MT692	36,589	0.43
MT228	11,675	0.14	MT693	1,971	0.02
MT254	30,577	0.36	MT694	26,102	0.30
			MT695	14,472	0.17

* Acreages are approximate - taken from 1:250,000 STATSGO Maps

EXHIBIT A-6
SOIL SERIES CHARACTERISTICS FOR POWDER RIVER RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT421	CAMBETH	silt loam	0.37	6	4-25		
(9.7 %)	MEGONOT	silty clay loam	0.37	5	4-15		
	MANNING	loam	0.32	5	8-15		
	CABBART	loam	0.37	3	15-45	0-4	
	CREED	loam	0.43	6	0-8	0-4	
	YAMAC	loam	0.37	5	0-15		
	GERDRUM	silty clay loam	0.43	4	0-8	0-2	
	ABOR	silty clay	0.37	6	15-25	0-4	
	KOBAR	silty clay loam	0.37	6	0-8	0-2	1-5
	DAVIDELL	silty clay loam	0.32	7	0-4		
	MARVAN	silty clay	0.37	4	0-8	0-4	0-4
MT089	CABBART	loam	0.37	3	15-70	0-4	
(9.7 %)	BIRNEY	channery-loam	0.2	5	25-70	0-2	
	YAMAC	loam	0.37	5	15-25		
	KIRBY	channery-loam	0.17	4	25-70	0-2	
	BIRNEY	channery-loam	0.2	5	4-25	0-2	
	YAMAC	loam	0.37	5	2-15		
	KOBAR	silty clay loam	0.37	6	0-8	0-2	1-5
	KOBAR	silty clay loam	0.37	6	2-15	0-2	1-5
	YAMAC	loam	0.37	5	2-8		
	YAWDIM	silty clay loam	0.37	3	8-70		
	GERDRUM	silty clay loam	0.43	4	0-8	0-2	
	DELPOINT	loam	0.37	3	15-25		
	DELPOINT	loam	0.37	3	25-70	0-4	
	BUSBY	fine sandy loam	0.2	4	8-25		
MT675	YAWDIM	clay loam	0.37	3	8-70		
(8.8 %)	CABBART	silt loam	0.37	3	15-75	0-4	
	THURLOW	silty clay loam	0.32	4	2-15		
	HYDRO	silty clay loam	0.32	7	0-15		
	CABBART	silt loam	0.37	3	8-15	0-4	
	REMMIT	fine sandy loam	0.24	12	4-25		
	CUSHMAN	silt loam	0.37	7	0-15	0-2	
	FLEAK	fine sandy loam	0.2	3	8-45		
	KEISER	silty clay loam	0.28	3	2-8		
	HAVRE	silty clay loam	0.32	8	0-4	0-2	
MT384	MARVAN	silty clay	0.37	4	0-8	0-4	0-4
(7.9 %)	NELDORE	clay	0.32	3	4-15	0-2	
	BASCOVY	clay	0.37	6	2-15	2-4	1-5
	GERDRUM	clay loam	0.43	4	0-8	0-2	
	VANDA	silty clay loam	0.43	4	0-8	2-8	20-30
	ORINOCO	silty clay loam	0.32	7	2-15		
	YAWDIM	silty clay loam	0.37	3	4-15		
	PINELLI	silty clay loam	0.37	3	2-8		
	VOLBORG	clay	0.32	3	4-45	0-4	
	CREED	loam	0.43	6	2-8	0-4	
	HAVRE	loam	0.37	8	0-2	0-2	

Note: Only the top 16 Map Units based on total acreage are included (% in parenthesis). This represents 80% of the soils in the study area. Map Units are presented in decending areal coverage.

EXHIBIT A-6
SOIL SERIES CHARACTERISTICS FOR POWDER RIVER RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT092	CABBART	loam	0.37	3	8-70	0-4	
(6.5 %)	DELPOINT	loam	0.37	3	15-25	0-4	
	YAMAC	loam	0.37	5	2-8		
	YAWDIM	silty clay loam	0.37	3	8-70		
	YAMAC	loam	0.37	5	4-15		
	BUSBY	fine sandy loam	0.2	4	8-25		
	DELPOINT	loam	0.37	3	4-15	0-4	
	ABOR	silty clay	0.37	6	8-25	0-4	
	GERDRUM	clay loam	0.43	4	2-8	0-2	
	DAVIDELL	loam	0.37	7	2-8		
	KOBAR	silty clay loam	0.37	6	0-15	0-2	1-5
	BUSBY	fine sandy loam	0.2	4	2-15		
	HAVRE	loam	0.37	8	0-2	0-2	
MT084	CABBA	silt loam	0.37	3	15-50	0-4	
(5.8 %)	RINGLING	slaty-loam	0.17	5	5-50		
	YAWDIM	clay loam	0.37	3	8-70		
	CABBART	silt loam	0.37	3	15-75	0-4	
	CABBART	silt loam	0.37	3	4-15	0-4	
	RELAN	loam	0.37	13	2-30		
	CUSHMAN	silt loam	0.37	7	2-8	0-2	
	KOBAR	silty clay loam	0.37	6	4-8	0-2	1-5
	KOBAR	silty clay loam	0.37	6	0-4	0-2	1-5
	THURLOW	silty clay loam	0.32	4	0-15		
MT019	ASSINNIBOINE	sandy clay loam	0.32	6	2-8		
(5.4 %)	PRING	sandy loam	0.2	10	2-8		
	ARCHIN	loam	0.43	12	2-8	0-2	
	EVANSTON	loam	0.37	8	2-8		
	YAMAC	loam	0.37	5	2-8		
	TWILIGHT	fine sandy loam	0.2	4	2-15		
	HAVRE	loam	0.37	8	0-2	0-2	
	DELPOINT	loam	0.37	3	8-15	0-4	
	FLEAK	loamy fine sand	0.17	3	15-50		
	GERDRUM	clay loam	0.43	4	0-8	0-2	
	BUSBY	fine sandy loam	0.2	4	2-15		
	CABBART	silt loam	0.37	3	8-15	0-4	
	BLACKHALL	fine sandy loam	0.2	7	8-15		
	BANKS	loamy fine sand	0.17	4	0-4		
	RHAME	fine sandy loam	0.2	8	3-9		
MT676	YAWDIM	silty clay loam	0.37	3	8-35		
(5.2 %)	DELPOINT	loam	0.37	3	15-35	0-4	
	DELPOINT	loam	0.37	3	8-15	0-4	
	THURLOW	silty clay loam	0.32	4	0-8		
	MCRAE	loam	0.37	5	1-8	0-2	
	DELPOINT FAMILY	stony-loam	0.24	2	15-70		
	FORELLE	loam	0.37	4	8-15		
	DAST	fine sandy loam	0.2	3	2-15		
	HARLEM	silty clay loam	0.37	10	0-4	2-4	
	ABOR	clay	0.37	6	0-15	0-4	
	VANDA	clay	0.37	4	1-8	2-8	20-30
	GERDRUM	clay	0.37	4	0-8	0-2	
	VANDA FAMILY	clay loam	0.37	6	0-4	8-16	20-30
	TRAVESSILLA FAMILY	loam	0.32	2	2-15		

Note: Only the top 16 Map Units based on total acreage are included (% in parenthesis). This represents 80% of the soils in the study area. Map Units are presented in decending areal coverage.

EXHIBIT A-6
SOIL SERIES CHARACTERISTICS FOR POWDER RIVER RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT048	BITTON	channery-loam	0.24	11	25-70	0-2	
(3.6 %)	CABBA	loam	0.37	3	8-70	0-4	
	SHAMBO	loam	0.37	5	0-8		
	DONEY	loam	0.37	4	15-70	0-2	
	DONEY	loam	0.37	4	2-35	0-2	
	SHAMBO	loam	0.37	5	8-15		
	RINGLING	channery-loam	0.17	5	3-70		
	SAGEDALE	silty clay loam	0.37	4	8-25		
	WAYDEN	silty clay loam	0.37	6	8-70	0-4	
	SAVAGE	silty clay loam	0.37	6	2-8		
	HAVRE	loam	0.37	8	0-2	0-2	
MT083	CABBA	silt loam	0.37	3	15-50	0-4	
(3.5 %)	RINGLING	slaty-loam	0.17	5	6-50		
	YAWDIM	clay loam	0.37	3	8-70		
	FARLAND	silt loam	0.37	4	0-8		
	CABBART	silt loam	0.37	3	8-75	0-4	
	HAVRELON	silt loam	0.37	13	4-6		
MT407	MOYERSON	silty clay loam	0.32	4	4-50	0-4	
(3.0 %)	ORINOCO	silty clay loam	0.32	7	2-15		
	YAWDIM	silty clay loam	0.37	3	4-15		
	PINELLI	loam	0.32	3	2-8		
	MARVAN	silty clay	0.37	4	0-8	0-4	0-4
	GERDRUM	clay loam	0.43	4	2-8	0-2	
	HAVRE	loam	0.37	8	0-2	0-2	
	VANDA	silty clay loam	0.43	4	0-2	2-8	20-30
MT668	YAMAC	loam	0.37	5	0-8		
(2.5 %)	HAVRE	silty clay loam	0.32	8	0-2	0-2	
	BIRNEY	channery-loam	0.2	5	15-35	0-2	
	KOBAR	silty clay loam	0.37	6	0-8	0-2	1-5
	GERDRUM	clay loam	0.43	4	2-8	0-2	
	HAVRE	silty clay loam	0.32	8	0-2	8-16	0-4
MT382	MARVAN	silty clay	0.37	4	0-8	0-4	0-4
(2.3 %)	GERDRUM	clay loam	0.43	4	0-8	0-2	
	VANDA	silty clay loam	0.43	4	0-8	2-8	20-30
	ABSHER	clay	0.37	5	0-8	4-8	1-5
	HARLEM	silty clay loam	0.37	10	0-2	0-4	0-4
	FORELLE	loam	0.37	4	2-8		
	BICKERDYKE	clay	0.32	4	0-2	0-2	
	HAVRE	loam	0.37	8	0-2	0-2	
	CREED	loam	0.43	6	2-8	0-4	
	NELDORE	clay	0.32	3	4-15	0-2	
	BASCOVY	clay	0.37	6	4-15	2-4	1-5
	TEIGEN	silty clay loam	0.37	4	0-4		
MT679	YAWDIM	clay loam	0.37	3	8-70		
(2.2 %)	HESPER	silty clay loam	0.37	2	0-15		
	CABBART	silt loam	0.37	3	15-75	0-4	
	CABBART	silt loam	0.37	3	8-15	0-4	
	REMMIT	fine sandy loam	0.24	12	4-25		
	GERDRUM	silt loam	0.49	4	0-8	0-2	
	FLEAK	fine sandy loam	0.2	3	8-45		
	FORELLE	silt loam	0.37	4	2-8		
	HAVRE	silt loam	0.37	8	0-4	0-2	

Note: Only the top 16 Map Units based on total acreage are included (% in parenthesis). This represents 80% of the soils in the study area. Map Units are presented in decending areal coverage.

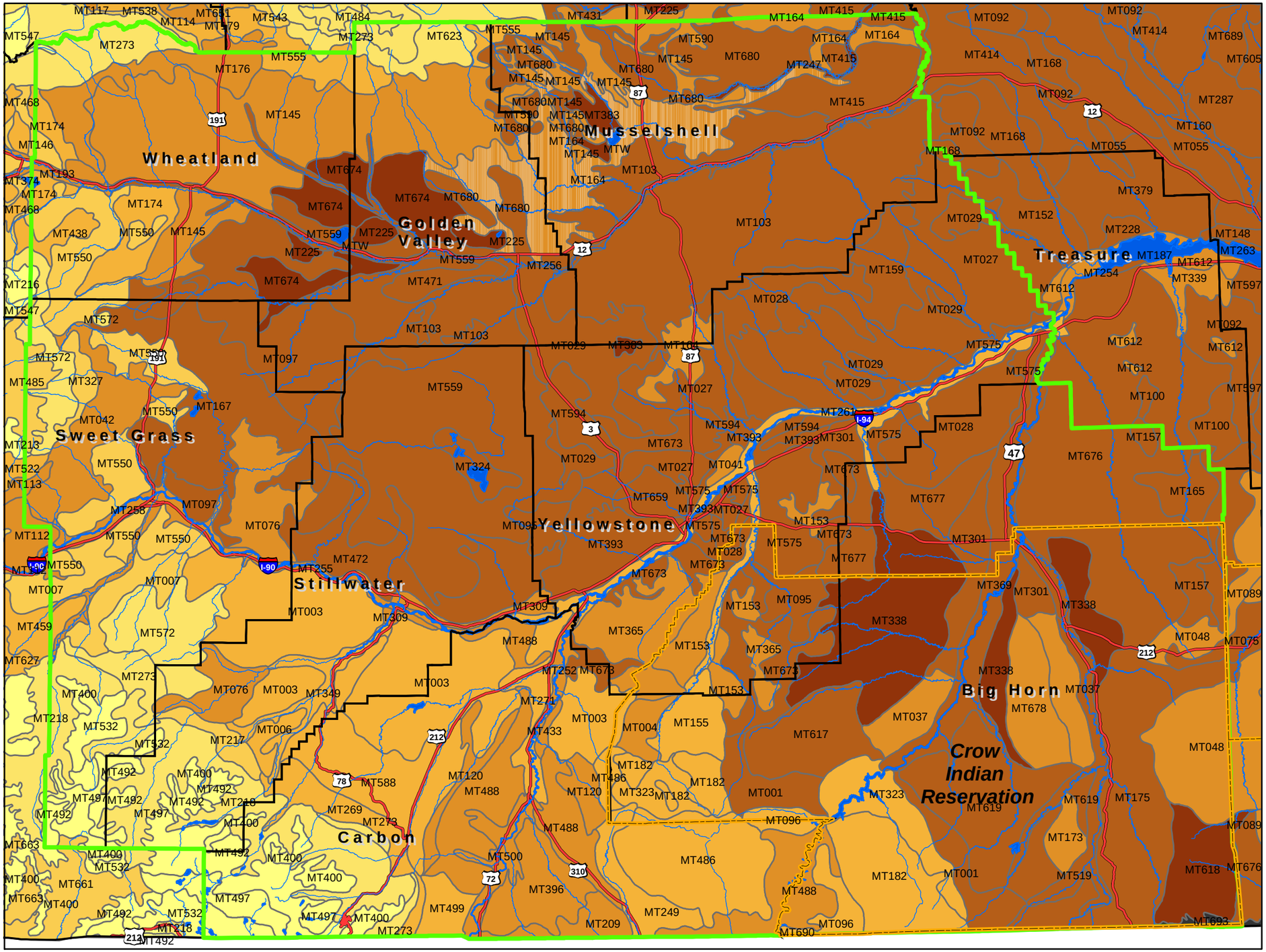
EXHIBIT A-6

SOIL SERIES CHARACTERISTICS FOR POWDER RIVER RMA

STATSGO Map Unit	Soil Series	Surface Texture	K-factor	Depth (in)	Slope (%)	Salinity (mmhos/cm)	SAR
MT090	CABBART	silt loam	0.37	3	2-15	0-4	
(2.2 %)	CAMBETH	silt loam	0.37	6	2-15		
	CABBART	silt loam	0.37	3	15-45	0-4	
	BONFRI	loam	0.37	7	2-15		
	FORELLE	loam	0.37	4	2-8		
	GERDRUM	clay loam	0.43	4	2-8	0-2	
	PINELLI	silty clay loam	0.37	3	2-15		
	HAVRE	loam	0.37	8	0-2	0-2	
	TWILIGHT	fine sandy loam	0.2	4	2-15		
	PARCHIN	fine sandy loam	0.24	3	2-8	0-2	
	KIRBY	channery-loam	0.17	4	8-60	0-2	
	BLACKHALL	fine sandy loam	0.2	7	15-60		
MT259	HAVRE	silt loam	0.37	8	0-4	0-2	
(2.0 %)	HAVRE	silty clay	0.28	8	0-2	0-2	
	HANLY	fine sandy loam	0.17	5	0-4		
	GLENDIVE	fine sandy loam	0.2	5	0-2	0-4	
	HYDRO	silty clay loam	0.32	7	0-2		
	KOBAR	silty clay loam	0.37	6	0-2	0-2	1-5
	HAVRE	loam	0.37	8	0-4	8-16	0-4
	HAVRE	silty clay loam	0.32	8	0-4	0-2	

Note: Only the top 16 Map Units based on total acreage are included (% in parenthesis). This represents 80% of the soils in the study area. Map Units are presented in decending areal coverage.

Exhibit A-7: Mean K-Factor by STATSGO Map Unit Billings RMP Area



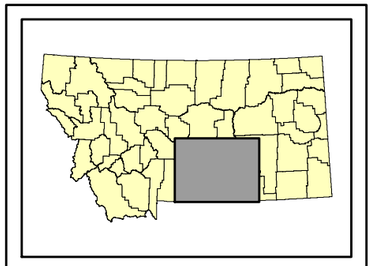
Legend

- Highways
- Rivers
- Native American Reservations

Mean K-FACTOR

- 0 - 0.10
- 0.11 - 0.15
- 0.16 - 0.20
- 0.21 - 0.25
- 0.26 - 0.30
- 0.31 - 0.35
- 0.36 - 0.37
- 0.37 - 0.64

The mean K-factors for the different Soil Map Units are presented. The K-factor and slope are factors that are used in the estimation of soil erosion potential. Values above 0.37 are considered easily eroded. Resistant soils have a K-factor less than 0.37.



Location Map

Date Prepared: April 2, 2001

Prepared by: J. Patton

Project Mgr.: D. Arthur

N W E S

1:850,000

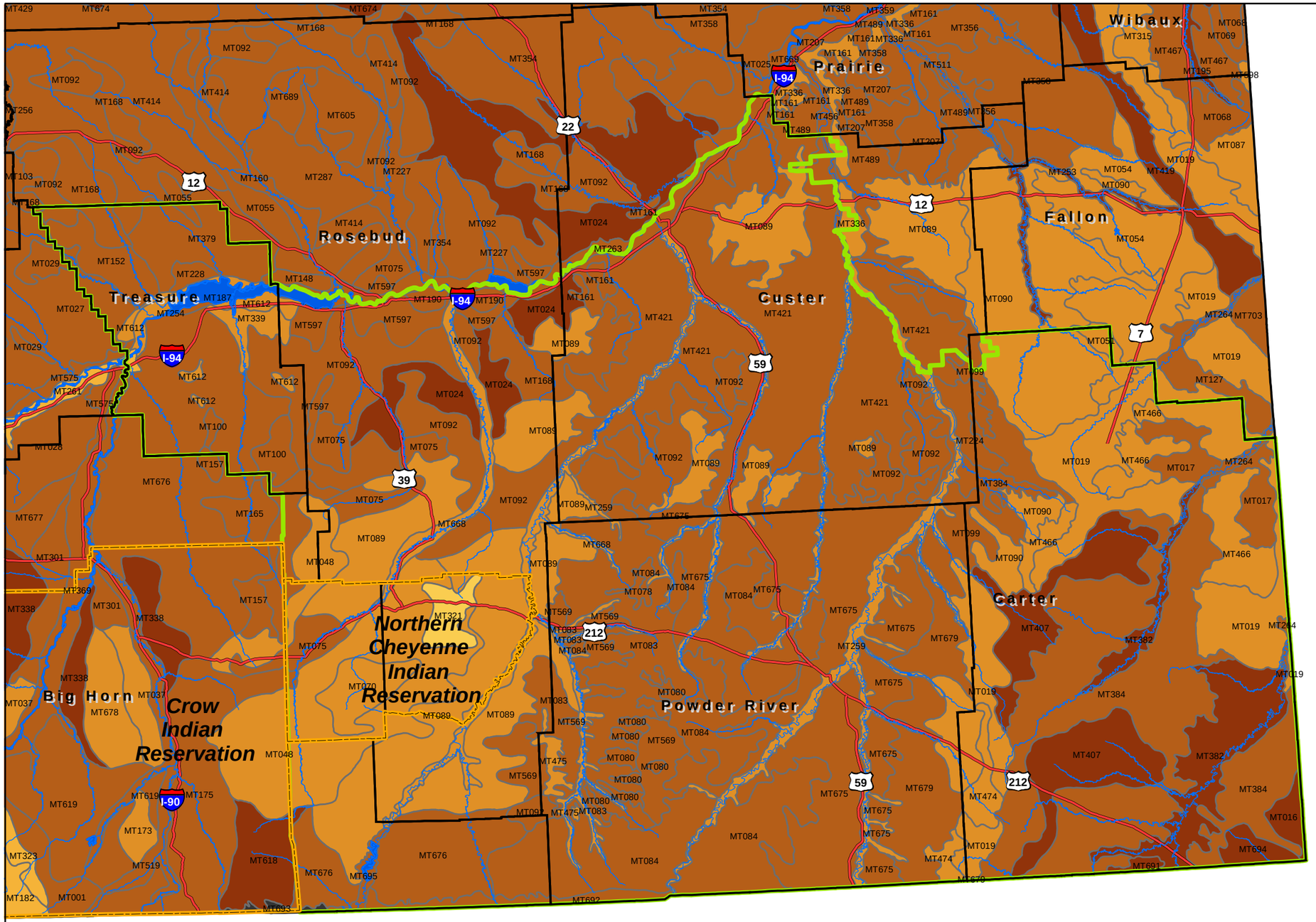
20 10 0 20 Miles

20,000 10,000 0 20,000 40,000 Meters

DATA SOURCES

Counties: 1:100,000 scale, counties, Montana State Library/NRIS, Helena, Montana
Highways: 1:100,000 scale, roads, Montana State Library/NRIS, Helena, Montana.
Reservations: 1:100,000 scale, reservations, Montana State Library/NRIS, Helena, Montana.
Rivers: 1:100,000 scale, rivers, Montana State Library/NRIS, Helena, Montana.
Soils: 1:250,000 scale, USDA NRCS, STATSGO Database for Montana.

Exhibit A-8: Mean K-Factor by STATSGO Map Unit Powder River RMP Area



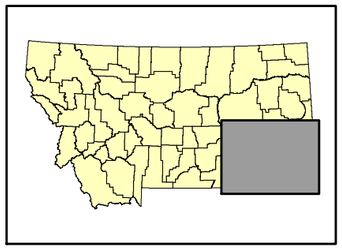
Legend

- Highways
- Rivers
- Native American Reservations

Mean K-FACTOR

- 0 - 0.10
- 0.11 - 0.15
- 0.16 - 0.20
- 0.21 - 0.25
- 0.26 - 0.30
- 0.31 - 0.35
- 0.36 - 0.37
- 0.37 - 0.64

The mean K-factors for the different Soil Map Units are presented. The K-factor and slope are factors that are used in the estimation of soil erosion potential. Values above 0.37 are considered easily eroded. Resistant soils have a K-factor less than 0.37.



Location Map

Date Prepared: April 2, 2001
Prepared by: J. Patton
Project Mgr.: D. Arthur

N W E S

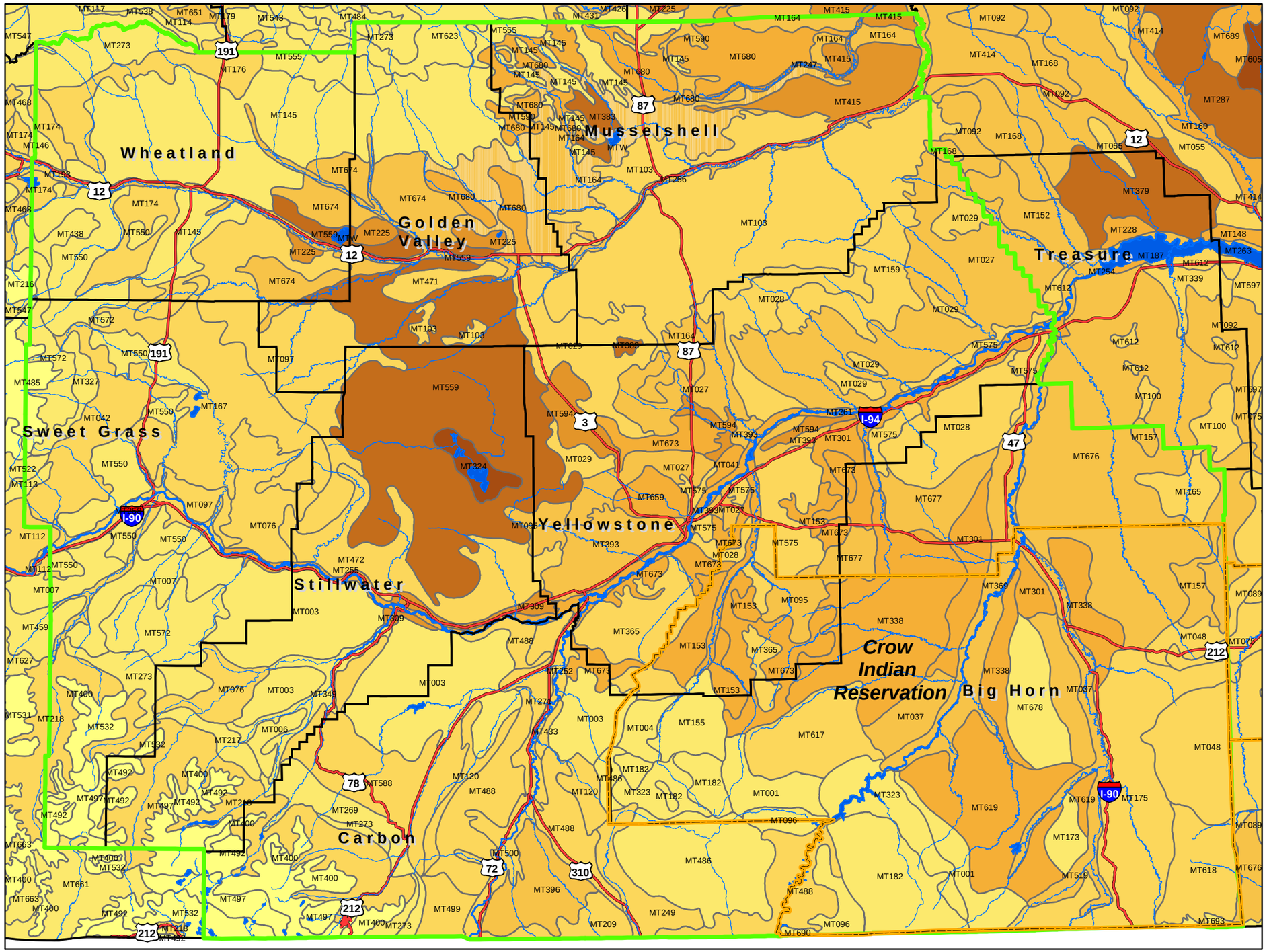
1:980,000

20 10 0 20 Miles
20,000 10,000 0 20,000 40,000 Meters

DATA SOURCES

Counties: 1:100,000 scale, counties, Montana State Library/NRIS, Helena, Montana
Highways: 1:100,000 scale, roads, Montana State Library/NRIS, Helena, Montana.
Reservations: 1:100,000 scale, reservations, Montana State Library/NRIS, Helena, Montana.
Rivers: 1:100,000 scale, rivers, Montana State Library/NRIS, Helena, Montana.
Soils: 1:250,000 scale, USDA NRCS, STATSGO Database for Montana.

Exhibit A-9: Mean Soil Salinity by STATSGO Map Unit Billings RMP Area



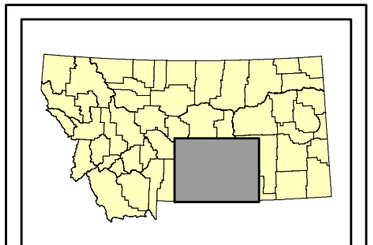
Legend

- Highways
- Rivers
- Billings RMP Area Boundary
- Native American Reservations

Mean Salinity (mmhos/cm)

- 0 - 1.59
- 1.60 - 3.19
- 3.20 - 4.79
- 4.80 - 6.39
- 6.40 - 7.99
- 8.00 - 9.59
- 9.60 - 11.19
- 11.20 - 12.79
- 12.80 - 14.39
- 14.40 - 16

Salinity is a measurement of the salt load on soils and affects crop water availablity. It is a measurement of the electrical conductivity (EC) of the soil. STATSGO provides a range of low and high values for salinity for soils. The mean of the high value of the range was used for this exhibit in order to present conservative values. Actual value ranges are presented in Exhibit A-3 (Billings) A-6 (PRB).



Location Map

Date Prepared: April 2, 2001

Prepared by: J. Patton

Project Mgr.: D. Arthur

N W E S

1:850,000

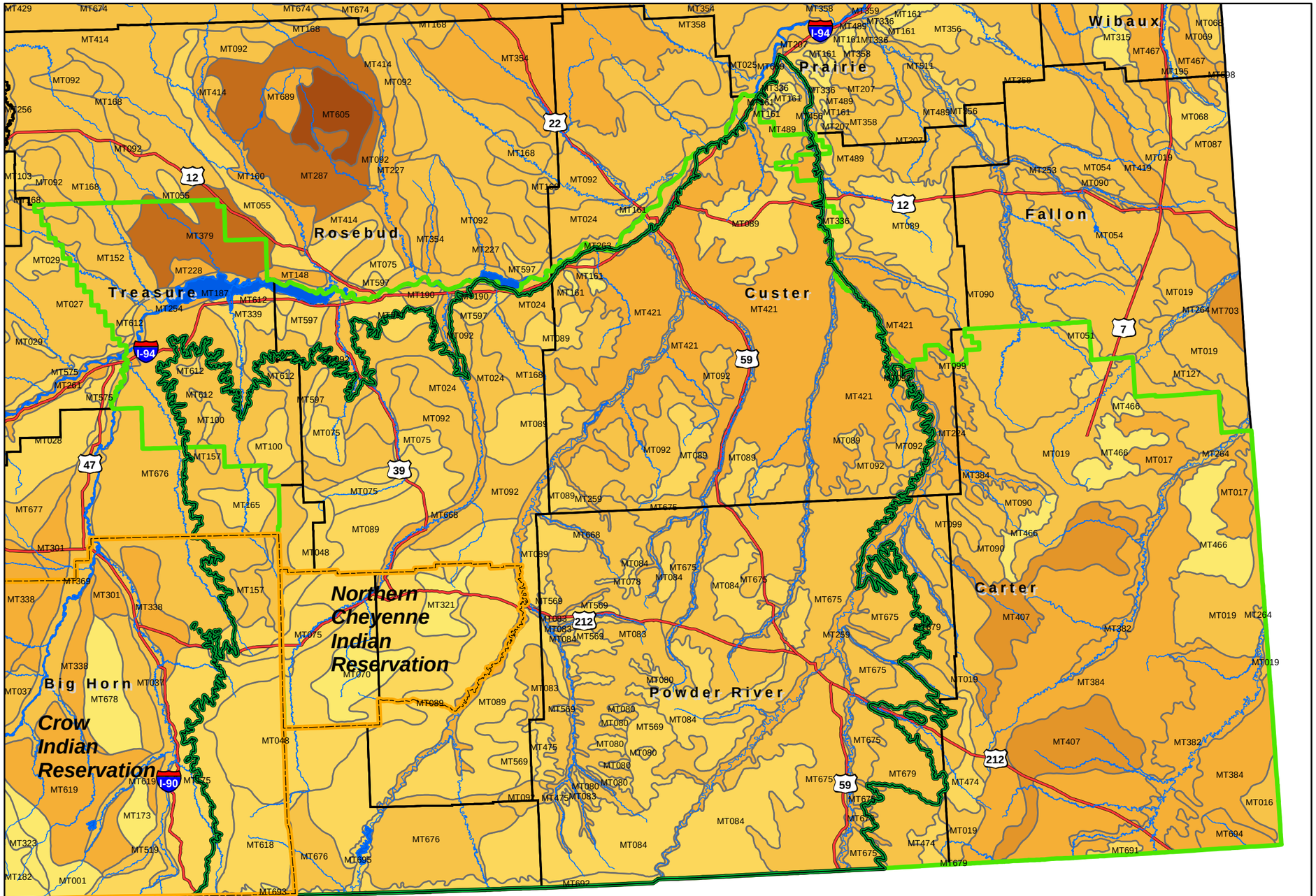
20 10 0 20 Miles

20,000 10,000 0 20,000 40,000 Meters

DATA SOURCES

Counties: 1:100,000 scale, counties, Montana State Library/NRIS, Helena, Montana
Highways: 1:100,000 scale, roads, Montana State Library/NRIS, Helena, Montana.
Reservations: 1:100,000 scale, reservations, Montana State Library/NRIS, Helena, Montana.
Rivers: 1:100,000 scale, rivers, Montana State Library/NRIS, Helena, Montana.
Soils: 1:250,000 scale, USDA NRCS, STATSGO Database for Montana.

Exhibit A-10: Mean Soil Salinity by STATSGO Map Unit Powder River RMP Area



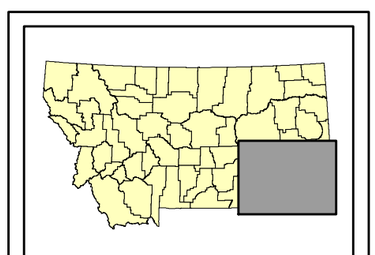
Legend

- Highways
- Rivers
- Native American Reservations
- Powder River RMP Area
- Powder River Geologic Basin Boundary

Mean Salinity (mmhos/cm)

- 0 - 1.59
- 1.60 - 3.19
- 3.20 - 4.79
- 4.80 - 6.39
- 6.40 - 7.99
- 8.00 - 9.59
- 9.60 - 11.19
- 11.20 - 12.79
- 12.80 - 14.39
- 14.40 - 16

Salinity is a measurement of the salt load on soils and affects crop water availablity. It is a measurement of the electrical conductivity (EC) of the soil. STATSGO provides a range of low and high values for salinity for soils. The mean of the high value of the range was used for this exhibit in order to present conservative values. Actual value ranges are presented in Exhibit A-3 (Billings) A-6 (PRB).



Location Map

Date Prepared: April 2, 2001
Prepared by: J. Patton
Project Mgr.: D. Arthur

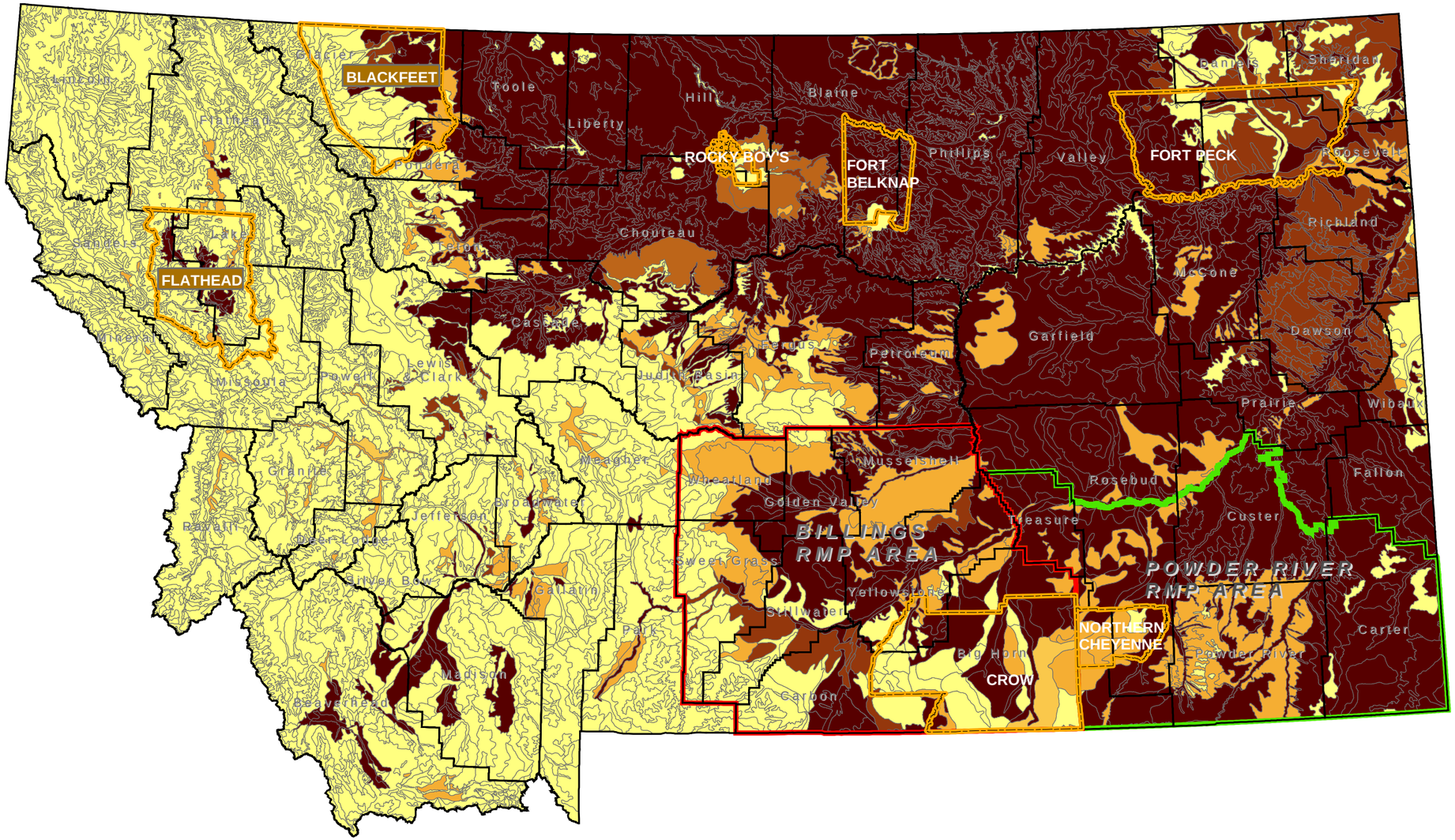
N W E S

1:990,000

20 10 0 20 Miles
20,000 10,000 0 20,000 40,000 Meters

DATA SOURCES
Counties: 1:100,000 scale, counties, Montana State Library/NRIS, Helena, Montana
Highways: 1:100,000 scale, roads, Montana State Library/NRIS, Helena, Montana.
Reservations: 1:100,000 scale, reservations, Montana State Library/NRIS, Helena, Montana.
Rivers: 1:100,000 scale, rivers, Montana State Library/NRIS, Helena, Montana.
Soils: 1:250,000 scale, USDA NRCS, STATSGO Database for Montana.

Exhibit A-11: Statewide Maximum Soil SAR by STATSGO Map Unit



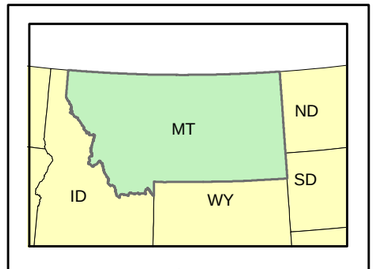
Legend

- Powder River RMP Area
- Billings RMP Area
- Native American Reservations

MAX SAR

- 0
- 0.01 - 0.9
- 1.00 - 1.99
- 2.00 - 2.99
- 3.00 - 3.99
- 4.00 - 4.99
- 5.00 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99
- 9.00 - 9.99
- 10.00 - 10.99
- 11.00 - 11.99
- 12.00 - 200

The Sodium Absorption Ratio (SAR) is a measure of sodicity, and affects the infiltration rate of water. Usually, SAR values below 3.0 are not considered to be a threat to crops and native plants, however SAR values above 12.0 are considered sodic and may affect soils and vegetation. The STATSGO data for SAR is sparse and may not accurately represent all soils in a given Map Unit. Refer to Exhibits A-3 and A-6 for actual value ranges.



Location Map

Date Prepared: April 2, 2001
Prepared by: J. Patton
Project Mgr.: D. Arthur

N W E S

1:3,000,000

50 25 0 50 Miles
50,000 25,000 0 50,000 100,000 Meters

DATA SOURCES

Counties: 1:100,000 scale, counties, Montana State Library/NRIS, Helena, Montana
Highways: 1:100,000 scale, roads, Montana State Library/NRIS, Helena, Montana.
Reservations: 1:100,000 scale, reservations, Montana State Library/NRIS, Helena, Montana.
Rivers: 1:100,000 scale, rivers, Montana State Library/NRIS, Helena, Montana.
Soils: 1:250,000 scale, USDA NRCS, STATSGO Database for Montana.