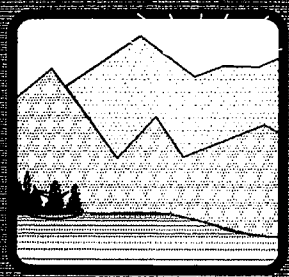

Waters of the U.S. and Wetlands
Santa Fe Pacific Gold, Elkhorn Project
Jefferson County, Montana
Environmental Baseline Report

Prepared For:

Santa Fe Pacific Gold Corporation
Albuquerque, New Mexico

Prepared By:

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Helena, Montana

September 1994

Hydrometrics,Inc.

Table A6. (Continued)

	VEGETATION TYPE and ECODATA PLOT NUMBER						
		POA PRATENSIS community type					
	INDICATOR STATUS	37	57	64	66	108	Mean n=5
SUBSHRUBS							
Berberis repens	NI	–	–	0.5	–	–	0.1
TOTAL SUBSHRUBS		0.0	0.0	0.5	0.0	0.0	0.1
SHRUBS							
Alnus incana	FACW	–	–	–	5	–	1.0
Artemisia tridentata	NI	0.5	–	–	–	–	0.1
Juniperus communis	NI	–	–	0.5	1	–	0.3
Potentilla fruticosa	FAC–	0.5	1	–	–	–	0.3
Ribes setosum	NI(FAC?)	–	–	2	0.5	0.5	0.6
Rosa woodsii	FACU	–	–	2	1	8	2.2
Rubus idaeus	FACU	–	–	0.5	0.5	–	0.2
Salix bebbiana	FACW	–	0.5	–	2	–	0.5
Salix boothii	OBL	–	–	0.5	–	–	0.1
Salix geyeriana	FACW+	0.5	–	–	–	–	0.1
Symphoricarpos occidentalis	NI	–	–	–	–	0.5	0.1
TOTAL SHRUBS		1.5	1.5	5.5	10.0	9.0	5.5
TREES							
Juniperus scopulorum	NI	–	–	0.5	–	–	0.1
Pinus contorta	FAC–	–	–	–	2	–	0.4
Populus tremuloides	FAC+	–	–	0.5	3	–	0.7
Pseudotsuga menziesii	NI	–	–	0.5	0.5	–	0.2
TOTAL TREES		0.0	0.0	1.5	5.5	0.0	1.4
TOTAL HYDROPHYTIC VEGETATION (Strat.)		59.0	63.0	79.5	27.5	62.0	58.2
TOTAL VEGETATION (Stratified)		191.0	162.5	121.0	186.5	153.0	162.8
Hydrophytic Composition (%)* **							
COE Manual (1987)		20	40	71	33	33	40
Relative cover		31	39	66	15	41	36

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jurisdictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

WATERS OF THE U.S. AND WETLANDS

SANTA FE PACIFIC GOLD, ELKHORN PROJECT

JEFFERSON COUNTY, MONTANA

ENVIRONMENTAL BASELINE REPORT

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September 1994

Table A6. (Continued)

	VEGETATION TYPE and ECODATA PLOT NUMBER						
		POA PRATENSIS community type					
	INDICATOR STATUS	37	57	64	66	108	Mean n=5
NATIVE PERENNIAL FORBS (Continued)							
Prunella vulgaris	FACU+	–	–	–	1	–	0.2
Ranunculus uncinatus	FAC	–	–	–	0.5	–	0.1
Rumex salicifolius	FACW	0.5	–	–	–	–	0.1
Sagina procumbens	FAC	–	–	0.5	–	–	0.1
Senecio sphaerocephalus	FACW	0.5	–	–	–	–	0.1
Solidago missouriensis	NI	–	–	0.5	–	–	0.1
Stellaria longipes	FACW–	–	–	0.5	–	–	0.1
Trifolium longipes	FAC–	–	0.5	–	–	–	0.1
Urtica dioica	FAC+	–	–	0.5	1	–	0.3
Viola adunca	FAC	–	0.5	–	–	–	0.1
Viola macloskeyi	OBL	–	0.5	–	–	–	0.1
TOTAL NPF		59.5	16.5	13.5	26.5	30.0	29.2
INTRODUCED PERENNIAL FORBS							
Cerastium vulgatum	FACU	–	4	0.5	10	–	2.9
Cirsium arvense	FACU+	–	–	–	–	0.5	0.1
Ranunculus acris	FACW–	–	2	7	–	–	1.8
Rumex acetosella	FACU	–	–	–	0.5	–	0.1
Taraxacum officinale	FACU	–	8	4	18	1	6.2
Trifolium repens	FACU+	3	20	21	60	10	22.8
TOTAL IPF		3.0	34.0	32.5	88.5	11.5	33.9
FERNS AND ALLIES							
Cystopteris fragilis	FACU	–	–	0.5	–	–	0.1
Equisetum arvense	FAC	–	0.5	–	–	–	0.1
Equisetum hyemale	FACW	–	–	–	0.5	–	0.1
Equisetum laevigatum	FACW	–	–	0.5	–	–	0.1
TOTAL F&A		0.0	0.5	1.0	0.5	0.0	0.4
NATIVE ANNUAL/BIENNIAL FORBS							
Androsace septentrionalis	FAC–	–	–	0.5	–	–	0.1
Erysimum cheiranthoides	FACU	–	–	0.5	–	–	0.1
Gentianella amarella	FACW–	0.5	–	–	–	–	0.1
Polygonum aviculare	FACW–	–	–	–	–	0.5	0.1
TOTAL NAF		0.5	0.0	1.0	0.0	0.5	0.4
INTRODUCED ANNUAL/BIENNIAL FORBS							
Arabis glabra	NI	–	–	–	0.5	–	0.1
Carduus nutans	NI	–	–	–	–	0.5	0.1
Cirsium vulgare	FACU	–	–	–	–	0.5	0.1
Medicago lupulina	FAC	0.5	–	–	–	4	0.9
Verbascum thapsus	NI	–	–	–	–	0.5	0.1
TOTAL IAF		0.5	0.0	0.0	0.5	5.5	1.3

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Table A6. (Continued)

	VEGETATION TYPE and ECODATA PLOT NUMBER						
		POA PRATENSIS community type					
	INDICATOR STATUS	37	57	64	66	108	Mean n=5
INTRODUCED PERENNIAL GRAMINOIDS							
Agropyron cristatum	NI	–	–	–	0.5	–	0.1
Agrostis stolonifera	FAC+	–	8	28	0.5	18	10.9
Phleum pratense	FACU	12	16	4	8	10	10.0
Poa compressa	FACU	–	–	–	0.5	–	0.1
Poa palustris	FAC	–	0.5	13	–	–	2.7
Poa pratensis	FACU+	50	38	1	25	58	34.4
TOTAL IPG		62.0	62.5	46.0	34.5	86.0	58.2
NATIVE ANNUAL GRAMINOIDS							
Juncus bufonius	FACW+	–	–	–	–	0.5	0.1
TOTAL NAG		0.0	0.0	0.0	0.0	0.5	0.1
INTRODUCED ANNUAL GRAMINOIDS							
TOTAL IAG		0.0	0.0	0.0	0.0	0.0	0.0
NATIVE PERENNIAL FORBS							
Achillea millefolium	FACU	5	3	–	12	–	4.0
Agoseris glauca	FAC	–	–	0.5	–	–	0.1
Angelica arguta	FACW	–	–	0.5	–	–	0.1
Antennaria microphylla	NI	3	–	1	0.5	0.5	1.0
Arenaria lateriflora	NI	–	–	–	0.5	–	0.1
Arnica chamissonis	FACW	–	0.5	–	–	–	0.1
Arnica cordifolia	NI	–	–	–	0.5	–	0.1
Aster foliaceus	FACW–	–	–	–	0.5	–	0.1
Aster integrifolius	NI	0.5	–	–	–	–	0.1
Aster occidentalis	FAC	–	2	0.5	–	8	2.1
Aster pansus	FAC+	–	–	–	–	2	0.4
Astragalus agrestis	FACW–	–	–	–	–	0.5	0.1
Cirsium scariosum	NI	10	0.5	0.5	0.5	0.5	2.4
Clematis hirsutissima	NI	0.5	–	–	–	–	0.1
Crepis runcinata	FACU	–	0.5	–	–	0.5	0.2
Disporum trachycarpum	NI	–	–	–	0.5	–	0.1
Dodecatheon conjugens	FAC–	–	0.5	–	–	–	0.1
Epilobium ciliatum	FACW–	–	0.5	0.5	–	–	0.2
Epilobium palustre	OBL	–	0.5	–	–	–	0.1
Fragaria virginiana	UPL	18	0.5	0.5	3	–	4.4
Galium triflorum	FACU	–	–	–	0.5	–	0.1
Geranium richardsonii	FACU+	–	–	0.5	1	–	0.3
Geum macrophyllum	FACW+	3	1	–	3	–	1.4
Heuchera cylindrica	NI	–	–	0.5	–	–	0.1
Iris missouriensis	FACW+	0.5	–	–	0.5	14	3.0
Mentha arvensis	FAC	–	–	0.5	–	–	0.1
Mertensia ciliata	FACW+	–	–	0.5	–	–	0.1
Osmorhiza chilensis	NI	–	–	–	0.5	–	0.1
Penstemon procerus	NI	–	–	0.5	–	–	0.1
Potentilla anserina	OBL	–	0.5	–	–	–	0.1
Potentilla gracilis	FAC	18	5	5	0.5	4	6.5

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		VEGETATION TYPE and ECODATA PLOT NUMBER					
		POA PRATENSIS community type					
	INDICATOR STATUS	37	57	64	66	108	Mean n=5
SITE PARAMETERS							
Slope (percent)		3	4	5	10	4	–
Aspect (degrees)		162	140	230	135	056	–
Topography*		Bot.	Ter.	Bot.	Ter.	Swale	–
Configuration**		S	S	V	U	S	–
Elevation (feet)		5950	5905	5900	6030	5330	–
GROUND COVER							
Bare Ground		0.5	2	3	2	1	1.7
Rock		–	1	7	0.5	1	1.9
Gravel		–	–	3	0.5	0.5	0.8
Litter		85	86	67	45	89	74.4
Wood		–	–	2	7	0.5	1.9
Lichens		–	0.5	0.5	0.5	0.5	0.4
Moss		0.5	3	8	35	0.5	9.4
Water		–	1	3	–	–	0.8
Basal Vegetation		15	7	7	10	6	9.0
VEGETATION STRUCTURE (nonstratified cover)							
Total Vegetation		96	95	85	95	94	93.0
Perennial Graminoids		90	84	55	45	84	71.6
Annual Graminoids		–	–	–	–	0.5	0.1
Perennial Forbs		52	42	35	75	37	48.2
Annual/Biennial Forbs		0.5	–	0.5	0.5	5	1.3
Subshrubs		–	–	0.5	–	–	0.1
Shrubs		1	1	5	9	8	4.8
Trees		–	–	0.5	5	–	1.1
CLASS\SPECIES							
NATIVE PERENNIAL GRAMINOIDS							
Agropyron caninum	FAC–	18	1	1	7	–	5.4
Agropyron smithii	FACU	0.5	–	–	–	–	0.1
Agrostis scabra	FAC	2	–	0.5	0.5	–	0.6
Alopecurus alpinus	FACW	–	2	–	–	–	0.4
Carex microptera	FAC	–	2	0.5	2	–	0.9
Carex nebraskensis	OBL	0.5	9	1	–	2	2.5
Carex praegracilis	FACW	20	1	–	–	–	4.2
Carex rostrata	OBL	5	–	–	–	–	1.0
Danthonia intermedia	FACU+	–	–	–	0.5	–	0.1
Deschampsia cespitosa	FACW	0.5	6	–	–	5	2.3
Festuca scabrella	NI	–	6	–	–	–	1.2
Glyceria striata	OBL	–	0.5	–	5	–	1.1
Hordeum brachyantherum	FACW	2	2	3	0.5	–	1.5
Juncus balticus	OBL	5	18	13	2	3	8.2
Juncus longistylis	FACW	–	–	0.5	–	–	0.1
Koeleria cristata	NI	0.5	–	–	–	–	0.1
Stipa occidentalis	NI	10	–	–	3	–	2.6
TOTAL NPG		64.0	47.5	19.5	20.5	10.0	32.3

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Table A5. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
SHRUBS (Continued)													
Salix drummondiana	FACW	20	2	4	8.7	–	–	–	–	0.0	3.7	–	–
Salix exigua	OBL	–	–	–	0.0	–	80	70	38	62.7	26.9	–	–
Salix geyeriana	FACW+	30	32	18	26.7	–	–	–	–	0.0	11.4	–	3
Symphoricarpos occidentalis	NI	–	–	–	0.0	–	3	12	–	5.0	2.1	–	–
TOTAL SHRUBS		82.0	52.5	62.5	65.7	23.0	119.0	124.5	49.0	97.5	73.2	61.0	26.0
TREES													
Juniperus scopulorum	NI	–	–	0.5	0.2	0.5	0.5	2	0.5	1.0	0.6	–	–
Picea engelmannii	FAC	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Pseudotsuga menziesii	NI	–	–	–	0.0	1	–	–	7	2.3	1.1	–	–
TOTAL TREES		0.0	0.0	0.5	0.2	1.5	0.5	2.0	8.0	3.5	1.8	0.0	0.0
TOTAL HYDROPHYTIC VEGETATION (Strat.)		199.5	182.0	165.5	182.3	107.0	159.0	143.5	106.5	136.3	151.9	135.5	94.5
TOTAL VEGETATION (Stratified)		235.5	202.0	169.5	202.3	146.0	283.5	278.5	190.5	250.8	215.1	216.5	145.5
Hydrophytic Composition (%)* **													
COE Manual (1987)		73	88	100	100	71	46	50	50	40	80	50	67
Relative cover		85	90	98	90	73	56	52	56	54	71	63	65

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jursidictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

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TABLE 7. RANK OF DOMINANT VASCULAR PLANT SPECIES AND PERCENT HYDROPHYTIC COMPOSITION FOR 5 PLOTS SAMPLED IN ONE HERBACEOUS BOTTOMLAND TYPE, ELKHORN STUDY AREA, 1990-1993 21

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Table A5. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
INTRODUCED ANNUAL/BIENNIAL FORBS													
Arabis glabra	NI	–	–	–	0.0	–	–	0.5	0.5	0.3	0.1	0.5	–
Arctium lappa	NI	–	–	–	0.0	–	2	–	–	0.7	0.3	–	–
Asperugo procumbens	NI	–	–	–	0.0	1	–	–	–	0.0	0.1	–	–
Capsella bursa–pastoris	FAC–	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Cirsium vulgare	FACU	–	–	–	0.0	–	0.5	3	–	1.2	0.5	8	–
Cynoglossum officinale	NI	–	–	–	0.0	0.5	–	–	–	0.0	0.1	–	–
Medicago lupulina	FAC	–	–	–	0.0	–	–	1	–	0.3	0.1	–	–
Melilotus officinalis	FACU	–	–	–	0.0	–	0.5	–	–	0.2	0.1	–	–
Thlaspi arvense	NI	–	–	–	0.0	0.5	–	–	–	0.0	0.1	2	–
Tragopogon dubius	NI	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Verbascum thapsus	NI	–	–	–	0.0	0.5	2	0.5	2	1.5	0.7	0.5	–
TOTAL IAF		0.0	0.0	0.0	0.0	2.5	5.0	5.5	2.5	4.3	2.2	11.5	0.0
SUBSHRUBS													
Artemisia frigida	NI	–	–	–	0.0	–	0.5	–	–	0.2	0.1	–	–
TOTAL SUBSHRUBS		0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.2	0.1	0.0	0.0
SHRUBS													
Alnus incana	FACW	0.5	0.5	22	7.7	–	–	–	–	0.0	3.3	60	–
Chrysothamnus nauseosus	NI	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Juniperus communis	NI	–	0.5	–	0.2	–	–	–	0.5	0.2	0.1	–	–
Potentilla fruticosa	FAC–	–	0.5	0.5	0.3	–	–	–	–	0.0	0.1	–	20
Prunus virginiana	FACU	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Ribes cereum	NI	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Ribes hudsonianum	OBL	–	–	3	1.0	–	–	–	–	0.0	0.4	0.5	–
Ribes inerme	FAC	0.5	–	–	0.2	–	–	–	–	0.0	0.1	–	–
Ribes lacustre	FAC+	–	–	0.5	0.2	–	–	–	–	0.0	0.1	–	–
Ribes setosum	NI(FAC?)	0.5	–	–	0.2	2	10	4	2	5.3	2.6	–	–
Rosa acicularis	FACU	0.5	–	0.5	0.3	–	–	–	–	0.0	0.1	–	–
Rosa woodsii	FACU	–	0.5	–	0.2	1	20	32	–	17.3	7.6	–	–
Rubus idaeus	FACU	2	0.5	–	0.8	–	3	–	6	3.0	1.6	–	–
Salix bebbiana	FACW	–	10	9	6.3	20	3	6	2	3.7	7.1	–	3
Salix boothii	OBL	28	6	5	13.0	–	–	–	–	0.0	5.6	–	–

LIST OF EXHIBITS

EXHIBIT 1. WETLAND INVENTORY MAP,
SANTA FE PACIFIC GOLD CORPORATION,
ELKHORN PROJECT,
JEFFERSON COUNTY, MONTANA . . . . . Map Pocket

EXHIBIT 2. WETLAND INVENTORY MAP, SECTIONS 1-4,
SANTA FE PACIFIC GOLD CORPORATION,
ELKHORN PROJECT,
JEFFERSON COUNTY, MONTANA . . . . . Map Pocket

Table A5. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
INTRODUCED PERENNIAL FORBS													
Cerastium vulgatum	FACU	0.5	–	0.5	0.3	0.5	–	7	1	2.7	1.4	5	–
Cirsium arvense	FACU+	–	–	0.5	0.2	–	38	0.5	7	15.2	6.6	1	–
Linaria dalmatica	NI	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Linaria vulgaris	NI	–	–	–	0.0	–	–	2	–	0.7	0.3	–	–
Plantago major	FAC+	–	–	–	0.0	–	–	2	–	0.7	0.3	–	–
Ranunculus acris	FACW–	–	–	–	0.0	–	–	2	–	0.7	0.3	–	–
Sonchus uliginosus	FACU+	–	–	–	0.0	–	10	–	–	3.3	1.4	–	–
Taraxacum officinale	FACU	2	1	0.5	1.2	1	–	12	–	4.0	2.4	2	–
Trifolium repens	FACU+	3	2	–	1.7	–	–	20	5	8.3	4.3	3	–
TOTAL IPF		5.5	3.0	1.5	3.3	1.5	48.0	45.5	13.5	35.7	16.9	11.0	0.0
FERNS AND ALLIES													
Equisetum arvense	FAC	–	0.5	0.5	0.3	–	–	–	–	0.0	0.1	–	–
TOTAL F&A		0.0	0.5	0.5	0.3	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
NATIVE ANNUAL/BIENNIAL FORBS													
Androsace filiformis	FACW	–	–	–	0.0	–	–	–	–	0.0	0.0	1	–
Arabis holboellii	FACU–	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Cardamine pensylvanica	FACW	0.5	–	–	0.2	–	–	–	–	0.0	0.1	–	–
Collomia linearis	FACU	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Descurainia richardsonii	NI	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Erigeron lonchophyllus	FACW	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Erysimum cheiranthoides	FACU	–	–	–	0.0	0.5	0.5	0.5	0.5	0.5	0.3	0.5	–
Galium bifolium	NI	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Hackelia floribunda	FACU–	–	–	–	0.0	–	0.5	0.5	0.5	0.5	0.2	–	–
Lactuca biennis	FAC+	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Monolepis nuttalliana	FAC–	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Polygonum douglasii	FACU	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Potentilla biennis	FACW	–	–	–	0.0	0.5	–	–	–	0.0	0.1	0.5	–
Ranunculus sceleratus	OBL	–	–	–	0.0	0.5	–	–	–	0.0	0.1	–	–
Rhinanthus crista–galli	FACU+	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
TOTAL NAF		0.5	0.0	0.0	0.2	1.5	1.0	2.0	2.5	1.8	1.1	4.0	0.0

WATERS OF THE U.S. AND WETLANDS
SANTA FE PACIFIC GOLD, ELKHORN PROJECT
JEFFERSON COUNTY, MONTANA

ENVIRONMENTAL BASELINE REPORT

1.0 INTRODUCTION

The following report discusses the methodology and results of a baseline environmental inventory conducted to identify and delineate Waters of the U.S., including jurisdictional wetlands associated with the proposed Santa Fe Gold Elkhorn Mine in Jefferson County, Montana (Figure 1). The inventory study area shown on Figure 2 encompasses areas potentially proposed to be disturbed by mining and associated activities, as well as potential alternative facility sites that may be included in an Environmental Impact Statement (EIS) for the Elkhorn Mine Project.

Site specific data on hydrophytic vegetation, hydric soils, and wetland hydrology within the study area was collected during the summer and autumn of 1993. Vegetation information was supplemented with survey information previously collected in 1989 and 1990. Additional information used in this analysis was obtained from baseline investigation reports, topographic maps, and aerial photographs.

Section 404 of the federal Clean Water Act prohibits the discharge of dredged or fill material into Waters of the U.S. without a permit from the U.S. Army Corps of Engineers (COE). Wetlands are a special category of Waters of the U.S. Federal agencies involved in the administration of Section 404 regulations in Montana include the COE, the Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (USFWS), and the Soil Conservation Service (SCS).

Table A5. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
NATIVE PERENNIAL FORBS (Continued)													
Pyrola asarifolia	FACU	0.5	–	0.5	0.3	–	–	0.5	–	0.2	0.2	–	–
Ranunculus cymbalaria	OBL	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Ranunculus macounii	OBL	–	–	–	0.0	0.5	–	–	–	0.0	0.1	–	–
Ranunculus subrigidus	OBL	0.5	–	–	0.2	–	–	–	–	0.0	0.1	–	–
Ranunculus uncinatus	FAC	–	–	–	0.0	–	–	1	–	0.3	0.1	0.5	–
Rumex occidentalis	FACW+	0.5	0.5	0.5	0.5	0.5	–	–	–	0.0	0.3	0.5	0.5
Rumex salicifolius	FACW	–	–	–	0.0	0.5	–	–	–	0.0	0.1	–	–
Sagina procumbens	FAC	–	–	–	0.0	–	–	–	–	0.0	0.0	0.5	–
Saxifraga arguta	FACW+	–	–	0.5	0.2	–	–	–	–	0.0	0.1	–	–
Senecio pseudaureus	FACW	–	–	–	0.0	–	–	–	–	0.0	0.0	–	0.5
Senecio serra	FAC	–	–	–	0.0	0.5	0.5	0.5	–	0.3	0.2	1	–
Senecio sphaerocephalus	FACW	0.5	9	–	3.2	–	–	–	–	0.0	1.4	–	3
Senecio triangularis	FACW+	–	–	0.5	0.2	–	–	–	–	0.0	0.1	–	–
Smilacina stellata	FAC–	0.5	–	–	0.2	0.5	–	1	–	0.3	0.3	–	–
Solidago canadensis	FACU	–	–	–	0.0	–	10	–	–	3.3	1.4	–	3
Solidago gigantea	FACW–	–	–	–	0.0	–	3	0.5	–	1.2	0.5	–	–
Solidago missouriensis	NI	–	–	–	0.0	–	–	–	4	1.3	0.6	–	–
Stellaria longifolia	FACW	–	1	0.5	0.5	–	–	–	–	0.0	0.2	0.5	–
Stellaria longipes	FACW–	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Thalictrum occidentale	FACU	0.5	–	0.5	0.3	–	–	0.5	–	0.2	0.2	–	–
Urtica dioica	FAC+	0.5	–	–	0.2	7	2	0.5	8	3.5	2.6	6	–
Veronica americana	OBL	–	–	–	0.0	6	–	–	–	0.0	0.9	2	–
Viola adunca	FAC	–	–	–	0.0	–	–	–	–	0.0	0.0	–	0.5
Viola canadensis	NI	0.5	–	–	0.2	–	–	–	–	0.0	0.1	–	–
Viola macloskeyi	OBL	–	0.5	0.5	0.3	–	–	–	–	0.0	0.1	–	0.5
TOTAL NPF		46.5	25.0	11.5	27.7	26.5	32.5	20.5	39.0	30.7	28.8	38.5	24.0

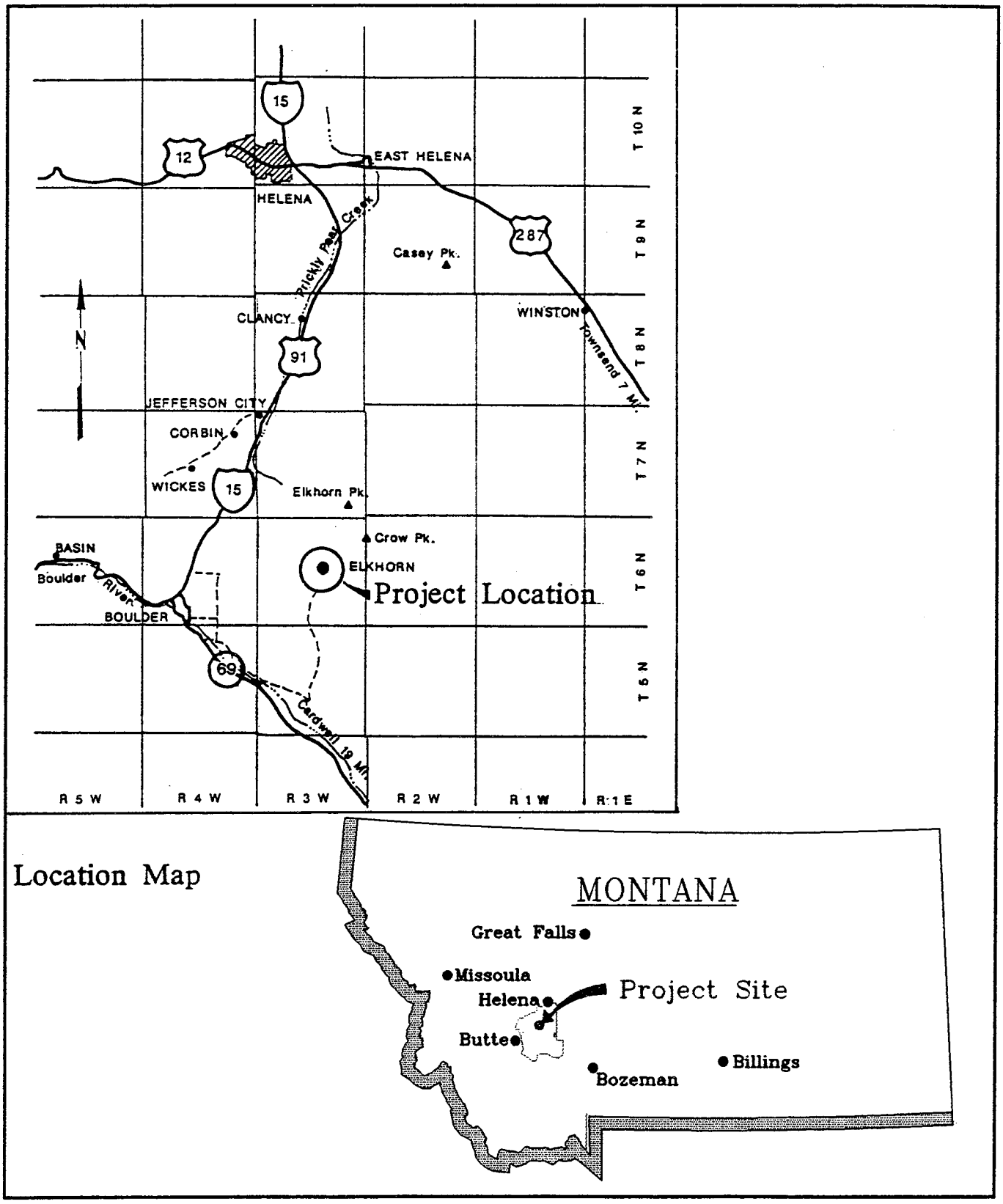

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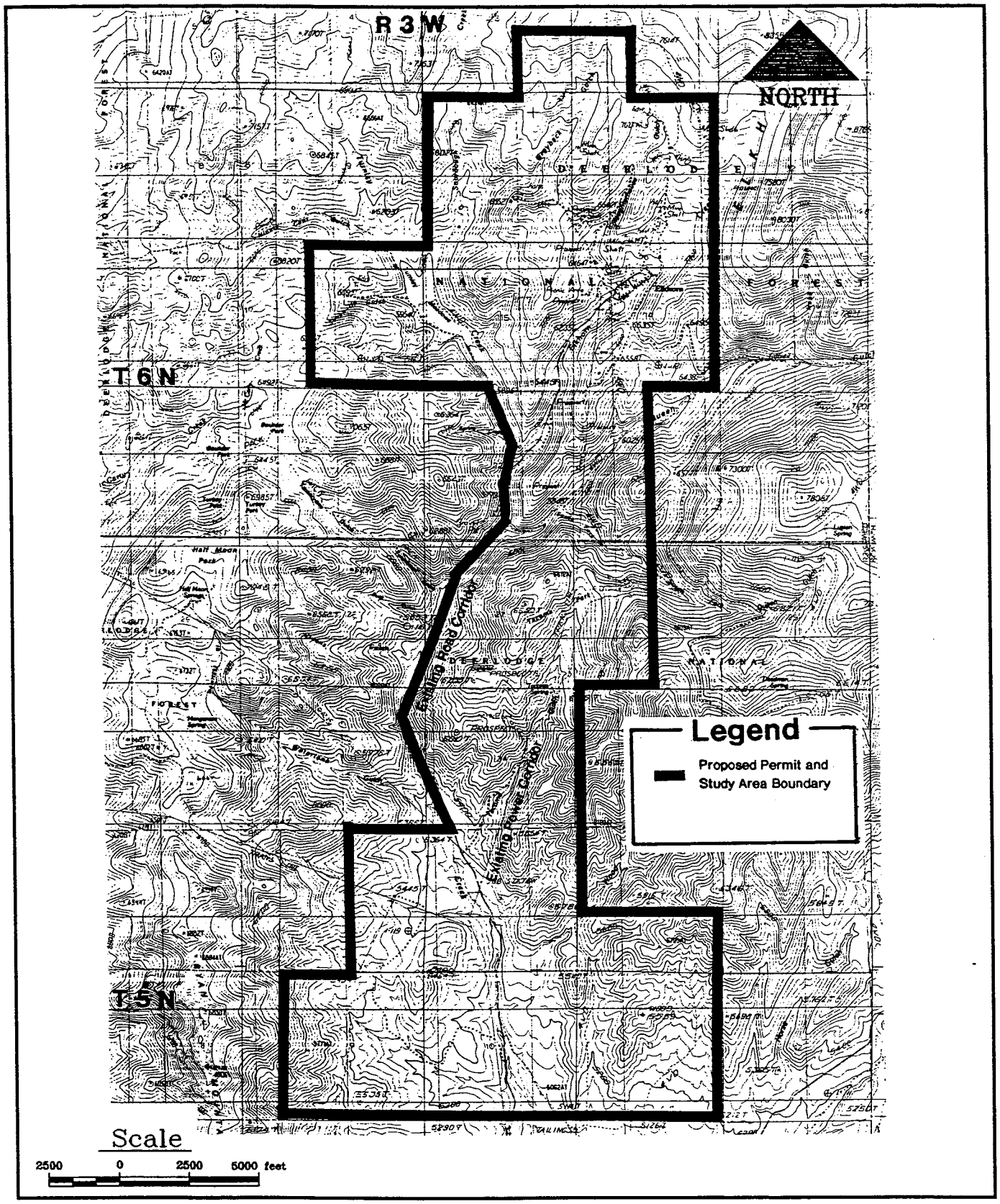
Figure 1

Regional Location Map
Elkhorn Project, Jefferson County, Montana

Waters of the U.S. and Wetlands
Santa Fe Pacific Gold Corporation

Table A5. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
NATIVE PERENNIAL FORBS (Continued)													
Astragalus agrestis	FACW−	0.5	–	–	0.2	–	–	–	–	0.0	0.1	–	0.5
Campanula rotundifolia	FACU+	–	–	–	0.0	–	–	0.5	0.5	0.3	0.1	–	–
Castilleja miniata	FAC	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Cerastium arvense	FACU	–	–	–	0.0	4	–	–	–	0.0	0.6	–	–
Cicuta douglasii	OBL	–	–	–	0.0	–	2	–	–	0.7	0.3	–	–
Cirsium scariosum	NI	0.5	0.5	–	0.3	–	–	–	–	0.0	0.1	–	–
Corallorhiza trifida	FAC	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Dodecatheon conjugens	FAC−	–	–	–	0.0	–	–	–	–	0.0	0.0	–	0.5
Epilobium angustifolium	FACU+	2	–	–	0.7	–	–	–	0.5	0.2	0.4	–	–
Epilobium ciliatum	FACW−	0.5	0.5	2	1.0	4	–	0.5	1	0.5	1.2	5	2
Fragaria virginiana	UPL	10	3	–	4.3	–	–	–	–	0.0	1.9	0.5	3
Galium boreale	FACU	–	–	–	0.0	–	–	–	–	0.0	0.0	–	0.5
Galium triflorum	FACU	2	–	–	0.7	–	–	3	–	1.0	0.7	–	–
Geranium richardsonii	FACU+	–	2	–	0.7	–	–	0.5	–	0.2	0.4	4	–
Geranium viscosissimum	FACU+	–	–	–	0.0	0.5	–	–	–	0.0	0.1	–	–
Geum macrophyllum	FACW+	3	2	1	2.0	1	3	3	4	3.3	2.4	2	0.5
Glycyrrhiza lepidota	FAC+	–	–	–	0.0	–	3	–	–	1.0	0.4	–	–
Habenaria hyperborea	FACW+	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Heracleum lanatum	FAC	2	–	1	1.0	–	3	–	–	1.0	0.9	0.5	–
Iris missouriensis	FACW+	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Mentha arvensis	FAC	0.5	1	0.5	0.7	1	3	0.5	–	1.2	0.9	3	–
Mertensia ciliata	FACW+	0.5	–	0.5	0.3	–	–	–	–	0.0	0.1	4	–
Mimulus guttatus	OBL	–	–	1	0.3	0.5	–	0.5	–	0.2	0.3	3	–
Osmorhiza chilensis	NI	–	–	–	0.0	–	–	1	–	0.3	0.1	–	–
Parnassia palustris	OBL	–	0.5	–	0.2	–	–	–	–	0.0	0.1	–	–
Pedicularis groenlandica	OBL	–	0.5	–	0.2	–	–	–	–	0.0	0.1	–	–
Penstemon attenuatus	FAC	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Penstemon procerus	NI	–	–	–	0.0	–	–	–	1	0.3	0.1	–	–
Phacelia hastata	NI	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Potentilla anserina	OBL	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Potentilla gracilis	FAC	–	0.5	–	0.2	–	–	0.5	–	0.2	0.1	–	3
Prunella vulgaris	FACU+	–	0.5	–	0.2	–	–	–	–	0.0	0.1	–	–



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Hydrometrics, Inc.

Figure 2

Baseline Wetland Inventory Study Area
Elkhorn Project, Jefferson County, Montana

Waters of the U.S. and Wetlands
Santa Fe Pacific Gold Corporation

Table A5. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
INTRODUCED PERENNIAL GRAMINOIDS													
Agropyron repens	FACU	–	–	–	0.0	–	–	–	14	4.7	2.0	–	–
Agrostis stolonifera	FAC+	–	1	–	0.3	52	10	36	8	18.0	15.3	30	–
Phleum pratense	FACU	0.5	0.5	–	0.3	4	–	4	3	2.3	1.7	0.5	0.5
Poa palustris	FAC	20	15	–	11.7	2	20	8	–	9.3	9.3	1	–
Poa pratensis	FACU+	10	6	–	5.3	22	30	28	12	23.3	15.4	40	10
TOTAL IPG		30.5	22.5	0.0	17.7	80.0	60.0	76.0	37.0	57.7	43.7	71.5	10.5
NATIVE ANNUAL GRAMINOIDS													
Juncus bufonius	FACW+	–	–	–	0.0	0.5	–	–	–	0.0	0.1	–	–
Poa annua	FAC–	–	0.5	–	0.2	–	–	–	–	0.0	0.1	0.5	–
TOTAL NAG		0.0	0.5	0.0	0.2	0.5	0.0	0.0	0.0	0.0	0.1	0.5	0.0
INTRODUCED ANNUAL GRAMINOIDS													
Bromus tectorum	NI	–	–	–	0.0	1	–	–	–	0.0	0.1	–	–
TOTAL IAG		0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0
NATIVE PERENNIAL FORBS													
Achillea millefolium	FACU	0.5	0.5	–	0.3	–	–	0.5	2	0.8	0.5	–	2
Actaea rubra	NI(FAC?)	–	–	0.5	0.2	–	–	0.5	–	0.2	0.1	0.5	–
Allium cernuum	NI	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Anemone multifida	NI	–	–	–	0.0	–	–	–	–	0.0	0.0	–	0.5
Angelica arguta	FACW	–	–	0.5	0.2	–	–	–	–	0.0	0.1	–	–
Antennaria microphylla	NI	–	0.5	–	0.2	–	–	–	–	0.0	0.1	–	0.5
Arabis drummondii	FACU	0.5	–	–	0.2	–	–	–	0.5	0.2	0.1	–	–
Arenaria lateriflora	NI	–	0.5	–	0.2	–	–	0.5	–	0.2	0.1	0.5	–
Artemisia ludoviciana	UPL	–	–	–	0.0	–	–	0.5	0.5	0.3	0.1	–	–
Artemisia michauxiana	NI	–	–	–	0.0	–	–	–	9	3.0	1.3	–	–
Aster campestris	NI	–	–	–	0.0	–	–	0.5	–	0.2	0.1	–	–
Aster foliaceus	FACW–	10	0.5	0.5	3.7	–	–	2	5	2.3	2.6	–	3
Aster hesperius	OBL	–	–	–	0.0	–	3	–	–	1.0	0.4	–	–
Aster modestus	FAC+	10	1	0.5	3.8	–	–	–	–	0.0	1.6	–	–
Aster occidentalis	FAC	–	–	–	0.0	–	–	–	–	0.0	0.0	4	–

2.0 IDENTIFICATION AND DELINEATION METHODOLOGY

The U.S. Army Corps of Engineers, in a March 1992 memorandum addressing clarification and interpretation of the agency's 1987 Wetland Delineation Manual, stressed that "the identification and delineation of wetlands must be fully consistent with both the 1987 manual and the Questions and Answers issued 7 October 1991" (COE 1992). The identification and delineation of wetlands discussed in this baseline environmental report has been conducted in compliance with the requirements of these documents.

2.1 WATERS OF THE U.S.

Waters of the U.S. (WUS), as defined in 33 CFR Part 328, encompasses all major streams and their tributary streams (including intermittent streams), lakes and ponds, and wetland occurring within the Elkhorn Mine Project study area. Wetlands are a regulatory subset of WUS that require additional investigation, delineation, and avoidance/mitigation measures designed to assure compliance with Section 404 (b)(1) of the Clean Water Act. This baseline report and the accompanying Waters of the U.S. and Wetland Inventory Map (Exhibit 1), identify non-wetland WUS occurring within the project area. In recognition of the special compliance requirements of Section 404 (b)(1) of the Clean Water Act, WUS areas meeting wetland delineation criteria are further identified as wetland.

2.2 WETLANDS

Wetlands as defined in 33 CFR Part 328, are:

> "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Wetlands possess three essential characteristics: 1)hydrophytic vegetation, 2)hydric soils, and 3) wetland hydrology. The 1987 Corps of Engineers Wetland Delineation Manual requires that all three of these technical criteria must be present prior to the delineation of a site as wetland (Environmental Laboratory 1987).

Table A5. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
CLASS\SPECIES													
NATIVE PERENNIAL GRAMINOIDS													
Agropyron caninum	FAC-	–	0.5	–	0.2	–	0.5	0.5	1	0.7	0.4	7	0.5
Agrostis scabra	FAC	–	4	0.5	1.5	–	–	–	–	0.0	0.6	–	0.5
Alopecurus aequalis	OBL	0.5	–	–	0.2	–	–	–	–	0.0	0.1	–	–
Bromus carinatus	NI	–	–	–	0.0	–	–	–	0.5	0.2	0.1	0.5	–
Bromus ciliatus	FAC+	20	–	–	6.7	–	–	–	–	0.0	2.9	–	–
Calamagrostis canadensis	FACW+	20	28	1	16.3	–	10	–	–	3.3	8.4	0.5	2
Calamagrostis stricta	FACW	–	–	1	0.3	–	–	–	–	0.0	0.1	–	–
Carex aquatilis	OBL	–	0.5	–	0.2	–	–	–	–	0.0	0.1	–	3
Carex canescens	FACW+	–	0.5	–	0.2	–	–	–	–	0.0	0.1	–	–
Carex deweyana	FAC+	–	–	–	0.0	–	–	–	4	1.3	0.6	–	–
Carex disperma	FACW	–	–	0.5	0.2	–	–	–	–	0.0	0.1	–	–
Carex microptera	FAC	–	0.5	–	0.2	1	–	1	18	6.3	2.9	5	–
Carex nebraskensis	OBL	–	–	18	6.0	4	–	–	–	0.0	3.1	0.5	2
Carex petasata	NI	–	–	–	0.0	–	–	–	0.5	0.2	0.1	–	–
Carex praegracilis	FACW	–	–	–	0.0	–	–	–	2	0.7	0.3	–	10
Carex rostrata	OBL	28	62	72	54.0	–	–	–	2	0.7	23.4	–	12
Carex simulata	OBL	–	–	–	0.0	–	–	–	–	0.0	0.0	–	0.5
Carex stipata	OBL	–	–	–	0.0	–	3	–	–	1.0	0.4	–	–
Catabrosa aquatica	OBL	–	–	–	0.0	2	–	–	–	0.0	0.3	–	–
Deschampsia cespitosa	FACW	–	0.5	–	0.2	–	–	–	–	0.0	0.1	–	22
Elymus cinereus	NI	–	–	–	0.0	–	3	–	–	1.0	0.4	–	–
Elymus glaucus	FACU	–	–	–	0.0	–	–	–	–	0.0	0.0	2	–
Festuca idahoensis	NI	–	–	–	0.0	–	–	–	–	0.0	0.0	–	10
Glyceria grandis	OBL	0.5	–	–	0.2	–	–	–	–	0.0	0.1	–	–
Glyceria striata	OBL	0.5	0.5	–	0.3	–	–	0.5	–	0.2	0.2	3	–
Hordeum brachyantherum	FACW	–	–	–	0.0	–	–	–	–	0.0	0.0	–	0.5
Juncus balticus	OBL	0.5	0.5	–	0.3	–	–	0.5	10	3.5	1.6	–	22
Juncus tenuis	FAC	–	–	–	0.0	1	–	–	–	0.0	0.1	–	–
Phalaris arundinacea	FACW	–	–	–	0.0	–	0.5	–	–	0.2	0.1	–	–
Poa scabrella	NI	–	–	–	0.0	–	–	–	1	0.3	0.1	–	–
Scirpus microcarpus	OBL	0.5	0.5	–	0.3	–	–	–	–	0.0	0.1	–	–
TOTAL NPG		70.5	98.0	93.0	87.2	8.0	17.0	2.5	39.0	19.5	46.9	18.5	85.0

2.2.1 Hydrophytic Vegetation

Hydrophytic vegetation data were interpreted in accordance with criteria of the 1987 Wetland Delineation Manual (Environmental Laboratory 1987). The baseline vegetation inventory for the study area was conducted during the 1989, 1990, and 1993 field seasons. Canopy cover for all vascular plant species was estimated on a 0.1-acre plot using USDA Forest Service Ecodata methods (USDA 1987). The scope of work was expanded during the 1993 field season to inventory additional vegetation plots to evaluate hydrophytic vegetation in potential wetlands within the baseline study area (Figure 1). Elkhorn Project area hydrophytic vegetation plot locations are shown in Exhibit 1 and, on a larger scale (1:6000), in four maps comprising Exhibit 2. Detailed plot data are presented in Attachment A, Tables A-1 through A-6.

Indicator status for each species was assigned using Reed (1988). Percent hydrophytic composition was calculated by plot and vegetation type using: 1) procedures outlined in the 1987 COE manual (number of dominant species by vegetation stratum) and 2) relative cover of all hydrophytic species as a percentage of total vascular plant cover.

An area was considered to have hydrophytic vegetation when more than 50 percent of the dominant species from all strata were obligate wetland (OBL), facultative wetland (FACW) and/or facultative (FAC) species. Other indicators used in identifying hydrophytic vegetation included visual observations of plant species growing in areas of prolonged inundation and/or soil saturation, recognizable morphological, physiological or reproductive adaptions, and technical literature.

Taxonomic references used for species identification include Hitchcock and Cronquist (1973), Hitchcock et al. (1955-1969), Dorn (1984), Cronquist et al. (1977), Brunsfeld and Johnson (1985) and Hermann (1970). Delineation of bottomland vegetation types follows Hansen et al. (1991).

Table A5. Percent canopy cover of vascular plant species and percent hydrophytic composition for 9 plots sampled in five SHRUB BOTTOMLAND types, Elkhorn study area, 1990–1993.

	VEGETATION TYPE and ECODATA PLOT NUMBER											
	SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
SITE PARAMETERS												
Slope (percent)	3	4	4	–	8	5	4	8	–	–	8	3
Aspect (degrees)	146	150	204	–	162	190	155	182	–	–	215	143
Topography*	Bot.	Bot.	Bot.	–	Bot.	Bot.	Ter.	Bot.	–	–	Bot.	Bot.
Configuration**	S	S	S	–	V	V	S	U	–	–	V	S
Elevation (feet)	5990	5860	6010	–	5860	4960	5255	6090	–	–	6360	5945
GROUND COVER												
Bare Ground	0.5	0.5	0.5	0.5	2	0.5	25	2	9.2	4.4	8	10
Rock	–	–	–	0.0	4	0.5	0.5	1	0.7	0.9	2	–
Gravel	0.5	–	–	0.2	0.5	–	0.5	0.5	0.3	0.3	1	0.5
Litter	83	78	73	78.0	85	72	50	70	64.0	73.0	65	50
Wood	3	3	5	3.7	1	10	6	10	8.7	5.4	4	0.5
Lichens	0.5	–	0.5	0.3	0.5	–	0.5	0.5	0.3	0.4	–	–
Moss	0.5	5	5	3.5	0.5	0.5	12	10	7.5	4.8	10	30
Water	4	5	8	5.7	2	0.5	0.5	–	0.3	2.9	2	–
Basal Vegetation	8	8	8	8.0	5	16	6	7	9.7	8.3	8	10
VEGETATION STRUCTURE (nonstratified cover)												
Total Vegetation	96	96	96	96.0	86	96	98	94	96.0	94.6	97	NC
Perennial Graminoids	82	92	86	86.7	76	70	66	62	66.0	76.3	75	90
Annual Graminoids	–	0.5	–	0.2	1	–	–	–	0.0	0.2	0.5	–
Perennial Forbs	50	22	8	26.7	24	74	52	44	56.7	39.1	38	52
Annual/Biennial Forbs	0.5	–	–	0.2	3	6	5	3	4.7	2.5	12	–
Subshrubs	–	–	–	0.0	–	0.5	–	–	0.2	0.1	–	–
Shrubs	72	44	54	56.7	22	80	84	44	69.3	57.1	60	25
Trees	–	–	0.5	0.2	1	0.5	2	7	3.2	1.6	–	–

Throughout this report, the common sedge in many wet sites is identified as Carex rostrata (beaked sedge). Recently it has been proposed that this sedge in Montana should be more properly cited as Carex utriculata (Heidel 1993).

2.2.2 Hydric Soils

Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part (USDA 1987a). In general, hydric soils are flooded, ponded, or saturated for usually one week or more during the period when soil temperatures are above biologic zero, 41 degrees Fahrenheit (5 degrees Celsius), as defined by the USDA (1975). These soils usually support hydrophytic vegetation.

The National Technical Committee for Hydric Soils (NTCHS) has developed criteria for hydric soils and has compiled a list of the nation's hydric soils (USDA 1987a). In addition, the SCS has listed hydric soils specific to Montana (USDA 1987b). The NTCHS criteria for hydric soils (revised 9/90) is as follows:

CRITERIA FOR HYDRIC SOILS

1. All Histosols except Folists, or
2. Soils in Aquic suborders, Aquic subgroups, Albolls suborders, Salorthids great group, Pell great groups of Vertisols, Pachic subgroups, or Cumulic subgroups that are:

    a. Somewhat poorly drained and have a frequently occurring water table at less than 0.5 ft from the surface for a significant period (usually more than two weeks) during the growing season, or more) during the growing season, or

    b. Poorly drained or very poorly drained and have either:

        1) a frequently occurring water table at less than 0.5 ft from the surface for a significant period (usually more than two weeks) during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches, or for other soils

Table A4. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER							
		POPULUS TREMULOIDES / POA PRATENSIS community type				POPULUS TRICHOCARPA / CORNUS STOLONIFERA community type			
	INDICATOR STATUS	68	69	79	Mean n=3	47	49	101	Mean n=3
TREES									
Juniperus scopulorum	NI	3	0.5	2	1.8	6	30	1	12.3
Populus tremuloides	FAC+	45	12	30	29.0	–	3	–	1.0
Populus trichocarpa	FAC	–	–	–	0.0	22	50	38	36.7
Pseudotsuga menziesii	NI	5	5	1	3.7	–	2	1	1.0
TOTAL TREES		53.0	17.5	33.0	34.5	28.0	85.0	40.0	51.0
TOTAL HYDROPHYTIC VEGETATION (Strat.)		62.0	137.5	103.5	101.0	116.5	102.5	148.5	122.5
TOTAL VEGETATION (Stratified)		186.0	206.5	199.5	197.3	244.0	192.5	215.0	217.2
Hydrophytic Composition (%)* **									
COE Manual (1987)		22	63	44	44	38	33	67	55
Relative cover		33	67	52	51	48	53	69	56

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jurisdictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

2) a frequently occurring water table at less than 1.0 ft from the surface for a significant period (usually more than two weeks) during the growing season if permeability is equal to or greater than 6.0 inches/hr in all layers within 20 inches, or

3) a frequently occurring water table at less than 1.5 ft from the surface for a significant period (usually more than two weeks) during the growing season if permeability is less than 6.0 inches/hr in any layer within 20 inches, or

3. Soils that are frequently ponded for long duration or very long duration during the growing season, or

4. Soils that are frequently flooded for long duration or very long duration during the growing season.

Based on previous baseline investigations (Hydrometrics, Inc. 1990 and 1993), surface water monitoring within the project area, and a spring and seep inventory, locations which potentially met the hydric soils criteria listed above were identified. Using hydric soil indicators as outlined in the Environmental Laboratory (1987) COE Wetland Delineation Manual (soil drainage, presence of surface saturation, redoximorphic features (mottles), sulfidic material, gleying, depth to water table, flowing water or ponding over seven days, and evidence of past surface water inundation), numerous shallow soil pits approximately 20 inches deep were hand dug at each location to verify the presence of hydric soils. Descriptive soil profile information relative to the indicators listed above was collected from these pits, documented on field forms, and photographed. Each site was field mapped using 1:6,000 orthophoto base maps and 1:12,000 topographic base maps.

2.2.3 Wetland Hydrology

Of the three diagnostic criteria needed to define a wetland, wetland hydrology is often the most difficult to identify in the field, primarily because of annual, seasonal, and daily fluctuations (FICWD 1989). Areas characterized by wetland hydrology are periodically inundated or have soils saturated to the surface during at least a portion of the growing season. The presence of water creates an anaerobic and reducing environment necessary to promote the development of hydrophytic vegetation and hydric soils.

Table A4. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER							
		POPULUS TREMULOIDES / POA PRATENSIS community type				POPULUS TRICHOCARPA / CORNUS STOLONIFERA community type			
	INDICATOR STATUS	68	69	79	Mean n=3	47	49	101	Mean n=3
INTRODUCED ANNUAL/BIENNIAL FORBS									
Arabis glabra	NI	–	0.5	0.5	0.3	1	–	0.5	0.5
Cirsium vulgare	FACU	–	–	–	0.0	–	0.5	0.5	0.3
Cynoglossum officinale	NI	0.5	–	–	0.2	–	–	–	0.0
Sisymbrium altissimum	FACU–	–	–	–	0.0	–	0.5	–	0.2
Stellaria media	NI	–	–	–	0.0	–	–	0.5	0.2
Tragopogon dubius	NI	–	–	–	0.0	0.5	0.5	–	0.3
Verbascum thapsus	NI	–	0.5	0.5	0.3	2	0.5	0.5	1.0
TOTAL IAF		0.5	1.0	1.0	0.8	3.5	2.0	2.0	2.5
SUBSHRUBS									
Berberis repens	NI	1	–	–	0.3	–	–	–	0.0
TOTAL SUBSHRUBS		1.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0
SHRUBS									
Alnus incana	FACW	–	18	–	6.0	30	8	20	19.3
Amelanchier alnifolia	FACU	–	–	–	0.0	–	–	0.5	0.2
Artemisia tridentata	NI	–	–	0.5	0.2	–	0.5	–	0.2
Chrysothamnus viscidiflorus	NI	–	–	0.5	0.2	–	–	–	0.0
Clematis ligusticifolia	FACU	–	–	–	0.0	22	3	–	8.3
Clematis occidentalis	NI	–	0.5	–	0.2	–	–	–	0.0
Cornus stolonifera	FACW	–	–	–	0.0	10	5	3	6.0
Juniperus communis	NI	12	4	4	6.7	–	–	–	0.0
Prunus virginiana	FACU	–	–	–	0.0	8	8	2	6.0
Rhus aromatica	NI	–	–	–	0.0	3	0.5	–	1.2
Ribes aureum	FAC+	–	–	–	0.0	–	2	–	0.7
Ribes cereum	NI	2	–	0.5	0.8	–	–	–	0.0
Ribes hudsonianum	OBL	–	1	–	0.3	–	–	–	0.0
Ribes inerme	FAC	–	–	–	0.0	–	–	0.5	0.2
Ribes setosum	NI(FAC?)	–	3	2	1.7	8	2	1	3.7
Rosa acicularis	FACU	1	3	1	1.7	–	–	0.5	0.2
Rosa woodsii	FACU	–	2	1	1.0	36	12	5	17.7
Rubus idaeus	FACU	0.5	1	–	0.5	0.5	–	2	0.8
Salix bebbiana	FACW	–	7	1	2.7	–	3	28	10.3
Salix boothii	OBL	–	3	3	2.0	12	6	9	9.0
Salix exigua	OBL	–	–	–	0.0	4	–	–	1.3
Salix geyeriana	FACW+	–	–	0.5	0.2	–	–	–	0.0
Salix scouleriana	FAC	–	–	–	0.0	2	14	–	5.3
Symphoricarpos albus	FACU	2	–	–	0.7	–	–	–	0.0
Symphoricarpos occidentalis	NI	–	–	–	0.0	14	16	–	10.0
TOTAL SHRUBS		17.5	42.5	14.0	24.7	149.5	80.0	71.5	100.3

An abundance of water is a characteristic common to all wetlands. The source of water can be from direct precipitation, flooding, groundwater discharge, and surface water runoff. The wetness of an area is influenced by the stratigraphy, topography, soil permeability, and plant cover (Environmental Laboratory 1987).

Duration of inundation and/or soil saturation during the growing season is more influential on the plant community than frequency of inundation/saturation during the growing season. At a minimum, an area characterized by wetland hydrology area will be inundated or saturated for a duration of five percent of the growing season. Field indicators that provide evidence of wetland hydrology characteristics include, but are not necessarily limited to: drainage patterns, drift lines, sediment deposition, watermarks, stream gage data and flood predictions, historic records, visual observation of saturated soils, and visual observation of inundation. Both recorded data and field observations can be used as indicators of wetland hydrology (Environmental Laboratory 1987).

Hydrologic field investigations were conducted in September of 1993 and included collecting qualitative and quantitative data by traversing each drainage and spring/seep area within the project area. Indicators of WUS and wetland hydrology which were observed and recorded included visual observation of inundation, soil saturation, watermarks, drift lines, sediment deposits, and drainage patterns. Additional evidence of WUS and wetland hydrology was obtained from a spring and seep inventory of the project area and hydrologic investigations within the project area since late 1989 (Hydrometrics, Inc. 1990), including a Baseline Water Resources Investigation (Hydrometrics, Inc. 1993).

It should be noted that an important limitation when using field wetland hydrology indicators is that they are not necessarily indicative of hydrologic events that occur principally during the growing season. It should also be noted that the late spring, summer, and early autumn of 1993 were abnormally wet, which may have increased the area of wetland hydrology noted during the field investigations (i.e. surface water present in drainages normally dry during the growing season).

Table A4. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER							
		POPULUS TREMULOIDES / POA PRATENSIS community type				POPULUS TRICHOCARPA / CORNUS STOLONIFERA community type			
	INDICATOR STATUS	68	69	79	Mean n=3	47	49	101	Mean n=3
NATIVE PERENNIAL FORBS (Continued)									
Sisyrinchium angustifolium	FACW–	–	0.5	0.5	0.3	–	–	–	0.0
Smilacina racemosa	FAC–	–	0.5	–	0.2	–	–	0.5	0.2
Smilacina stellata	FAC–	2	7	3	4.0	3	0.5	5	2.8
Solidago canadensis	FACU	–	–	–	0.0	8	–	–	2.7
Solidago gigantea	FACW–	–	–	–	0.0	1	0.5	–	0.5
Solidago missouriensis	NI	–	–	–	0.0	–	0.5	–	0.2
Spiranthes romanzoffiana	NI	–	0.5	–	0.2	–	–	–	0.0
Stachys palustris	FACW+	–	0.5	–	0.2	–	–	–	0.0
Stellaria crispa	FAC+	–	–	–	0.0	0.5	–	–	0.2
Stellaria longifolia	FACW	–	0.5	0.5	0.3	0.5	–	–	0.2
Thalictrum occidentale	FACU	–	–	0.5	0.2	–	–	3	1.0
Thermopsis rhombifolia	FACU	–	–	–	0.0	0.5	–	–	0.2
Trifolium longipes	FAC–	–	0.5	–	0.2	–	–	–	0.0
Urtica dioica	FAC+	–	0.5	2	0.8	1	0.5	0.5	0.7
Veronica serpyllifolia	FAC	0.5	–	–	0.2	–	–	–	0.0
Viola adunca	FAC	1	–	0.5	0.5	0.5	0.5	–	0.3
TOTAL NPF		31.5	31.0	41.0	34.5	33.0	11.0	30.5	24.8
INTRODUCED PERENNIAL FORBS									
Cerastium vulgatum	FACU	–	–	2	0.7	0.5	0.5	1	0.7
Cirsium arvense	FACU+	–	–	–	0.0	0.5	1	–	0.5
Linaria dalmatica	NI	–	–	0.5	0.2	0.5	–	0.5	0.3
Medicago sativa	NI	–	–	–	0.0	–	0.5	–	0.2
Ranunculus acris	FACW–	–	4	2	2.0	–	–	2	0.7
Taraxacum officinale	FACU	0.5	0.5	1	0.7	0.5	2	1	1.2
Trifolium pratense	FACU	–	1	–	0.3	0.5	–	–	0.2
Trifolium repens	FACU+	1	14	30	15.0	2	2	24	9.3
TOTAL IPF		1.5	19.5	35.5	18.8	4.5	6.0	28.5	13.0
FERNS AND ALLIES									
Botrychium lunaria	FAC	0.5	–	–	0.2	–	–	–	0.0
Equisetum arvense	FAC	–	5	0.5	1.8	6	0.5	12	6.2
Equisetum hyemale	FACW	–	0.5	0.5	0.3	–	–	–	0.0
TOTAL F&A		0.5	5.5	1.0	2.3	6.0	0.5	12.0	6.2
NATIVE ANNUAL/BIENNIAL FORBS									
Chenopodium leptophyllum	FACU	–	–	–	0.0	–	0.5	–	0.2
Collomia linearis	FACU	–	–	–	0.0	–	0.5	–	0.2
Descurainia pinnata	NI	0.5	–	–	0.2	–	–	–	0.0
Erigeron lonchophyllus	FACW	–	0.5	–	0.2	–	–	–	0.0
Hackelia floribunda	FACU–	–	–	–	0.0	0.5	–	–	0.2
TOTAL NAF		0.5	0.5	0.0	0.3	0.5	1.0	0.0	0.5

3.0 OVERVIEW

3.1 HYDROPHYTIC VEGETATION

The majority of the baseline study area is dominated by upland vegetation (Scow and Culwell 1994), including nine savannah and forest types dominated by Juniperus scopulorum (Rocky Mountain juniper), Pinus flexilis (limber pine), Pseudotsuga menziesii (Douglas-fir), Pinus contorta (lodgepole pine), or Abies lasiocarpa (subalpine fir); seven shrub types dominated by Artemisia nova (black sagebrush), Artemisia tridentata (big sagebrush), Chrysothamnus nauseosus (rubber rabbitbrush), or Cercocarpus ledifolius (curl-leaf mountain mahogany); and six grassland types dominated by Stipa comata (needle-and-thread grass), Agropyron spicatum (bluebunch wheatgrass), Festuca idahoensis (Idaho fescue) or Festuca scabrella (rough fescue).

The vegetation baseline study also described 16 bottomland types using the classification of Hansen et al. (1991), eight of which are dominated by hydrophytic species. Table 1 lists bottomland vegetation type, plot numbers, and percent hydrophytic composition by type. Attachment A discusses bottomland types which were not dominated by hydrophytic species, and the eight types generally dominated by hydrophytic species. The percent composition of hydrophytic vegetation often varied considerably among sample sites within a vegetation type, for the following reasons:

1) The incised nature of most drainages in the study area often limits hydrophytic species to narrow (5 to 20 feet wide) stringers along stream courses, with adjoining terraces and flood plains frequently comprised of primarily upland species.

2) Extensive surface disturbance by historic logging, grazing and mining throughout the study area has significantly altered vegetation composition along drainage bottoms and adjacent uplands; hydrophytic species have in many areas been replaced by non-hydrophytic species, for instance sites which at climax would be dominated by Picea engelmannii (FAC), are currently dominated by Pinus contorta (FAC-). Remnant hydrophytic vegetation is again limited to very narrow stringers along stream courses, sometimes with a patchy distribution.

Table A4. (Continued)

	VEGETATION TYPE and ECODATA PLOT NUMBER								
		POPULUS TREMULOIDES / POA PRATENSIS community type				POPULUS TRICHOCARPA / CORNUS STOLONIFERA community type			
	INDICATOR STATUS	68	69	79	Mean n=3	47	49	101	Mean n=3
NATIVE PERENNIAL FORBS (Continued)									
Astragalus eucosmus	FACU	–	0.5	–	0.2	–	–	–	0.0
Astragalus flexuosus	NI	–	–	–	0.0	–	0.5	–	0.2
Campanula rotundifolia	FACU+	0.5	0.5	0.5	0.5	–	0.5	0.5	0.3
Cardamine breweri	FACW+	–	0.5	–	0.2	0.5	0.5	–	0.3
Cirsium scariosum	NI	2	–	0.5	0.8	–	–	–	0.0
Cirsium undulatum	FACU+	–	–	–	0.0	–	0.5	–	0.2
Clematis hirsutissima	NI	1	–	–	0.3	–	–	–	0.0
Epilobium angustifolium	FACU+	–	0.5	–	0.2	–	–	–	0.0
Epilobium ciliatum	FACW–	–	0.5	1	0.5	0.5	0.5	0.5	0.5
Fragaria vesca	NI	0.5	–	0.5	0.3	–	–	–	0.0
Fragaria virginiana	UPL	6	0.5	0.5	2.3	–	–	1	0.3
Galium boreale	FACU	1	–	–	0.3	–	–	–	0.0
Galium triflorum	FACU	–	0.5	–	0.2	0.5	0.5	–	0.3
Gentiana affinis	FACU	0.5	–	–	0.2	–	–	–	0.0
Geranium richardsonii	FACU+	2	0.5	–	0.8	–	–	1	0.3
Geranium viscosissimum	FACU+	2	–	–	0.7	–	0.5	–	0.2
Geum macrophyllum	FACW+	0.5	1	2	1.2	0.5	–	1	0.5
Geum triflorum	FACU	0.5	–	–	0.2	–	–	–	0.0
Glycyrrhiza lepidota	FAC+	–	–	–	0.0	0.5	–	–	0.2
Habenaria dilatata	FACW+	–	–	–	0.0	–	–	0.5	0.2
Habenaria hyperborea	FACW+	–	0.5	0.5	0.3	–	0.5	–	0.2
Heracleum lanatum	FAC	–	0.5	0.5	0.3	–	–	2	0.7
Heuchera cylindrica	NI	–	–	0.5	0.2	–	–	–	0.0
Iris missouriensis	FACW+	–	–	3	1.0	–	–	–	0.0
Lactuca oblongifolia	FAC	–	–	–	0.0	–	0.5	–	0.2
Lithospermum incisum	NI	–	–	–	0.0	0.5	–	–	0.2
Lithospermum ruderale	NI	0.5	–	–	0.2	0.5	–	–	0.2
Mentha arvensis	FAC	–	0.5	–	0.2	0.5	0.5	1	0.7
Mimulus guttatus	OBL	–	–	0.5	0.2	–	–	–	0.0
Osmorhiza chilensis	NI	–	0.5	0.5	0.3	–	0.5	0.5	0.3
Osmorhiza occidentalis	NI	–	–	–	0.0	–	–	0.5	0.2
Pedicularis groenlandica	OBL	–	0.5	–	0.2	–	–	–	0.0
Penstemon procerus	NI	3	0.5	3	2.2	–	–	0.5	0.2
Perideridia gairdneri	FACU	0.5	–	–	0.2	–	–	–	0.0
Phacelia hastata	NI	–	–	0.5	0.2	–	–	–	0.0
Potentilla glandulosa	FAC–	0.5	–	–	0.2	–	–	–	0.0
Potentilla gracilis	FAC	0.5	0.5	1	0.7	–	–	–	0.0
Pyrola asarifolia	FACU	–	1	–	0.3	2	–	0.5	0.8
Ranunculus macounii	OBL	–	–	–	0.0	0.5	0.5	–	0.3
Ranunculus uncinatus	FAC	–	–	0.5	0.2	–	–	–	0.0
Senecio serra	FAC	–	–	–	0.0	2	0.5	–	0.8
Senecio triangularis	FACW+	–	–	–	0.0	–	–	0.5	0.2
Silene menziesii	FAC	–	–	–	0.0	–	0.5	–	0.2

Table 1. Vegetation type classification of bottomland plots sampled in the Elkhorn study area, Jefferson County, Montana, 1989-1993.

BOTTOMLAND VEGETATION TYPES	1989-1993 SAMPLE SITES	MEAN PERCENT HYDROPHYTIC COMPOSITION[1]	
		COE	R.C.
Conifer Bottomland			
Abies lasiocarpa/Calamagrostis canadensis h.t.	92,94	44	45
Abies lasiocarpa/Streptopus amplexifolius h.t.	106	78	67
Picea engelmannii/Equisetum arvense h.t.	103	82	81
Picea engelmannii/Galium triflorum h.t.	T21,T23,83,84	44	62
Pinus contorta/Calamagrostis rubescens Bottom c.t.	93,96,102	38	38
Mixed Conifer Ephemeral Drainage			
Juniperus scopulorum/Pseudotsuga menziesii Bottom c.t.	56,58	0	8
Juniperus scopulorum/Pseudotsuga menziesii/Pinus flexilis Bottom c.t.	31,48,52	0	0
Pinus flexilis/Agropyron smithii Bottom c.t.	10	0	0
Pseudotsuga menziesii/Calamagrostis rubescens h.t.	97	0	3
Abies lasiocarpa/Vaccinium scoparium h.t.	87	10	4
Deciduous Tree Bottomland			
Populus tremuloides/Poa pratensis c.t.	68,69,79	44	51
Populus trichocarpa/Cornus stolonifera c.t.	47,49,101	55	56
Shrub Bottomland			
Salix geyeriana/Carex rostrata h.t.	36,55,65	100	90
Salix bebbiana c.t.	107	71	73
Salix exigua c.t.	11,51,77	40	54
Alnus incana c.t.	72	50	63
Potentilla fruticosa/Deschampsia cespitosa h.t.	38	67	65
Herbaceous Bottomland			
Poa pratensis c.t.	37,57,64,66,108	40	36

[1]Hydrophytic composition calculated using: 1) Army Corps of Engineers (COE, 1987) Manual; and 2) Relative Cover (R.C.) of all vascular plant species.

Table A4. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER							
		POPULUS TREMULOIDES / POA PRATENSIS community type				POPULUS TRICHOCARPA / CORNUS STOLONIFERA community type			
	INDICATOR STATUS	68	69	79	Mean n=3	47	49	101	Mean n=3
NATIVE PERENNIAL GRAMINOIDS (Continued)									
Deschampsia cespitosa	FACW	–	0.5	1	0.5	–	–	–	0.0
Elymus cinereus	NI	–	–	–	0.0	–	0.5	–	0.2
Elymus glaucus	FACU	–	–	–	0.0	–	–	0.5	0.2
Festuca idahoensis	NI	0.5	–	–	0.2	–	–	–	0.0
Glyceria striata	OBL	–	0.5	–	0.2	–	–	–	0.0
Juncus balticus	OBL	–	12	12	8.0	–	–	1	0.3
Juncus tenuis	FAC	–	–	–	0.0	–	0.5	–	0.2
Koeleria cristata	NI	0.5	–	–	0.2	–	–	–	0.0
Stipa occidentalis	NI	2	–	0.5	0.8	–	–	0.5	0.2
Trisetum spicatum	FACU–	–	–	0.5	0.2	–	–	–	0.0
TOTAL NPG		37.0	38.5	30.0	35.2	2.0	2.0	9.5	4.5
INTRODUCED PERENNIAL GRAMINOIDS									
Agropyron repens	FACU	–	–	–	0.0	2	–	–	0.7
Agrostis stolonifera	FAC+	–	34	14	16.0	5	1	10	5.3
Bromus inermis	NI	–	–	–	0.0	–	–	1	0.3
Phleum pratense	FACU	1	6	12	6.3	–	–	2	0.7
Poa palustris	FAC	6	0.5	–	2.2	–	–	–	0.0
Poa pratensis	FACU+	36	10	18	21.3	10	4	8	7.3
TOTAL IPG		43.0	50.5	44.0	45.8	17.0	5.0	21.0	14.3
NATIVE ANNUAL GRAMINOIDS									
TOTAL NAG		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTRODUCED ANNUAL GRAMINOIDS									
TOTAL IAG		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NATIVE PERENNIAL FORBS									
Achillea millefolium	FACU	2	0.5	2	1.5	–	–	0.5	0.2
Actaea rubra	NI(FAC?)	–	1	1	0.7	0.5	–	1	0.5
Agoseris glauca	FAC	–	–	0.5	0.2	–	–	–	0.0
Allium cernuum	NI	0.5	–	0.5	0.3	–	–	0.5	0.2
Anemone multifida	NI	1	0.5	0.5	0.7	–	–	–	0.0
Angelica arguta	FACW	–	0.5	–	0.2	–	–	2	0.7
Antennaria microphylla	NI	2	–	–	0.7	0.5	–	–	0.2
Antennaria parvifolia	NI	0.5	–	–	0.2	–	–	–	0.0
Arenaria lateriflora	NI	0.5	0.5	–	0.3	–	–	–	0.0
Artemisia ludoviciana	UPL	–	–	–	0.0	1	–	–	0.3
Artemisia michauxiana	NI	–	2	4	2.0	–	–	–	0.0
Aster foliaceus	FACW–	–	6	10	5.3	7	1	7	5.0
Aster modestus	FAC+	–	–	–	0.0	–	0.5	0.5	0.3
Astragalus drummondii	NI	–	–	–	0.0	0.5	–	–	0.2

Throughout the type descriptions, the important species listed are those that were dominant in the vegetation strata defined in the 1987 COE manual. Attachment Tables A1 through A6 present vegetation data by plot and type; plot locations are shown on Exhibit 1.

Conifer bottomland in the study area consists of two habitat types in the Abies lasiocarpa (subalpine fir)series, two habitat types in the Picea engelmannii (Englemann spruce) series, and one community type dominated by Pinus contorta (lodgepole pine). The five conifer bottomland types occur along streams and adjacent terraces at higher elevations in the study area. One Abies lasciocarpa type and both spruce types are generally dominated by hydrophytic species (Tables 2 and 3).

Mixed conifer ephemeral drainages include five community and habitat types at various elevations (Table 4). At lower elevations in the southern part of the study area, three community types dominated by various combinations of Juniperus scopulorum (Rocky Mountain juniper), Pseudotsuga menziesii (Douglas-fir) and Pinus flexilis (limber pine) were identified in ephemeral drainages. At middle to high elevations in the northern part of the study area, typically upland habitat types Pseudotsuga menziesii/Calamagrostis rubescens (Douglas-fir/pinegrass) and Abies lasiocarpa/Vaccinium scoparium (subalpine fir/grouse whortleberry) also occurred in intermittent drainages such as upper Elkhorn Creek where site parameters precluded all but a sparse representation of hydrophytic species. All five types are non-hydrophytic and are classified as non-wetland WUS.

Deciduous tree bottomland (Table 5) occurs at low and middle elevations in the study area, mostly along major creek bottoms. The Populus tremuloides/Poa pratensis (quaking aspen/Kentucky bluegrass) community type is more frequent on commonly disturbed, higher elevation sites in the Pseudotsuga menziesii zone. The Populus trichocarpa/Cornus stolonifera (black cottonwood/red-osier dogwood) community is generally at lower elevations, interspersed with Salix (willow) communities. The Populus tremuloides community is primarily non-hydrophytic, while the Populus trichocarpa community is variable but more often hydrophytic.

Table A4. Percent canopy cover of vascular plant species and percent hydrophytic composition for 6 plots sampled in two DECIDUOUS TREE BOTTOMLAND types, Elkhorn study area, 1993.

		VEGETATION TYPE and ECODATA PLOT NUMBER							
		POPULUS TREMULOIDES / POA PRATENSIS community type				POPULUS TRICHOCARPA / CORNUS STOLONIFERA community type			
	INDICATOR STATUS	68	69	79	Mean n=3	47	49	101	Mean n=3
SITE PARAMETERS									
Slope (percent)		25	9	8	–	5	5	5	–
Aspect (degrees)		288	182	234	–	146	160	210	–
Topography*		L	Bot.	Bot.	–	Bot.	Bot.	Bot.	–
Configuration**		U	V	V	–	V	V	V	–
Elevation (feet)		5960	5790	5900	–	5020	5110	5560	–
GROUND COVER									
Bare Ground		4	0.5	1	1.8	2	8	0.5	3.5
Rock		1	2	1	1.3	1	5	5	3.7
Gravel		0.5	0.5	0.5	0.5	0.5	0.5	3	1.3
Litter		82	78	82	80.7	65	60	64	63.0
Wood		5	3	3	3.7	17	12	14	14.3
Lichens		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Moss		3	3	5	3.7	3	1	2	2.0
Water		–	7	3	3.3	5	8	6	6.3
Basal Vegetation		5	6	6	5.7	6	5	5	5.3
VEGETATION STRUCTURE (nonstratified cover)									
Total Vegetation		92	92	93	92.3	94	88	94	92.0
Perennial Graminoids		70	72	58	66.7	18	6	28	17.3
Annual Graminoids		–	–	–	0.0	–	–	–	0.0
Perennial Forbs		25	40	64	43.0	35	10	60	35.0
Annual/Biennial Forbs		0.5	0.5	0.5	0.5	3	1	0.5	1.5
Subshrubs		1	–	–	0.3	–	–	–	0.0
Shrubs		15	38	12	21.7	82	65	58	68.3
Trees		47	16	32	31.7	25	70	38	44.3
CLASS\SPECIES									
NATIVE PERENNIAL GRAMINOIDS									
Agropyron caninum	FAC–	6	2	2	3.3	0.5	0.5	–	0.3
Agrostis exarata	FACW	–	–	–	0.0	–	–	0.5	0.2
Bromus carinatus	NI	1	0.5	1	0.8	–	–	–	0.0
Calamagrostis canadensis	FACW+	–	10	–	3.3	–	–	–	0.0
Calamagrostis rubescens	NI	18	–	–	6.0	–	–	–	0.0
Carex aurea	FACW+	–	0.5	–	0.2	–	–	–	0.0
Carex deweyana	FAC+	–	–	–	0.0	–	–	0.5	0.2
Carex hoodii	NI	1	0.5	–	0.5	–	–	–	0.0
Carex lanuginosa	OBL	–	8	–	2.7	1	–	0.5	0.5
Carex microptera	FAC	–	3	7	3.3	0.5	0.5	6	2.3
Carex nebraskensis	OBL	–	–	1	0.3	–	–	–	0.0
Carex petasata	NI	–	0.5	–	0.2	–	–	–	0.0
Carex praticola	FACW	8	–	–	2.7	–	–	–	0.0
Carex rostrata	OBL	–	0.5	5	1.8	–	–	–	0.0

Table 2. Rank of dominant vascular plant species and percent hydrophytic composition for 3 plots sampled in two habitat types in the ABIES LASIOCARPA BOTTOMLAND series, Elkhorn study area, 1993.

	VEGETATION TYPE and ECODATA PLOT NUMBER					
		ABIES LASIOCARPA / CALAMAGROSTIS CANADENSIS habitat type			ABI LAS / STR AMP h.t.	ABIES LASIOCARPA BOTTOMLAND series
	INDICATOR STATUS	92	94	Mean n=2	106	Mean n=3
VEGETATION LAYER						
HERBS						
Arnica chamissonis	FACW	–	–	–	1	–
Calamagrostis canadensis	FACW+	2	2	1	–	1
Calamagrostis rubescens	NI	–	1	2	–	2
Carex disperma	FACW	3	–	–	–	–
Equisetum arvense	FAC	–	–	–	4	–
Fragaria virginiana	UPL	–	3	–	–	–
Saxifraga arguta	FACW+	–	–	–	2	–
Senecio triangularis	FACW+	1	–	3	3	3
SHRUBS						
Alnus incana	FACW	–	3	–	2	–
Juniperus communis	NI	–	1	3	–	3
Ledum glandulosum	FACW+	1	–	2	–	2
Ribes lacustre	FAC+	3	–	–	3	–
Vaccinium scoparium	FACU–	2	2	1	1	1
TREES						
Abies lasiocarpa	FACU	3	3	3	2	3
Picea engelmannii	FAC	2	2	2	1	1
Pinus contorta	FAC–	1	1	1	–	2
TOTAL HYDROPHYTIC VEGETATION (Strat.)		82.0	72.5	77.3	94.0	82.8
TOTAL VEGETATION (Stratified)		145.5	197.5	171.5	140.5	161.2
Hydrophytic Composition (%)* **						
COE Manual (1987)		67	33	44	78	44
Relative cover		56	37	45	67	51

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jurisdictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
TREES											
Abies lasiocarpa	FACU	–	–	0.0	–	–	–	0.0	–	–	10
Juniperus scopulorum	NI	18	35	26.5	30	40	20	30.0	3	–	–
Pinus albicaulis	NI	–	–	0.0	–	–	–	0.0	–	–	0.5
Pinus contorta	FAC–	–	–	0.0	–	–	–	0.0	–	0.5	56
Pinus flexilis	NI	–	–	0.0	3	17	9	9.7	40	0.5	–
Pseudotsuga menziesii	NI	0.5	22	11.3	40	11	16	22.3	–	60	16
TOTAL TREES		18.5	57.0	37.8	73.0	68.0	45.0	62.0	43.0	61.0	82.5
TOTAL HYDROPHYTIC VEGETATION (Strat.)		10.5	8.0	9.3	0.0	1.0	0.0	0.3	0.0	5.0	5.0
TOTAL VEGETATION (Stratified)		125.5	112.5	119.0	87.5	110.5	71.0	89.7	96.5	144.5	138.5
Hydrophytic Composition (%)* **											
COE Manual (1987)		0	12	0	0	0	0	0	0	0	10
Relative cover		8	7	8	0	1	0	0	0	3	4

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jursidictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Table 3. Rank of dominant vascular plant species and percent hydrophytic composition for 6 plots sampled in three types in the PICEA ENGELMANNII BOTTOMLAND series, Elkhorn study area, 1989–1993.

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
VEGETATION LAYER												
HERBS												
Agrostis stolonifera	FAC+	2	–	–	–	–	–	–	2	–	–	–
Arnica cordifolia	NI	–	2	–	–	2	5	–	–	–	–	–
Aster foliaceus	FACW–	–	3	–	2	1	2	–	–	–	–	3
Calamagrostis canadensis	FACW+	–	–	–	–	–	–	2	–	–	3	–
Calamagrostis rubescens	NI	–	1	–	–	–	1	1	–	1	1	1
Carex disperma	FACW	5	–	–	–	–	–	–	–	–	–	–
Carex rostrata	OBL	4	–	–	–	–	–	–	–	–	–	–
Equisetum arvense	FAC	1	–	–	–	3	–	–	–	–	–	–
Glyceria striata	OBL	6	–	–	–	–	–	–	–	–	–	–
Mertensia ciliata	FACW+	–	–	–	1	–	3	–	–	–	–	–
Mitella pentandra	FACW+	–	–	1	–	–	–	–	–	–	–	–
Poa pratensis	FACU+	–	–	–	–	–	–	–	1	–	2	2
Pyrola secunda	FACU	7	–	–	–	–	–	–	–	–	–	–
Saxifraga arguta	FACW+	–	–	2	–	–	–	–	–	–	–	–
Senecio triangularis	FACW+	–	–	–	–	–	–	–	3	2	–	–
Thalictrum occidentale	FACU	–	–	–	3	4	4	3	–	–	–	–
Trifolium repens	FACU+	3	–	–	–	–	–	–	–	–	–	–
SHRUBS												
Alnus incana	FACW	1	–	–	2	–	–	2	1	2	1	1
Juniperus communis	NI	–	–	–	–	–	–	3	–	–	–	–
Lonicera utahensis	FACU+	–	2	–	–	–	–	–	–	–	–	–
Ribes hudsonianum	OBL	–	–	–	–	–	–	–	2	–	3	–
Ribes lacustre	FAC+	3	–	1	1	1	1	–	3	3	–	2
Rubus idaeus	FACU	–	–	2	–	–	–	–	–	–	–	–
Salix bebbiana	FACW	2	–	–	–	2	–	–	–	–	–	–
Vaccinium scoparium	FACU–	–	1	–	–	–	–	1	–	1	2	3

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
SUBSHRUBS											
Artemisia frigida	NI	0.5	–	0.3	–	0.5	0.5	0.3	3	–	–
Berberis repens	NI	–	1	0.5	–	–	–	0.0	–	4	9
Chimaphila umbellata	NI	–	–	0.0	–	–	–	0.0	–	0.5	0.5
Gutierrezia sarothrae	NI	0.5	–	0.3	–	0.5	0.5	0.3	3	–	–
TOTAL SUBSHRUBS		1.0	1.0	1.0	0.0	1.0	1.0	0.7	6.0	4.5	9.5
SHRUBS											
Acer glabrum	FAC	–	–	0.0	–	–	–	0.0	–	0.5	–
Artemisia nova	NI	–	–	0.0	0.5	1	0.5	0.7	10	–	–
Artemisia tridentata	NI	4	0.5	2.3	–	–	–	0.0	–	–	–
Chrysothamnus nauseosus	NI	–	–	0.0	0.5	0.5	–	0.3	0.5	–	–
Chrysothamnus viscidiflorus	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
Clematis occidentalis	NI	–	–	0.0	–	–	–	0.0	–	1	–
Juniperus communis	NI	–	0.5	0.3	–	–	–	0.0	–	8	5
Philadelphus lewisii	NI	–	1	0.5	–	–	–	0.0	–	–	–
Prunus virginiana	FACU	1	–	0.5	–	–	–	0.0	–	–	–
Rhus aromatica	NI	1	–	0.5	–	0.5	–	0.2	3	–	–
Ribes cereum	NI	0.5	1	0.8	0.5	1	0.5	0.7	0.5	–	–
Ribes lacustre	FAC+	–	–	0.0	–	–	–	0.0	–	–	2
Ribes setosum	NI(FAC?)	–	0.5	0.3	–	–	–	0.0	–	–	–
Rosa acicularis	FACU	–	–	0.0	0.5	–	–	0.2	–	0.5	0.5
Rosa arkansana	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Rosa woodsii	FACU	3	2	2.5	–	–	–	0.0	–	–	–
Rubus idaeus	FACU	–	–	0.0	–	–	–	0.0	–	–	0.5
Spiraea betulifolia	NI	–	1	0.5	–	–	–	0.0	–	0.5	2
Symphoricarpos albus	FACU	–	0.5	0.3	–	–	–	0.0	–	–	–
Symphoricarpos occidentalis	NI	5	–	2.5	–	–	–	0.0	–	–	–
Tetradymia canescens	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Vaccinium scoparium	FACU–	–	–	0.0	–	–	–	0.0	–	0.5	3
TOTAL SHRUBS		15.0	7.0	11.0	2.0	3.0	1.0	2.0	15.0	11.0	13.0

Table 3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
TREES												
Picea engelmannii	FAC	1	1	1	1	1	1	–	–	2	–	1
Pinus contorta	FAC–	–	2	–	–	3	2	1	1	1	1	2
Pseudotsuga menziesii	NI	–	3	2	2	2	3	2	2	–	2	3
TOTAL HYDROPHYTIC VEGETATION (Strat.)		175.5	47.5	80.5	104.0	111.0	85.8	47.0	123.0	66.5	78.8	94.4
TOTAL VEGETATION (Stratified)		218.0	119.5	107.5	144.0	179.0	137.5	236.0	224.0	167.5	209.2	174.4
Hydrophytic Composition (%)* **												
COE Manual (1987)		82	25	67	71	56	44	25	63	57	38	44
Relative cover		81	40	75	72	62	62	20	55	40	38	54

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jursidictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
NATIVE ANNUAL/BIENNIAL FORBS (Continued)											
Cryptantha celosioides	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Descurainia pinnata	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Epilobium paniculatum	UPL	–	0.5	0.3	–	0.5	–	0.2	–	–	–
Galium aparine	FACU	0.5	–	0.3	–	–	–	0.0	–	–	–
Gentianella amarella	FACW–	–	–	0.0	–	–	–	0.0	–	0.5	0.5
Grindelia squarrosa	FACU	0.5	–	0.3	–	–	–	0.0	–	–	–
Linum rigidum	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Parietaria pensylvanica	FACU	3	–	1.5	–	–	–	0.0	–	–	–
Phacelia linearis	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
Polygonum douglasii	FACU	0.5	–	0.3	–	–	–	0.0	–	–	–
Silene antirrhina	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
TOTAL NAF		8.0	1.5	4.8	0.5	1.5	0.5	0.8	0.5	1.0	0.5
INTRODUCED ANNUAL/BIENNIAL FORBS											
Alyssum desertorum	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
Camelina microcarpa	NI	0.5	–	0.3	–	0.5	–	0.2	–	–	–
Capsella bursa–pastoris	FAC–	0.5	–	0.3	–	–	–	0.0	–	–	–
Draba nemorosa	NI	–	–	0.0	0.5	–	–	0.2	–	–	–
Filago arvensis	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Medicago lupulina	FAC	3	0.5	1.8	–	0.5	–	0.2	–	–	–
Sisymbrium altissimum	FACU–	0.5	–	0.3	–	–	–	0.0	–	–	–
Thlaspi arvense	NI	0.5	0.5	0.5	–	–	–	0.0	–	–	–
Tragopogon dubius	NI	0.5	–	0.3	–	0.5	–	0.2	–	–	–
Verbascum thapsus	NI	1	0.5	0.8	–	1	0.5	0.5	–	–	–
TOTAL IAF		7.0	1.5	4.3	0.5	3.0	0.5	1.3	0.0	0.0	0.0

Table 4. Rank of dominant vascular plant species and percent hydrophytic composition for 6 plots sampled in three MIXED CONIFER EPHEMERAL DRAINAGE types, Elkhorn study area, 1990–1993.

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
VEGETATION LAYER											
HERBS											
Achillea millefolium	FACU	5	–	–	–	4	–	6	–	–	–
Agropyron smithii	FACU	–	–	–	–	–	–	–	1	–	–
Agropyron spicatum	FACU–	–	–	–	–	–	2	3	–	–	–
Antennaria parvifolia	NI	–	1	2	–	–	–	–	–	–	–
Antennaria racemosa	NI	–	–	–	–	–	–	–	–	3	–
Arnica cordifolia	NI	–	–	–	–	–	–	–	–	–	3
Artemisia frigida	NI	–	–	–	–	–	–	–	3	–	–
Astragalus miser	NI	–	2	–	–	–	–	–	–	–	–
Berberis repens	NI	–	–	–	–	–	–	–	–	4	2
Calamagrostis rubescens	NI	–	–	–	–	–	–	–	–	1	1
Carex geyeri	NI	–	–	–	–	–	–	–	–	2	–
Carex rossii	NI	–	–	–	–	2	3	4	–	–	–
Festuca idahoensis	NI	–	–	–	–	–	1	2	–	–	–
Penstemon aridus	NI	–	–	–	–	5	–	–	–	–	–
Penstemon attenuatus	FAC	–	3	–	–	–	–	–	–	–	–
Poa compressa	FACU	4	–	–	–	–	–	–	–	–	–
Poa pratensis	FACU+	1	–	1	–	–	–	–	2	–	–
Poa scabrella	NI	–	–	–	–	3	–	5	–	–	–
Solidago missouriensis	NI	–	–	–	1	1	–	1	–	–	–
Taraxacum officinale	FACU	2	–	3	–	–	–	–	–	–	–
Trifolium repens	FACU+	3	–	4	–	–	–	–	–	–	–
SHRUBS											
Artemisia nova	NI	–	–	–	–	1	–	–	1	–	–
Artemisia tridentata	NI	2	–	3	–	–	–	–	–	–	–
Clematis occidentalis	NI	–	–	–	–	–	–	–	–	2	–
Juniperus communis	NI	–	–	–	–	–	–	–	–	1	1
Philadelphus lewisii	NI	–	2	–	–	–	–	–	–	–	–
Rhus aromatica	NI	–	–	–	–	–	–	–	2	–	–
Ribes cereum	NI	–	3	–	–	2	–	–	–	–	–
Ribes lacustre	FAC+	–	–	–	–	–	–	–	–	–	3

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
NATIVE PERENNIAL FORBS (Continued)											
Senecio canus	NI	–	0.5	0.3	–	0.5	0.5	0.3	0.5	–	–
Senecio serra	FAC	–	–	0.0	–	–	–	0.0	–	–	0.5
Senecio streptanthifolius	FACU	–	0.5	0.3	–	–	–	0.0	–	–	–
Smilacina stellata	FAC–	–	0.5	0.3	–	–	–	0.0	–	–	–
Solidago missouriensis	NI	1	2	1.5	3	6	–	3.0	0.5	–	–
Sphaeralcea coccinea	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Thalictrum occidentale	FACU	–	–	0.0	–	–	–	0.0	–	0.5	2
Townsendia hookeri	NI	–	–	0.0	–	0.5	–	0.2	0.5	–	–
Valeriana dioica	FACW	–	–	0.0	–	–	–	0.0	–	0.5	–
Vicia americana	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
Viola adunca	FAC	–	0.5	0.3	–	–	–	0.0	–	–	–
TOTAL NPF		26.0	35.5	30.8	8.0	24.5	12.5	15.0	9.0	28.5	20.5
INTRODUCED PERENNIAL FORBS											
Linaria dalmatica	NI	0.5	–	0.3	–	–	–	0.0	0.5	–	–
Linaria vulgaris	NI	0.5	–	0.3	–	0.5	0.5	0.3	–	–	–
Taraxacum officinale	FACU	5	1	3.0	0.5	0.5	1	0.7	0.5	1	–
Trifolium repens	FACU+	5	1	3.0	–	–	–	0.0	–	–	–
TOTAL IPF		11.0	2.0	6.5	0.5	1.0	1.5	1.0	1.0	1.0	0.0
FERNS AND ALLIES											
Cystopteris fragilis	FACU	–	–	0.0	–	–	–	0.0	–	0.5	0.5
Selaginella densa	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
TOTAL F&A		0.5	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.5	0.5
NATIVE ANNUAL/BIENNIAL FORBS											
Androsace septentrionalis	FAC–	0.5	–	0.3	–	–	–	0.0	–	–	–
Arabis holboellii	FACU–	0.5	–	0.3	0.5	–	0.5	0.3	–	0.5	–
Chenopodium fremontii	FACU	0.5	–	0.3	–	–	–	0.0	–	–	–
Collinsia parviflora	NI	0.5	0.5	0.5	–	–	–	0.0	–	–	–
Collomia linearis	FACU	0.5	0.5	0.5	–	–	–	0.0	–	–	–

Table 4. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
SHRUBS (Continued)											
Rosa woodsii	FACU	3	1	1	–	–	–	–	–	–	–
Spiraea betulifolia	NI	–	–	–	–	–	–	–	–	–	4
Symphoricarpos occidentalis	NI	1	–	2	–	–	–	–	–	–	–
Vaccinium scoparium	FACU–	–	–	–	–	–	–	–	–	–	2
TREES											
Abies lasiocarpa	FACU	–	–	–	–	–	–	–	–	–	3
Juniperus scopulorum	NI	1	1	1	2	1	1	1	2	–	–
Pinus contorta	FAC–	–	–	–	–	–	–	–	–	–	1
Pinus flexilis	NI	–	–	–	3	2	3	3	1	–	–
Pseudotsuga menziesii	NI	–	2	2	1	3	2	2	–	1	2
TOTAL HYDROPHYTIC VEGETATION (Strat.)		10.5	8.0	9.3	0.0	1.0	0.0	0.3	0.0	5.0	5.0
TOTAL VEGETATION (Stratified)		125.5	112.5	119.0	87.5	110.5	71.0	89.7	96.5	144.5	138.5
Hydrophytic Composition (%)* **											
COE Manual (1987)		0	12	0	0	0	0	0	0	0	10
Relative cover		8	7	8	0	1	0	0	0	3	4

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jursidictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace
**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex
***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
NATIVE PERENNIAL FORBS (Continued)											
Geum triflorum	FACU	0.5	–	0.3	0.5	–	–	0.2	–	–	–
Glycyrrhiza lepidota	FAC+	1	–	0.5	–	–	–	0.0	–	–	–
Goodyera oblongifolia	FACU–	–	–	0.0	–	–	–	0.0	–	0.5	–
Haplopappus acaulis	NI	–	–	0.0	–	–	0.5	0.2	–	–	–
Heuchera cylindrica	NI	–	–	0.0	–	–	–	0.0	–	0.5	0.5
Heuchera parvifolia	NI	–	–	0.0	–	0.5	–	0.2	–	0.5	–
Hieracium albiflorum	NI	–	–	0.0	–	–	–	0.0	–	2	–
Lesquerella alpina	NI	–	–	0.0	–	0.5	–	0.2	0.5	–	–
Liatris punctata	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Lithospermum ruderale	NI	–	0.5	0.3	–	–	–	0.0	–	0.5	–
Lupinus sericeus	NI	0.5	0.5	0.5	–	–	–	0.0	–	–	–
Lychnis drummondii	NI	–	–	0.0	–	–	–	0.0	–	–	0.5
Mertensia ciliata	FACW+	–	–	0.0	–	–	–	0.0	–	0.5	–
Musineon divaricatum	NI	–	–	0.0	–	–	0.5	0.2	–	–	–
Opuntia polyacantha	NI	0.5	–	0.3	–	–	–	0.0	0.5	–	–
Orobanche corymbosa	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Osmorhiza chilensis	NI	–	0.5	0.3	–	–	–	0.0	–	0.5	0.5
Oxytropis sericea	NI	0.5	–	0.3	–	0.5	–	0.2	–	–	–
Paronychia sessiliflora	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Penstemon aridus	NI	–	–	0.0	–	2	1	1.0	–	–	–
Penstemon attenuatus	FAC	–	5	2.5	–	–	–	0.0	–	–	–
Penstemon eriantherus	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Phacelia hastata	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Phlox alyssifolia	NI	–	–	0.0	0.5	0.5	0.5	0.5	0.5	–	–
Phlox hoodii	NI	–	–	0.0	–	0.5	0.5	0.3	0.5	–	–
Potentilla glandulosa	FAC–	–	0.5	0.3	–	–	–	0.0	–	–	–
Potentilla gracilis	FAC	2	0.5	1.3	–	–	–	0.0	–	–	–
Potentilla hippiana	NI	2	–	1.0	0.5	0.5	–	0.3	–	–	–
Pyrola secunda	FACU	–	–	0.0	–	–	–	0.0	–	0.5	1
Ratibida columnifera	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
Sedum lanceolatum	NI	–	–	0.0	–	0.5	–	0.2	–	–	–

Table 5.

Rank of dominant vascular plant species and percent hydrophytic composition for 6 plots sampled in two DECIDUOUS TREE BOTTOMLAND types, Elkhorn study area, 1993.

		VEGETATION TYPE and ECODATA PLOT NUMBER							
		POPULUS TREMULOIDES / POA PRATENSIS community type				POPULUS TRICHOCARPA / CORNUS STOLONIFERA community type			
	INDICATOR STATUS	68	69	79	Mean n=3	47	49	101	Mean n=3
VEGETATION LAYER									
HERBS									
Agrostis stolonifera	FAC+	–	1	3	2	–	–	3	4
Aster foliaceus	FACW–	–	–	–	–	3	–	–	5
Calamagrostis rubescens	NI	2	–	–	–	–	–	–	–
Carex praticola	FACW	3	–	–	–	–	–	–	–
Equisetum arvense	FAC	–	–	–	–	–	–	2	3
Juncus balticus	OBL	–	3	–	–	–	–	–	–
Poa pratensis	FACU+	1	–	2	1	1	1	–	2
Solidago canadensis	FACU	–	–	–	–	2	–	–	–
Taraxacum officinale	FACU	–	–	–	–	–	2	–	–
Trifolium repens	FACU+	–	2	1	3	–	3	1	1
SHRUBS									
Alnus incana	FACW	–	1	–	2	2	–	2	1
Clematis ligusticifolia	FACU	–	–	–	–	3	–	–	–
Juniperus communis	NI	1	3	1	1	–	–	–	–
Ribes cereum	NI	2	–	–	–	–	–	–	–
Ribes setosum	NI(FAC?)	–	–	3	–	–	–	–	–
Rosa woodsii	FACU	–	–	–	–	1	3	–	2
Salix bebbiana	FACW	–	2	–	3	–	–	1	3
Salix boothii	OBL	–	–	2	–	–	–	3	–
Salix scouleriana	FAC	–	–	–	–	–	2	–	–
Symphoricarpos albus	FACU	3	–	–	–	–	–	–	–
Symphoricarpos occidentalis	NI	–	–	–	–	–	1	–	4
TREES									
Juniperus scopulorum	NI	3	–	2	3	2	2	2	2
Populus tremuloides	FAC+	1	1	1	1	–	3	–	–
Populus trichocarpa	FAC	–	–	–	–	1	1	1	1
Pseudotsuga menziesii	NI	2	2	3	2	–	–	3	–
TOTAL HYDROPHYTIC VEGETATION (Strat.)		62.0	137.5	103.5	101.0	116.5	102.5	148.5	122.5
TOTAL VEGETATION (Stratified)		186.0	206.5	199.5	197.3	244.0	192.5	215.0	217.2
Hydrophytic Composition (%)* **									
COE Manual (1987)		22	63	44	44	38	33	67	55
Relative cover		33	67	52	51	48	53	69	56

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jurisdictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
NATIVE PERENNIAL FORBS (Continued)											
Astragalus drummondii	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
Astragalus flexuosus	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Astragalus gilviflorus	NI	–	–	0.0	–	–	0.5	0.2	–	–	–
Astragalus lotiflorus	NI	–	–	0.0	–	0.5	0.5	0.3	–	–	–
Astragalus miser	NI	–	5	2.5	0.5	–	–	0.2	–	3	2
Astragalus purshii	NI	–	–	0.0	–	–	0.5	0.2	–	–	–
Balsamorhiza sagittata	NI	–	0.5	0.3	–	–	–	0.0	–	–	–
Besseya wyomingensis	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Campanula rotundifolia	FACU+	1	1	1.0	0.5	1	–	0.5	–	0.5	0.5
Castilleja miniata	FAC	–	0.5	0.3	–	–	–	0.0	–	–	–
Chrysopsis villosa	NI	0.5	–	0.3	–	0.5	0.5	0.3	0.5	–	–
Cirsium scariosum	NI	–	–	0.0	–	–	–	0.0	–	0.5	0.5
Cirsium undulatum	FACU+	–	–	0.0	–	0.5	0.5	0.3	0.5	–	–
Comandra umbellata	NI	–	–	0.0	–	–	0.5	0.2	–	–	–
Corallorhiza maculata	FAC–	–	–	0.0	–	–	–	0.0	–	0.5	–
Crepis acuminata	NI	–	0.5	0.3	–	0.5	0.5	0.3	–	–	–
Disporum trachycarpum	NI	–	1	0.5	–	–	–	0.0	–	0.5	–
Douglasia montana	NI	–	–	0.0	0.5	1	0.5	0.7	–	–	–
Draba oligosperma	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Erigeron compositus	NI	0.5	–	0.3	0.5	0.5	1	0.7	0.5	–	–
Erigeron corymbosus	NI	0.5	–	0.3	–	–	1	0.3	–	–	–
Erigeron speciosus	NI	–	0.5	0.3	–	–	–	0.0	–	0.5	–
Eriogonum umbellatum	NI	0.5	–	0.3	–	–	–	0.0	–	–	–
Erysimum inconspicuum	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Fragaria vesca	NI	–	0.5	0.3	–	–	–	0.0	–	–	3
Fragaria virginiana	UPL	–	1	0.5	–	–	–	0.0	–	0.5	–
Gaillardia aristata	NI	0.5	–	0.3	–	0.5	0.5	0.3	–	–	–
Galium boreale	FACU	–	–	0.0	–	–	–	0.0	–	0.5	0.5
Gaura coccinea	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Geranium richardsonii	FACU+	–	–	0.0	–	–	–	0.0	–	0.5	0.5
Geranium viscosissimum	FACU+	–	1	0.5	–	–	–	0.0	–	–	–

Shrub bottomland is found primarily at low to middle elevations in the study area, comprised of five types (Table 6). The three willow types are listed in Table 1 in general order of hydric to mesic regime and middle to lower elevation, dominated by Salix geyeriana (Geyer willow), Salix bebbiana (Bebb willow), or Salix exigua (sandbar willow). There is also a tall shrub community dominated by Potentilla fruticosa (shrubby cinquefoil). The shrub bottomland types are generally hydrophytic, although the Salix exigua community varies and considerable portions (e.g., stand peripheries) may be non-hydrophytic.

The only herbaceous bottomland type identified is the Poa pratensis (Kentucky bluegrass) community type (Table 7). This type is generally non-hydrophytic and often represents a degraded sere of various shrub bottomland types (particularly willow stands) or conifer bottomland where the tree overstory has been removed.

3.2 HYDRIC SOILS

Hydric soils in the Elkhorn Project area are associated with active streams, springs, and seeps and have developed in these areas due to periodic or permanent inundation. Hydric soils occur along active streams when the water table is close enough to the surface for a sufficient period to produce anaerobic conditions. Soils which form under these conditions are usually saturated, poorly drained, contain a high percentage of undecomposed organic material and features of anaerobic conditions (redoximorphic features, gleying, etc.). Hydric soils form in spring and seep areas due to sufficient groundwater discharge which affects the amount of soil saturation and inundation. Soils in these areas generally have the same characteristics and features as hydric soils along active streams.

3.2.1 Active Streams

Hydric soils occur along Turnley Creek and Elkhorn Creek and their respective perennial tributaries. Hydric soil development is extensive in the Turnley Meadows area where soils are very deep and poorly drained. Hydric soil development along tributaries to Turnley Creek (Sourdough Creek and the creek in Greyback Gulch) is limited to small saturated benches adjacent to these streams.

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
INTRODUCED PERENNIAL GRAMINOIDS											
Phleum pratense	FACU	–	–	0.0	–	–	–	0.0	–	0.5	–
Poa compressa	FACU	4	–	2.0	–	–	–	0.0	–	–	–
Poa pratensis	FACU+	27	2	14.5	–	–	–	0.0	3	–	–
TOTAL IPG		31.0	2.0	16.5	0.0	0.0	0.0	0.0	3.0	0.5	0.0
NATIVE ANNUAL GRAMINOIDS											
TOTAL NAG		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
INTRODUCED ANNUAL GRAMINOIDS											
TOTAL IAG		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NATIVE PERENNIAL FORBS											
Achillea millefolium	FACU	4	0.5	2.3	0.5	2	0.5	1.0	0.5	0.5	–
Allium cernuum	NI	0.5	0.5	0.5	–	0.5	0.5	0.3	0.5	0.5	0.5
Anemone multifida	NI	–	0.5	0.3	–	–	–	0.0	–	–	–
Angelica arguta	FACW	–	–	0.0	–	–	–	0.0	–	0.5	–
Antennaria microphylla	NI	2	0.5	1.3	0.5	–	1	0.5	–	–	–
Antennaria neglecta	NI	–	–	0.0	–	–	–	0.0	–	0.5	–
Antennaria parvifolia	NI	0.5	9	4.8	–	0.5	0.5	0.3	0.5	–	–
Antennaria racemosa	NI	–	–	0.0	–	–	–	0.0	–	8	0.5
Arabis sparsiflora	NI	–	–	0.0	–	0.5	–	0.2	–	–	–
Arnica chamissonis	FACW	–	–	0.0	–	–	–	0.0	–	–	0.5
Arnica cordifolia	NI	–	0.5	0.3	–	–	–	0.0	–	1	4
Artemisia dracunculus	NI	0.5	–	0.3	–	–	–	0.0	0.5	–	–
Artemisia ludoviciana	UPL	2	–	1.0	–	–	–	0.0	–	–	–
Artemisia michauxiana	NI	–	–	0.0	–	–	–	0.0	–	3	1
Aster chilensis	FAC	2	–	1.0	–	–	–	0.0	–	–	–
Aster conspicuus	NI	–	1	0.5	–	–	–	0.0	–	0.5	1
Aster falcatus	FACU–	1	–	0.5	0.5	–	–	0.2	–	–	–
Aster foliaceus	FACW–	–	–	0.0	–	–	–	0.0	–	0.5	1
Astragalus agrestis	FACW–	0.5	–	0.3	–	–	–	0.0	–	–	–

Table 6. Rank of dominant vascular plant species and percent hydrophytic composition for 9 plots sampled in five SHRUB BOTTOMLAND types, Elkhorn study area, 1990–1993.

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
VEGETATION LAYER													
HERBS													
Agropyron caninum	FAC–	–	–	–	–	–	–	–	–	–	–	4	–
Agropyron repens	FACU	–	–	–	–	–	–	–	2	–	–	–	–
Agrostis stolonifera	FAC+	–	–	–	–	1	5	1	–	2	3	2	–
Artemisia michauxiana	NI	–	–	–	–	–	–	–	5	–	–	–	–
Aster foliaceus	FACW–	5	–	–	–	–	–	–	–	–	–	–	–
Aster modestus	FAC+	6	–	–	–	–	–	–	–	–	–	–	–
Bromus ciliatus	FAC+	2	–	–	4	–	–	–	–	–	–	–	–
Calamagrostis canadensis	FACW+	3	2	–	2	–	4	–	–	–	5	–	–
Carex microptera	FAC	–	–	–	–	–	–	–	1	–	–	–	–
Carex nebraskensis	OBL	–	–	2	5	–	–	–	–	–	–	–	–
Carex praegracilis	FACW	–	–	–	–	–	–	–	–	–	–	–	4
Carex rostrata	OBL	1	1	1	1	–	–	–	–	–	1	–	3
Cirsium arvense	FACU+	–	–	–	–	–	1	–	–	3	–	–	–
Cirsium vulgare	FACU	–	–	–	–	–	–	–	–	–	–	3	–
Deschampsia cespitosa	FACW	–	–	–	–	–	–	–	–	–	–	–	1
Epilobium ciliatum	FACW–	–	–	3	–	–	–	–	–	–	–	–	–
Festuca idahoensis	NI	–	–	–	–	–	–	–	–	–	–	–	5
Fragaria virginiana	UPL	7	–	–	–	–	–	–	–	–	–	–	–
Juncus balticus	OBL	–	–	–	–	–	–	–	4	–	–	–	2
Poa palustris	FAC	4	3	–	3	–	3	5	–	4	4	–	–
Poa pratensis	FACU+	8	5	–	–	2	2	2	3	1	2	1	6
Senecio sphaerocephalus	FACW	–	4	–	–	–	–	–	–	–	–	–	–
Solidago canadensis	FACU	–	–	–	–	–	6	–	–	–	–	–	–
Sonchus uliginosus	FACU+	–	–	–	–	–	7	–	–	–	–	–	–
Taraxacum officinale	FACU	–	–	–	–	–	–	4	–	–	–	–	–
Trifolium repens	FACU+	–	–	–	–	–	–	3	–	5	–	–	–
Urtica dioica	FAC+	–	–	–	–	3	–	–	–	–	–	5	–
Veronica americana	OBL	–	–	–	–	4	–	–	–	–	–	–	–

Table A3. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER									
		JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
CLASS\SPECIES	INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
NATIVE PERENNIAL GRAMINOIDS											
Agropyron caninum	FAC–	–	0.5	0.3	–	–	–	0.0	–	0.5	0.5
Agropyron smithii	FACU	3	–	1.5	–	–	–	0.0	10	–	–
Agropyron spicatum	FACU–	–	0.5	0.3	0.5	1	2	1.2	0.5	–	–
Aristida longiseta	NI	–	–	0.0	–	–	–	0.0	0.5	–	–
Bouteloua gracilis	NI	–	–	0.0	–	0.5	–	0.2	0.5	–	–
Bromus anomalus	NI	–	0.5	0.3	–	–	–	0.0	–	–	–
Bromus ciliatus	FAC+	–	–	0.0	–	–	–	0.0	–	2	0.5
Calamagrostis rubescens	NI	–	–	0.0	–	–	–	0.0	–	18	9
Carex filifolia	NI	–	–	0.0	–	–	0.5	0.2	–	–	–
Carex geyeri	NI	–	–	0.0	–	–	–	0.0	–	12	2
Carex rossii	NI	–	0.5	0.3	0.5	2	1	1.2	0.5	–	–
Danthonia intermedia	FACU+	–	–	0.0	–	–	–	0.0	–	0.5	–
Festuca idahoensis	NI	0.5	0.5	0.5	0.5	0.5	3	1.3	–	–	–
Festuca scabrella	NI	–	1	0.5	0.5	–	–	0.2	–	–	–
Juncus balticus	OBL	2	–	1.0	–	–	–	0.0	–	–	–
Koeleria cristata	NI	1	–	0.5	–	1	1	0.7	3	–	–
Oryzopsis hymenoides	UPL	–	–	0.0	–	0.5	–	0.2	–	–	–
Poa interior	FAC	–	0.5	0.3	–	0.5	–	0.2	–	–	–
Poa juncifolia	FACU+	–	–	0.0	–	–	–	0.0	0.5	–	–
Poa nervosa	FACU–	–	–	0.0	–	–	–	0.0	–	3	–
Poa sandbergii	NI	–	–	0.0	–	0.5	0.5	0.3	3	–	–
Poa scabrella	NI	0.5	–	0.3	0.5	2	0.5	1.0	–	–	–
Stipa comata	NI	–	–	0.0	–	–	0.5	0.2	0.5	–	–
Stipa occidentalis	NI	–	1	0.5	–	–	–	0.0	–	0.5	–
Stipa viridula	NI	0.5	–	0.3	0.5	–	–	0.2	–	–	–
TOTAL NPG		7.5	5.0	6.3	3.0	8.5	9.0	6.8	19.0	36.5	12.0

Table 6. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER											
		SALIX GEYERIANA / CAREX ROSTRATA habitat type				SALIX BEBBIANA c.t.	SALIX EXIGUA community type				SALIX Series	ALNUS INCANA c.t.	POT FRU/ DES CES h.t.
	INDICATOR STATUS	36	55	65	Mean n=3	107	11	51	77	Mean n=3	Mean n=7	72	38
SHRUBS													
Alnus incana	FACW	–	–	1	4	–	–	–	–	–	–	1	–
Potentilla fruticosa	FAC–	–	–	–	–	–	–	–	–	–	–	–	1
Ribes setosum	NI(FAC?)	–	–	–	–	2	3	5	3	3	–	–	–
Rosa woodsii	FACU	–	–	–	–	3	2	2	–	2	3	–	–
Rubus idaeus	FACU	3	–	–	–	–	4	–	2	–	–	–	–
Salix bebbiana	FACW	–	2	3	5	1	5	4	4	–	4	–	2
Salix boothii	OBL	–	3	4	2	–	–	–	–	–	5	–	–
Salix drummondiana	FACW	2	–	5	3	–	–	–	–	–	–	–	–
Salix exigua	OBL	–	–	–	–	–	1	1	1	1	1	–	–
Salix geyeriana	FACW+	1	1	2	1	–	–	–	–	–	2	–	3
Symphoricarpos occidentalis	NI	–	–	–	–	–	6	3	–	4	–	–	–
TREES													
Pseudotsuga menziesii	NI	–	–	–	–	–	–	–	1	1	–	–	–
TOTAL HYDROPHYTIC VEGETATION (Strat.)		199.5	182.0	165.5	182.3	107.0	159.0	143.5	106.5	136.3	151.9	135.5	94.5
TOTAL VEGETATION (Stratified)		235.5	202.0	169.5	202.3	146.0	283.5	278.5	190.5	250.8	215.1	216.5	145.5
Hydrophytic Composition (%)* **													
COE Manual (1987)		73	88	100	100	71	46	50	50	40	80	50	67
Relative cover		85	90	98	90	73	56	52	56	54	71	63	65

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jursidictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Table A3. Percent canopy cover of vascular plant species and percent hydrophytic composition for 6 plots sampled in three MIXED CONIFER EPHEMERAL DRAINAGE types and 2 plots sampled in UPLAND FOREST types, Elkhorn study area, 1990–1993.

	VEGETATION TYPE and ECODATA PLOT NUMBER									
	JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII Bottom community type			JUNIPERUS SCOPULORUM / PSEUDOTSUGA MENZIESII / PINUS FLEXILIS Bottom c.t.				PIN FLE / AGR SMI Bottom c.t.	PSE MEN/ CAL RUB h.t.	ABI LAS / VAC SCO h.t.
INDICATOR STATUS	56	58	Mean n=2	31	48	52	Mean n=3	10	97	87
SITE PARAMETERS										
Slope (percent)	3	10	–	5	2	11	–	4	12	12
Aspect (degrees)	130	214	–	240	191	196	–	225	234	210
Topography*	Draw	Draw	–	Draw	Draw	Ben (Dr.)	–	Draw	Bot.	Bot.
Configuration**	V	V	–	V	V	S	–	V	V	U–V
Elevation (feet)	5155	5580	–	5410	5125	5365	–	5110	6720	7240
GROUND COVER										
Bare Ground	10	4	7.0	10	5	7	7.3	20	0.5	8
Rock	20	20	20.0	20	10	20	16.7	10	35	24
Gravel	15	7	11.0	20	33	25	26.0	30	2	4
Litter	36	33	34.5	20	38	31	29.7	25	36	36
Wood	2	6	4.0	3	5	6	4.7	3	4	8
Lichens	0.5	4	2.3	0.5	0.5	1	0.7	0.5	4	3
Moss	12	23	17.5	20	6	8	11.3	3	16	14
Water	–	–	0.0	–	–	–	0.0	–	–	–
Basal Vegetation	5	3	4.0	3	3	2	2.7	5	3	3
VEGETATION STRUCTURE (nonstratified cover)										
Total Vegetation	77	69	73.0	75	60	50	61.7	NC	70	82
Perennial Graminoids	35	5	20.0	3	7	8	6.0	20	32	11
Annual Graminoids	–	–	0.0	–	–	–	0.0	–	–	–
Perennial Forbs	27	32	29.5	10	18	9	12.3	10	22	16
Annual/Biennial Forbs	10	1	5.5	0.5	3	0.5	1.3	0.5	0.5	0.5
Subshrubs	0.5	1	0.8	–	1	0.5	0.5	6	4	9
Shrubs	14	5	9.5	2	2	0.5	1.5	14	9	12
Trees	18	50	34.0	70	51	40	53.7	40	60	68

Table 7. Rank of dominant vascular plant species and percent hydrophytic composition for 5 plots sampled in one HERBACEOUS BOTTOMLAND type, Elkhorn study area, 1990–1993.

	VEGETATION TYPE and ECODATA PLOT NUMBER						
		POA PRATENSIS community type					
VEGETATION LAYER	INDICATOR STATUS	37	57	64	66	108	Mean n=5
HERBS							
Achillea millefolium	FACU	–	–	–	4	–	–
Agropyron caninum	FAC–	3	–	–	–	–	–
Agrostis stolonifera	FAC+	–	–	1	–	2	3
Carex nebraskensis	OBL	–	5	–	–	–	–
Carex praegracilis	FACW	2	–	–	–	–	–
Cerastium vulgatum	FACU	–	–	–	5	–	–
Fragaria virginiana	UPL	4	–	–	–	–	–
Iris missouriensis	FACW+	–	–	–	–	3	–
Juncus balticus	OBL	–	3	3	–	–	5
Phleum pratense	FACU	5	4	–	–	4	4
Poa palustris	FAC	–	–	4	–	–	–
Poa pratensis	FACU+	1	1	–	2	1	1
Ranunculus acris	FACW–	–	–	5	–	–	–
Taraxacum officinale	FACU	–	–	–	3	–	–
Trifolium repens	FACU+	–	2	2	1	5	2
SHRUBS							
Alnus incana	FACW	–	–	–	1	–	–
Ribes setosum	NI(FAC?)	–	–	1	–	–	–
Rosa woodsii	FACU	–	–	2	–	1	–
Salix bebbiana	FACW	–	–	–	2	–	–
TREES							
Pinus contorta	FAC–	–	–	–	2	–	–
Populus tremuloides	FAC+	–	–	–	1	–	–
TOTAL HYDROPHYTIC VEGETATION (Strat.)		59.0	63.0	79.5	27.5	62.0	58.2
TOTAL VEGETATION (Stratified)		191.0	162.5	121.0	186.5	153.0	162.8
Hydrophytic Composition (%)* **							
COE Manual (1987)		20	40	71	33	33	40
Relative cover		31	39	66	15	41	36

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jurisdictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Table A2. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
TREES												
Abies lasiocarpa	FACU	–	–	–	0.5	–	0.1	0.5	–	–	0.2	0.1
Juniperus scopulorum	NI	0.5	–	–	0.5	0.5	0.3	–	–	0.5	0.2	0.3
Picea engelmannii	FAC	44	41	57	62	50	52.5	0.5	0.5	1	0.7	32.0
Pinus albicaulis	NI	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Pinus contorta	FAC–	–	26	0.5	–	6	8.1	50	20	41	37.0	17.9
Pinus flexilis	NI	–	0.5	–	–	–	0.1	–	–	–	0.0	0.1
Pseudotsuga menziesii	NI	0.5	4	5	3	17	7.3	10	3	0.5	4.5	5.4
TOTAL TREES		45.0	71.5	62.5	66.5	73.5	68.5	61.0	23.5	43.0	42.5	55.8
TOTAL HYDROPHYTIC VEGETATION (Strat.)		175.5	47.5	80.5	104.0	111.0	85.8	47.0	123.0	66.5	78.8	94.4
TOTAL VEGETATION (Stratified)		218.0	119.5	107.5	144.0	179.0	137.5	236.0	224.0	167.5	209.2	174.4
Hydrophytic Composition (%)* **												
COE Manual (1987)		82	25	67	71	56	44	25	63	57	38	44
Relative cover		81	40	75	72	62	62	20	55	40	38	54

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jursidictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace
**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex
***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Hydric soils are infrequent adjacent to Elkhorn Creek in its upper reaches where soils are well drained and surface saturation is limited to isolated benches adjacent to the creek. Lower Elkhorn Creek from Twenty One Gulch downstream to the southern permit boundary contains hydric soils which have developed adjacent to the creek and its tributaries.

3.2.2 Springs and Seeps

Hydric soils are developed in spring and seep areas where groundwater discharge is sufficient to saturate the soil for an extensive time period. Spring and seep areas which have hydric soils occur in the upper reaches of Slaughterhouse Gulch and Greyback Gulch. In these saturated areas, soils are organic and bogs have developed. Soils examined in these headwater areas show extensively gleying and mottling.

3.3 WATERS OF THE U.S. AND WETLAND HYDROLOGY

Within the Elkhorn project area, a number of factors influence the occurrence of WUS and wetland hydrology, including perennial and ephemeral streams, runoff from snowmelt and direct precipitation, flooding, springs, seeps and adits, and localized areas that collect run-on and are poorly drained. Wetland hydrology is associated with three principal types of surface features found in the project area; areas adjacent active stream channels, ephemeral streams, and springs, seeps, and adits.

3.3.1 Active Streams

Perennial stream flow occurs in both Turnley Creek and Elkhorn Creek and many of their respective tributaries. Groundwater levels measured in wells located adjacent to Turnley Creek and the creek in Slaughterhouse Gulch indicate the seasonal high water table (which determines the extent of soil saturation) intersects major stream channels along valley floors, but typically is below land surface away from active channel margins. The term channel, as used in this report, refers to the maximum width of a stream during bank full flow conditions. At higher elevations in the uppermost reaches of streams (i.e. Slaughterhouse, Greyback), the presence of seeps indicates the water table remains close to the land surface. In addition, seasonal flooding and overland flow from snowmelt can cause inundation and soil saturation beyond channel margins.

Table A2. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
SUBSHRUBS												
Arctostaphylos uva-ursi	FACU-	–	–	–	–	–	0.0	1	–	–	0.3	0.1
Berberis repens	NI	–	0.5	0.5	0.5	1	0.6	2	–	0.5	0.8	0.6
Chimaphila umbellata	NI	–	0.5	–	–	–	0.1	0.5	–	–	0.2	0.1
Linnaea borealis	FACU-	–	–	–	–	–	0.0	–	2	–	0.7	0.3
TOTAL SUBSHRUBS		0.0	1.0	0.5	0.5	1.0	0.8	3.5	2.0	0.5	2.0	1.1
SHRUBS												
Acer glabrum	FAC	–	–	–	–	–	0.0	0.5	–	–	0.2	0.1
Alnus incana	FACW	28	–	0.5	2	–	0.6	15	22	8	15.0	9.4
Clematis occidentalis	NI	–	0.5	0.5	0.5	–	0.4	–	–	–	0.0	0.2
Cornus stolonifera	FACW	–	–	–	–	–	0.0	0.5	2	–	0.8	0.3
Juniperus communis	NI	2	0.5	0.5	0.5	0.5	0.5	12	2	0.5	4.8	2.3
Lonicera utahensis	FACU+	–	2	0.5	0.5	–	0.8	0.5	0.5	–	0.3	0.5
Ribes hudsonianum	OBL	2	–	–	–	–	0.0	2	12	3	5.7	2.4
Ribes lacustre	FAC+	4	0.5	4	8	11	5.9	0.5	5	8	4.5	5.1
Rosa acicularis	FACU	0.5	0.5	–	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.4
Rubus idaeus	FACU	–	–	2	0.5	–	0.6	0.5	1	–	0.5	0.5
Salix bebbiana	FACW	12	–	–	–	2	0.5	–	4	0.5	1.5	2.3
Sambucus racemosa	FACU	–	–	–	–	–	0.0	–	0.5	0.5	0.3	0.1
Shepherdia canadensis	NI	0.5	–	–	–	0.5	0.1	–	–	0.5	0.2	0.2
Spiraea betulifolia	NI	–	0.5	0.5	–	–	0.3	1	–	0.5	0.5	0.3
Vaccinium scoparium	FACU-	–	3	–	0.5	–	0.9	18	1	14	11.0	4.6
TOTAL SHRUBS		49.0	7.5	8.5	13.0	14.5	10.9	51.0	50.5	36.0	45.8	28.8

Many tributaries which originate from high elevation springs become perched above the water table with distance downstream until they join the main stream channel along the valley floors. Some stream tributaries are intermittent which suggest they locally intersect the water table, depending on both topography and geology. Wetland hydrology of these tributaries results from stream leakage and the capillary fringe which saturates soil adjacent to the active channel margins.

3.3.2 Ephemeral Streams

The project area contains channels (stream beds, gullies, rills, etc.) that are typically dry during the summer months but show evidence (sediment erosion and deposition) of containing flow during the snowmelt runoff season. The extent of wetland hydrology associated with these channels is based on observation of erosional and depositional features. The channels are generally well-developed and are formed by ephemeral streams that presumably remain wet during the runoff season or following major precipitation events. Since they are dry during much of the year, most of the ephemeral stream channels are likely perched above the seasonal high water table.

3.3.3 Springs, Seeps and Adits

Springs, seeps and adits that discharge groundwater to the land surface were identified and mapped within the project area for the Water Resources Baseline Investigation, Elkhorn Project, Jefferson County (Hydrometrics, 1993). The amount of discharge from these features is variable, which affects the amount of inundation and soil saturation associated with these features. Some of the spring and adit discharges contribute to headwaters of major streams and their tributaries.

Table A2. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
INTRODUCED PERENNIAL FORBS												
Cerastium vulgatum	FACU	3	–	–	–	0.5	0.1	0.5	0.5	–	0.3	0.6
Taraxacum officinale	FACU	–	0.5	0.5	2	2	1.3	1	0.5	0.5	0.7	0.9
Trifolium repens	FACU+	12	0.5	0.5	0.5	5	1.6	5	2	–	2.3	3.2
TOTAL IPF		15.0	1.0	1.0	2.5	7.5	3.0	6.5	3.0	0.5	3.3	4.6
FERNS AND ALLIES												
Athyrium filix–femina	FAC	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Cystopteris fragilis	FACU	–	–	–	–	–	0.0	0.5	0.5	–	0.3	0.1
Equisetum arvense	FAC	18	–	0.5	0.5	6	1.8	0.5	1	0.5	0.7	3.4
Equisetum hyemale	FACW	–	0.5	–	–	–	0.1	0.5	1	0.5	0.7	0.3
TOTAL F&A		18.0	0.5	0.5	0.5	6.0	1.9	1.5	3.0	1.0	1.8	3.9
NATIVE ANNUAL/BIENNIAL FORBS												
Androsace septentrionalis	FAC–	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Collinsia parviflora	NI	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Collomia linearis	FACU	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Descurainia richardsonii	NI	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Erysimum cheiranthoides	FACU	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Gentianella amarella	FACW–	0.5	–	–	0.5	0.5	0.3	–	–	0.5	0.2	0.3
Phacelia franklinii	NI	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
TOTAL NAF		0.5	0.0	0.0	2.5	0.5	0.8	0.0	1.0	0.5	0.5	0.6
INTRODUCED ANNUAL/BIENNIAL FORBS												
Arabis glabra	NI	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Potentilla norvegica	FAC	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
TOTAL IAF		0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.3	0.1

4.0 RESULTS BY DRAINAGE

4.1 ELKHORN CREEK DRAINAGE

In addition to Elkhorn Creek, the Elkhorn Creek drainage includes Slaughterhouse Gulch, an unnamed tributary west of Elkhorn Creek, and Queen Gulch. Turnley Creek flows into Elkhorn Creek just above the Queen Gulch confluence, and is evaluated in Section 4.2 of this baseline report.

4.1.1 Hydrophytic Vegetation

Elkhorn Creek above the Elkhorn townsite has essentially non-hydrophytic vegetation, primarily the habitat types Pseudotsuga menziesii/Calamagrostis rubescens and, above 7200 feet elevation, Abies lasiocarpa/Vaccinium scoparium. Portions of Slaughterhouse Gulch and main-stem Elkhorn Creek from the townsite to the confluence with Turnley Creek are intermittently non-hydrophytic (e.g., the Poa pratensis community type), depending on the extent of historic disturbance, and would be characterized as non-wetland WUS. The majority of these reaches contain hydrophytic vegetation, although it is in many areas restricted to within 5 to 15 feet of the stream channel. The predominant bottomland type in these areas is Picea engelmannii/Galium triflorum, with Abies lasiocarpa/Streptopus amplexifolius at the head of Slaughterhouse. Picea engelmannii bottomland disturbed to varying degrees by historic logging, grazing, and mining is currently a patchwork of seral types, particularly from the Elkhorn townsite to below the confluence of Elkhorn and Turnley Creeks. These types are generally hydrophytic only in proximity of the stream channel, including the Pinus contorta/Calamagrostis rubescens Bottom, Populus tremuloides/Poa pratensis, Salix exigua and Poa pratensis community types.

Elkhorn Creek below the confluence with Turnley Creek to the mouth of the canyon supports a mosaic of Populus trichocarpa/Cornus stolonifera and willow communities interspersed with herbaceous bottomland and conifer bottomland. Again, hydrophytic vegetation is generally limited to creek banks and low terraces, while the periphery of these types is mainly non-hydrophytic, sub-irrigated riparian land.

Table A2. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
NATIVE PERENNIAL FORBS (Continued)												
Prunella vulgaris	FACU+	4	–	0.5	–	1	0.4	3	0.5	0.5	1.3	1.2
Pyrola asarifolia	FACU	–	–	–	–	–	0.0	2	2	2	2.0	0.8
Pyrola chlorantha	FAC	–	0.5	0.5	–	0.5	0.4	–	0.5	–	0.2	0.3
Pyrola secunda	FACU	6	1	0.5	0.5	0.5	0.6	0.5	0.5	0.5	0.5	1.3
Pyrola uniflora	FACU	0.5	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Ranunculus macounii	OBL	0.5	–	0.5	–	–	0.1	–	–	–	0.0	0.1
Ranunculus uncinatus	FAC	0.5	–	0.5	1	3	1.1	0.5	0.5	0.5	0.5	0.8
Rumex salicifolius	FACW	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Saxifraga arguta	FACW+	3	–	3	1	4	2.0	–	3	5	2.7	2.4
Senecio pseudaureus	FACW	–	–	–	0.5	0.5	0.3	–	–	–	0.0	0.1
Senecio serra	FAC	–	0.5	–	0.5	–	0.3	–	–	–	0.0	0.1
Senecio streptanthifolius	FACU	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Senecio triangularis	FACW+	0.5	–	1	2	0.5	0.9	0.5	7	6	4.5	2.2
Silene menziesii	FAC	0.5	–	–	–	–	0.0	–	–	–	0.0	0.1
Smilacina racemosa	FAC–	–	–	–	–	–	0.0	–	–	0.5	0.2	0.1
Smilacina stellata	FAC–	0.5	0.5	–	0.5	0.5	0.4	–	–	–	0.0	0.3
Stellaria crispa	FAC+	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Stellaria longifolia	FACW	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Stellaria longipes	FACW–	0.5	–	–	–	–	0.0	–	–	–	0.0	0.1
Stellaria umbellata	FAC+	0.5	–	–	–	–	0.0	–	–	–	0.0	0.1
Streptopus amplexifolius	FAC–	–	–	0.5	0.5	–	0.3	0.5	2	1	1.2	0.6
Thalictrum dasycarpum	FACW	–	0.5	0.5	–	–	0.3	–	–	–	0.0	0.1
Thalictrum occidentale	FACU	0.5	1	2	4	6	3.3	8	4	1	4.3	3.3
Trollius laxus	OBL	–	–	–	–	–	0.0	–	4	2	2.0	0.8
Urtica dioica	FAC+	–	–	0.5	2	–	0.6	–	3	0.5	1.2	0.8
Valeriana dioica	FACW	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Veratrum viride	OBL	–	–	–	0.5	–	0.1	0.5	–	5	1.8	0.8
Veronica americana	OBL	–	–	–	–	1	0.3	0.5	0.5	–	0.3	0.3
Veronica serpyllifolia	FAC	–	–	–	0.5	0.5	0.3	–	–	1	0.3	0.3
Viola adunca	FAC	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
TOTAL NPF		34.0	17.0	28.0	48.5	58.0	37.9	51.0	68.5	52.5	57.3	44.7

4.1.2 Hydric Soils

Hand dug soil pits were examined at many locations along the Elkhorn Creek drainage and its tributaries. Tables 8, 9, 10, and 11 provide descriptive soil information obtained from pits excavated along Elkhorn Creek, Slaughterhouse Gulch, and Queen Gulch (designated EC, SH, and QG, respectively).

Elkhorn Creek is ephemeral above the Slaughterhouse Gulch drainage and the soils in this portion of the drainage are well drained. Hydric soils have not developed along upper Elkhorn Creek or its tributaries upstream of the Slaughterhouse Gulch confluence.

Hydric soils are present in the spring and seep areas which make up the headwaters of Slaughterhouse Gulch. Hydric soils also occur on saturated benches and spring/seep areas along this perennial tributary of Elkhorn Creek. Site SH-16, located in the headwaters north of the project boundary, was in aquic, organic soil of a saturated bog-like area.

Further downstream in the vicinity of the Union Mine, hydric soils were examined at sites SH-11 through SH-14. Saturated, bog-like areas occur within and on the east side of the drainage in this area and reducing soil conditions are prevalent. Soil drainage is poor and sulfidic odor, mottling, and gleying are present.

Downstream from the Union Mine area, hydric soil development is limited to saturated benches and slopes adjacent to the creek (sites SH-01 and SH-03). Hydric soils are not present in unsaturated areas (sites SH-02 and SH-04).

The creek in Slaughterhouse Gulch splits into two channels north of the East Butte Mill. Hydric soils, indicated by gleying and surface saturation (SH-05 and SH-06), are present in this area. Hydric soils do not occur along the next 800 feet of the creek as the soils are well-drained, the creek is well-incised, and hydric soil indicators are not present (SH-07).

Table A2. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
NATIVE PERENNIAL FORBS (Continued)												
Cardamine breweri	FACW+	0.5	–	–	–	0.5	0.1	–	0.5	–	0.2	0.2
Cirsium scariosum	NI	0.5	0.5	0.5	0.5	0.5	0.5	0.5	1	–	0.5	0.5
Corallorhiza trifida	FAC	0.5	–	–	–	0.5	0.1	–	–	–	0.0	0.1
Delphinium bicolor	NI	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Disporum trachycarpum	NI	–	–	0.5	0.5	–	0.3	–	–	–	0.0	0.1
Dodecatheon conjugens	FAC–	–	–	–	–	0.5	0.1	–	–	–	0.0	0.1
Epilobium angustifolium	FACU+	0.5	0.5	0.5	–	–	0.3	0.5	0.5	0.5	0.5	0.4
Epilobium ciliatum	FACW–	0.5	–	0.5	–	5	1.4	0.5	1	0.5	0.7	1.0
Erigeron acris	FACU	–	–	–	–	–	0.0	0.5	–	–	0.2	0.1
Fragaria vesca	NI	–	–	0.5	–	–	0.1	–	–	0.5	0.2	0.1
Fragaria virginiana	UPL	1	0.5	0.5	1	0.5	0.6	4	3	3	3.3	1.7
Galium boreale	FACU	–	–	–	–	–	0.0	0.5	–	–	0.2	0.1
Galium triflorum	FACU	–	–	0.5	1	0.5	0.5	0.5	3	0.5	1.3	0.8
Geranium richardsonii	FACU+	1	0.5	0.5	2	4	1.8	3	4	3	3.3	2.3
Geranium viscosissimum	FACU+	–	–	0.5	–	–	0.1	–	–	–	0.0	0.1
Geum macrophyllum	FACW+	0.5	–	0.5	0.5	2	0.8	1	2	0.5	1.2	0.9
Habenaria dilatata	FACW+	0.5	–	–	–	0.5	0.1	–	–	–	0.0	0.1
Habenaria hyperborea	FACW+	1	–	–	–	–	0.0	–	–	–	0.0	0.1
Heracleum lanatum	FAC	–	–	0.5	–	–	0.1	–	4	3	2.3	0.9
Hieracium albiflorum	NI	–	–	–	0.5	–	0.1	2	–	0.5	0.8	0.4
Iris missouriensis	FACW+	–	–	–	–	0.5	0.1	–	–	–	0.0	0.1
Listera borealis	FACW	0.5	–	–	–	–	0.0	–	–	–	0.0	0.1
Lupinus sericeus	NI	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Mertensia ciliata	FACW+	0.5	–	2	12	0.5	3.6	0.5	6	0.5	2.3	2.8
Mimulus guttatus	OBL	0.5	–	0.5	0.5	0.5	0.4	0.5	1	–	0.5	0.4
Mitella pentandra	FACW+	0.5	–	4	–	0.5	1.1	0.5	1	1	0.8	0.9
Osmorhiza chilensis	NI	0.5	0.5	2	3	2	1.9	1	1	1	1.0	1.4
Parnassia fimbriata	OBL	0.5	–	–	–	–	0.0	–	–	0.5	0.2	0.1
Penstemon procerus	NI	–	0.5	–	–	0.5	0.3	–	–	–	0.0	0.1
Potentilla anserina	OBL	0.5	–	–	–	–	0.0	–	–	–	0.0	0.1
Potentilla gracilis	FAC	0.5	0.5	–	0.5	0.5	0.4	0.5	0.5	–	0.3	0.4

Table 8. Hydric soil pit parameters, Santa Fe Pacific Gold Elkhorn Project Area, September 1993.

Site	Soil Drainag	Surface satura-tion (Yes, No)	Depth to Water table (inches)	Evidence of past surface water inunda-tion (Yes, No	Sulfidic materials present	Depth to Mottles (redoxi-morphic features) (inches)	Moistene color of redox concen-trations (Mottles)	Moistene color of redox depletions or gleying (Matrix)	Depth to gleying (inches)	Thicknes of gleying (inches)	Mineral (M) or Organi (O) soil	Aquic (Yes, No)	Peraquic (Yes, No	Flowing water or ponding over 7 days (Yes, No	Hydric (Yes, No)
SH-01	M	Y	10	Y	N	None	--	--	None	--	M	N	Y	Y	Y
SH-02	G	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
SH-03	P	Y	4	Y	N	None	--	--	None	--	M	N	Y	Y	Y
SH-04	G	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
SH-05	M	N	17	Y	N	None	--	5Y 2.5/1	7	6+	M	Y	Y	Y	Y
SH-06	G	Y	0	Y	N	None	--	--	None	--	M	N	Y	Y	Y
SH-07	G	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
SH-08	M	Y	12	Y	N	10	10YR 4/4	10YR 3/1	None	--	M	N	Y	Y	Y
SH-09	VP	Y	2	Y	N	4	10YR 4/6	10YR 3/1	None	--	M	Y	Y	Y	Y
SH-10	P	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
SH-11	P	Y	0	Y	Y	4	10YR 4/6	5G 4/1	4	6+	M	Y	Y	Y	Y
SH-12	P	Y	0	Y	Y	5	7.5YR 3/4	5GY 4/1	5	10+	M	Y	Y	Y	Y
SH-13	P	Y	0	Y	Y	None	--	5GY 4/1	4	8+	M	Y	Y	Y	Y

VP - very poor; P - poor; M - moderate; MW - moderately well; G - good; Y - yes; N - no; F - faint

Table A2. (Continued)

		VEGETATION TYPE and ECODATA PLOT NUMBER										
		PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
	INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
INTRODUCED PERENNIAL GRAMINOIDS												
Agrostis stolonifera	FAC+	16	–	0.5	–	–	0.1	–	12	–	4.0	3.6
Phleum pratense	FACU	4	–	–	–	1	0.3	0.5	1	–	0.5	0.8
Poa pratensis	FACU+	3	–	–	–	–	0.0	–	28	–	9.3	3.9
TOTAL IPG		23.0	0.0	0.5	0.0	1.0	0.4	0.5	41.0	0.0	13.8	8.3
NATIVE ANNUAL GRAMINOIDS												
Poa annua	FAC–	–	–	–	–	0.5	0.1	–	–	–	0.0	0.1
TOTAL NAG		0.0	0.0	0.0	0.0	0.5	0.1	0.0	0.0	0.0	0.0	0.1
INTRODUCED ANNUAL GRAMINOIDS												
TOTAL IAG		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NATIVE PERENNIAL FORBS												
Achillea millefolium	FACU	0.5	0.5	–	0.5	1	0.5	0.5	0.5	0.5	0.5	0.5
Actaea rubra	NI(FAC?)	–	0.5	0.5	1	1	0.8	0.5	1	1	0.8	0.7
Agoseris aurantiaca	FAC	–	–	–	–	–	0.0	0.5	–	–	0.2	0.1
Agoseris glauca	FAC	–	0.5	–	–	–	0.1	–	–	–	0.0	0.1
Allium cernuum	NI	–	0.5	–	–	–	0.1	–	–	–	0.0	0.1
Anaphalis margaritacea	NI	–	–	–	–	–	0.0	–	0.5	–	0.2	0.1
Anemone multifida	NI	–	0.5	–	–	0.5	0.3	–	–	–	0.0	0.1
Angelica arguta	FACW	0.5	0.5	–	0.5	–	0.3	0.5	1	–	0.5	0.4
Antennaria microphylla	NI	0.5	0.5	–	–	0.5	0.3	5	1	–	2.0	0.9
Antennaria neglecta	NI	–	–	–	0.5	–	0.1	0.5	–	–	0.2	0.1
Antennaria racemosa	NI	–	1	0.5	2	–	0.9	0.5	–	–	0.2	0.5
Arabis drummondii	FACU	–	–	–	0.5	–	0.1	–	0.5	–	0.2	0.1
Arenaria lateriflora	NI	–	–	–	0.5	–	0.1	0.5	0.5	–	0.3	0.2
Arnica cordifolia	NI	–	2	2	0.5	8	3.1	4	2	5	3.7	2.9
Aster conspicuus	NI	–	0.5	–	–	0.5	0.3	0.5	0.5	2	1.0	0.5
Aster foliaceus	FACW–	4	2	0.5	4	9	3.9	4	3	3	3.3	3.7
Aster modestus	FAC+	0.5	–	–	–	–	0.0	–	0.5	0.5	0.3	0.2
Astragalus miser	NI	–	–	–	–	–	0.0	1	–	–	0.3	0.1
Campanula rotundifolia	FACU+	–	0.5	0.5	–	–	0.3	1	–	–	0.3	0.3

Table 9. Hydric soil pit parameters, Santa Fe Pacific Gold Elkhorn Project Area, September 1993.

Site	Soil Drainag	Surfac satura-tion (Yes, No)	Depth to Water table (inches)	Evidence of past surface water inunda-tion (Yes, No	Sulfidic materials present	Depth to Mottles (redoxi-morphic features) (inches)	Moistene color of redox concen-trations (Mottles)	Moistened color of redox depletions or gleying (Matrix)	Depth to gleying (inches)	Thicknes of gleying (inches)	Mineral (M) or Organi (O) soil	Aquic (Yes, No)	Peraquic (Yes, No	Flowing water or ponding over 7 days (Yes, No	Hydric (Yes, No)
SH-14	P	Y	3	Y	F	None	--	7.5YR 2.5/	8	14+	O/M	Y	Y	Y	Y
SH-15	M	N	6	Y	N	None	--	--	None	--	M	N	N	N	N
SH-16	P	Y	6	Y	N	None	--	--	None	--	O	Y	Y	Y	Y
EC-01	M	N	18+	Y	N	None	--	--	None	--	M	N	N	N	N
EC-02	P	9	Y	N	N	9	7.5YR 4/4	2.5Y 4/1	None	--	M	Y	Y	Y	Y
EC-03	P	Y	9	Y	N	6	7.5YR 4/6	5Y 2.5/1	6	6+	M	Y	Y	Y	Y
EC-04	P	N	6	Y	N	2	7.5YR 4/6	2.5Y 4/1	None	--	M	Y	Y	Y	Y
EC-05	P	N	3	Y	N	2	7.5YR 4/6	2.5Y 3/2	None	--	M	Y	Y	Y	Y
EC-06	P	Y	18+	Y	N	None	--	2.5Y 4/2	4	14+	M	N	Y	Y	Y
EC-07	P	Y	18+	N	N	None	--	5G 4/2	6	12+	M	Y	N	N	Y
EC-08	G	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
EC-09	G	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
EC-10	P	Y	2	Y	Y	None	--	N 3/	9	16+	M	Y	Y	Y	Y

VP - very poor; P - poor; M - moderate; MW - moderately well; G - good; Y - yes; N - no; F - faint

Table A2. (Continued)

CLASS\SPECIES	INDICATOR STATUS	VEGETATION TYPE and ECODATA PLOT NUMBER: PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
		103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
NATIVE PERENNIAL GRAMINOIDS												
Agropyron caninum	FAC–	–	0.5	–	0.5	–	0.3	1	0.5	–	0.5	0.3
Agrostis exarata	FACW	1	–	–	–	1	0.3	0.5	2	–	0.8	0.6
Agrostis scabra	FAC	–	–	–	–	–	0.0	–	3	–	1.0	0.4
Bromus anomalus	NI	–	–	0.5	–	–	0.1	–	–	–	0.0	0.1
Bromus carinatus	NI	–	–	–	0.5	0.5	0.3	–	0.5	–	0.2	0.2
Bromus ciliatus	FAC+	–	–	–	–	–	0.0	–	–	0.5	0.2	0.1
Calamagrostis canadensis	FACW+	–	–	–	1	–	0.3	8	6	4	6.0	2.4
Calamagrostis rubescens	NI	–	18	1	0.5	1	5.1	34	4	14	17.3	9.1
Carex concinnoides	NI	–	0.5	–	–	–	0.1	0.5	–	1	0.5	0.3
Carex disperma	FACW	6	–	1	0.5	0.5	0.5	1	–	2	1.0	1.4
Carex geyeri	NI	–	–	0.5	2	0.5	0.8	–	–	3	1.0	0.8
Carex lanuginosa	OBL	1	–	–	–	–	0.0	–	–	–	0.0	0.1
Carex microptera	FAC	5	–	0.5	1	5	1.6	1	5	0.5	2.2	2.3
Carex nebraskensis	OBL	3	–	–	–	–	0.0	–	–	–	0.0	0.4
Carex rossii	NI	–	–	–	–	–	0.0	1	–	0.5	0.5	0.2
Carex rostrata	OBL	8	–	–	–	–	0.0	3	–	–	1.0	1.4
Cinna latifolia	FACW	–	–	0.5	–	–	0.1	0.5	4	1	1.8	0.8
Danthonia intermedia	FACU+	–	–	–	–	–	0.0	1	–	–	0.3	0.1
Elymus glaucus	FACU	–	0.5	0.5	1	1	0.8	3	2	–	1.7	1.0
Festuca idahoensis	NI	–	–	–	0.5	–	0.1	–	–	–	0.0	0.1
Glyceria elata	FACW+	–	–	–	–	–	0.0	–	–	6	2.0	0.8
Glyceria striata	OBL	6	–	0.5	–	3	0.9	2	–	–	0.7	1.4
Juncus balticus	OBL	3	–	–	–	0.5	0.1	–	1	–	0.3	0.6
Luzula parviflora	FAC–	–	–	–	–	0.5	0.1	–	0.5	0.5	0.3	0.2
Poa alpina	FAC	–	–	–	0.5	0.5	0.3	–	–	–	0.0	0.1
Poa nervosa	FACU–	0.5	0.5	0.5	1	2	1.0	2	–	0.5	0.8	0.9
Stipa occidentalis	NI	–	0.5	–	0.5	–	0.3	2	2	–	1.3	0.6
Trisetum spicatum	FACU–	–	0.5	0.5	0.5	0.5	0.5	0.5	–	–	0.2	0.3
TOTAL NPG		33.5	21.0	6.0	10.0	16.5	13.4	61.0	30.5	33.5	41.7	26.5

Table 10. Hydric soil pit parameters, Santa Fe Pacific Gold Elkhorn Project Area, September 1993.

Site	Soil Drainag	Surfac satura-tion (Yes, No)	Depth to Water table (inches)	Evidence of past surface water inunda-tion (Yes, No	Sulfidic materials present	Depth to Mottles (redoxi-morphic features) (inches)	Moistene color of redox concen-trations (Mottles)	Moistened color of redox depletions or gleying (Matrix)	Depth to gleying (inches)	Thicknes of gleying (inches)	Mineral (M) or Organi (O) soil	Aquic (Yes, No)	Peraquic (Yes, No	Flowing water or ponding over 7 days (Yes, No	Hydric (Yes, No)
EC-11	P	Y	4	Y	F	None	--	N 3/	11	12+	M	Y	Y	Y	Y
EC-12	G	N	18	N	F	3	7.5YR 4/6	N 3/	7	13+	M	Y	N	N	Y
EC-13	G	N	16	N	N	5	7.5YR 4/4	5Y 2.5/1	10	6+	M	N	Y	N	Y
EC-14	M	N	14	N	F	None	--	N 3/	12	4+	M	N	Y	Y	Y
EC-15	M	N	20	N	N	9	7.5YR 4/6	10YR 2/1	19	2+	M	N	Y	N	Y
EC-16	G	Y	4	Y	F	4	7.5YR 4/6	10YR 2/1 N 2.5/	12	5+	M	Y	Y	Y	Y
EC-17	M	N	14	Y	F	6	7.5YR 4/6	10YR 2/1 N 2.5/	10	6+	M	Y	Y	N	Y
EC-18	M	N	10	N	F	None	--	N 2.5/	8	5+	M	Y	Y	N	Y
EC-19	M	N	14	Y	F	5	5YR 4/6	N 2.5/	14	6+	M	Y	N	N	Y
EC-20	P	N	12	N	F	4	7.5YR 4/6	N 3/	12	8+	M	Y	Y	N	Y

VP - very poor; P - poor; M - moderate; MW - moderately well; G - good; Y - yes; N - no; F - faint

Table A2. Percent canopy cover of vascular plant species and percent hydrophytic composition for 6 plots sampled in three types in the PICEA ENGELMANNII BOTTOMLAND series, Elkhorn study area, 1989–1993.

	VEGETATION TYPE and ECODATA PLOT NUMBER										
	PICEA ENGELMANNII / EQUISETUM ARVENSE habitat type	PICEA ENGELMANNII / GALIUM TRIFLORUM habitat type					PINUS CONTORTA / CALAMAGROSTIS RUBESCENS Bottom community type				PIC ENG BOTTOMLAND series
INDICATOR STATUS	103	T21	T23	83	84	Mean n=4	93	96	102	Mean n=3	Mean n=8
SITE PARAMETERS											
Slope (percent)	6	6	8	9	6	–	10	12	4	–	–
Aspect (degrees)	204	188	220	245	200	–	244	282	210	–	–
Topography*	Bot.	Ter.	Bot.	Bot.	L	–	Bot.	Bot.	Bot.	–	–
Configuration**	V	S	U	V	U	–	V	V	S	–	–
Elevation (feet)	6550	6665	6625	6870	6960	–	6640	6400	6870	–	–
GROUND COVER											
Bare Ground	1	–	0.5	1	2	0.9	3	2	1	2.0	1.3
Rock	0.5	–	3	1	1	1.0	2	2	0.5	1.5	1.3
Gravel	0.5	NC	NC	0.5	–	0.3	0.5	0.5	–	0.3	0.3
Litter	30	96	64	79	48	69.1	62	66	70	66.0	63.1
Wood	8	NC	NC	4	7	5.5	8	4	16	9.3	7.2
Lichens	1	0.5	2	1	0.5	1.0	3	0.5	0.5	1.3	1.1
Moss	52	1	27	8	35	17.8	16	16	6	12.7	20.1
Water	2	–	3	3	2	2.0	2	4	2	2.7	2.3
Basal Vegetation	5	3	4	3	5	3.8	4	5	4	4.3	4.1
VEGETATION STRUCTURE (nonstratified cover)											
Total Vegetation	93	75	76	82	91	81.0	90	94	90	91.3	86.4
Perennial Graminoids	52	20	6	7	13	11.5	54	60	30	48.0	30.3
Annual Graminoids	–	–	–	–	–	0.0	–	–	–	0.0	0.0
Perennial Forbs	54	16	26	35	53	32.5	44	56	42	47.3	40.8
Annual/Biennial Forbs	0.5	–	–	0.5	0.5	0.3	–	0.5	0.5	0.3	0.3
Subshrubs	–	0.5	0.5	0.5	1	0.6	3	2	0.5	1.8	1.0
Shrubs	44	7	8	11	13	9.8	42	42	30	38.0	24.6
Trees	45	NC	NC	64	60	NC	56	22	42	40.0	NC

Table 11. Hydric soil pit parameters, Santa Fe Pacific Gold Elkhorn Project Area, September 1993.

Site	Soil Drainag	Surface satura-tion (Yes, No)	Depth to Water table (inches)	Evidence of past surface water inunda-tion (Yes, No	Sulfidic materials present	Depth to Mottles (redoxi-morphic features) (inches)	Moistene color of redox concen-trations (Mottles)	Moistene color of redox depletions or gleying (Matrix)	Depth to gleying (inches)	Thicknes of gleying (inches)	Mineral (M) or Organi (O) soil	Aquic (Yes, No)	Peraquic (Yes, No	Flowing water or ponding over 7 days (Yes, No	Hydric (Yes, No)
TM-14	G	N	24+	N	N	None	--	--	None	--	M	N	N	N	N
TM-15	P	N	12	N	N	12	7.5YR 4/4	5GY 4/1	None	--	M	N	Y	N	Y
TM-16	G	N	24+	N	N	None	--	--	None	--	M	N	N	N	N
SD-01	M	N	12	N	N	None	--	--	None	--	M	N	N	N	N
SD-02	P	Y	0	Y	N	6	7.5 5/8	7.5YR 3/1	None	--	M	N	Y	Y	Y
SD-03	G	N	24+	N	N	None	--	--	None	--	M	N	N	N	N
GG-01	P	Y	9	Y	F	11	7.5YR 4/6	5GY 4/1	None	--	M	Y	Y	Y	Y
GG-02	G	N	24+	N	N	None	--	--	None	--	M	N	N	N	N
GG-03	P	Y	13	Y	N	None	--	--	None	--	M	N	Y	Y	Y
QG-01	G	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
QG-02	G	N	18+	N	N	None	--	--	None	--	M	N	N	N	N
QG-03	G	N	18+	Y	N	None	--	--	None	--	M	N	N	Y	N
SA-01	M	Y	12	Y	N	None	--	--	None	--	M	N	Y	N	N

VP - very poor; P - poor; M - moderate; MW - moderately well; G - good; Y - yes; N - no; F - faint

Table A1. (Continued)

	VEGETATION TYPE and ECODATA PLOT NUMBER					
		ABIES LASIOCARPA / CALAMAGROSTIS CANADENSIS habitat type			ABI LAS / STR AMP h.t.	ABIES LASIOCARPA BOTTOMLAND series
	INDICATOR STATUS	92	94	Mean n=2	106	Mean n=3
SUBSHRUBS						
Arctostaphylos uva-ursi	FACU-	–	2	1.0	–	0.7
Berberis repens	NI	–	0.5	0.3	–	0.2
Chimaphila umbellata	NI	–	0.5	0.3	–	0.2
TOTAL SUBSHRUBS		0.0	3.0	1.5	0.0	1.0
SHRUBS						
Acer glabrum	FAC	–	–	0.0	0.5	0.2
Alnus incana	FACW	–	10	5.0	2	4.0
Cornus stolonifera	FACW	–	0.5	0.3	–	0.2
Juniperus communis	NI	0.5	18	9.3	0.5	6.3
Ledum glandulosum	FACW+	22	–	11.0	0.5	7.5
Lonicera utahensis	FACU+	–	0.5	0.3	0.5	0.3
Ribes hudsonianum	OBL	–	8	4.0	0.5	2.8
Ribes lacustre	FAC+	1	4	2.5	2	2.3
Rosa acicularis	FACU	–	1	0.5	–	0.3
Salix bebbiana	FACW	–	1	0.5	–	0.3
Spiraea betulifolia	NI	0.5	1	0.8	–	0.5
Vaccinium scoparium	FACU-	9	14	11.5	3	8.7
TOTAL SHRUBS		33.0	58.0	45.5	9.5	33.5
TREES						
Abies lasiocarpa	FACU	1	8	4.5	28	12.3
Picea engelmannii	FAC	20	12	16.0	44	25.3
Pinus contorta	FAC-	42	12	27.0	–	18.0
Pseudotsuga menziesii	NI	0.5	1	0.8	–	0.5
TOTAL TREES		63.5	33.0	48.3	72.0	56.2
TOTAL HYDROPHYTIC VEGETATION (Strat.)		82.0	72.5	77.3	94.0	82.8
TOTAL VEGETATION (Stratified)		145.5	197.5	171.5	140.5	161.2
Hydrophytic Composition (%)* **						
COE Manual (1987)		67	33	44	78	44
Relative cover		56	37	45	67	51

Indicator status categories are defined in the 1987 COE Manual for Identifying and Delineating Jurisdictional Wetlands, and correlated with vascular taxa in the National List of Plant Species that occur in Wetlands: Montana (Reed 1988). Note that indicator status applies to Region 9. Nomenclature follows USDA Forest Service (1987).

*Topography codes: Ben = Bench, Bot = Bottom, Dr = Draw, L = Lower slope, M = Middle slope, U = Upper slope, Ter = Terrace

**Configuration codes: S = Straight, U = Undulating, V = Concave, X = Convex

***Percent hydrophytic composition was calculated for each vegetation type using:

1) procedures outlined in the 1987 Federal Manual (number of dominant species by vegetation stratum), and
2) relative cover of all hydrophytic vascular plant species as a percentage of total vascular plant cover.

Slaughterhouse Gulch has been modified by historic mining and milling activity approximately 1000 feet from the confluence with Elkhorn Creek. A small tailings impoundment and tailings dam is located in this portion of the drainage. In this area, the creek in Slaughterhouse Gulch spills from its small channel and flows into a wider saturated area. Hydric soils excavated in this area (sites SH-08 and SH-09) show very poor to moderate drainage, shallow depth to water, and mottling. Hydric soils do not occur along the creek as it flows onto the tailings above the dam, most likely as a result of increased soil permeability. Hydric soils do not occur between the tailings dam and the confluence with Elkhorn Creek.

Elkhorn Creek becomes a perennial stream below the Slaughterhouse Gulch confluence. Hydric soils which occur along Elkhorn Creek are generally located adjacent to active channels or in saturated/inundated areas. It should be noted that historic mining and milling has resulted in the deposition of fine to medium sand-sized sediments (tailings) in the Elkhorn Creek drainage below the confluence with Slaughterhouse Gulch. Surface water flow through these upstream disturbances has transported and deposited these sediments downstream.

Sites EC-01, EC-08, and EC-09, located in the upper Elkhorn drainage, exhibited moderate to good soil drainage with groundwater greater than 18 inches from the surface. These sites were located on benches with dense vegetation adjacent to Elkhorn Creek, but lacked hydric soil indicators. Hydric soil occurred at sites EC-02 through EC-07, which were characterized by poor to moderate drainage and aquic or peraquic moisture regimes, and the presence of mottling and/or gleying. These sites adjacent to Elkhorn Creek were excavated in well-sorted, sandy-textured material which indicated the presence of tailings.

Soils excavated at verification sites along the drainage indicate that hydric soils along Elkhorn Creek are most prevalent in areas where the creek is not well-incised. In areas where Elkhorn Creek flows in a narrow, well-incised channel, hydric soil indicators immediately adjacent to the channel are not present, although limited small areas of hydric soils may occur in the vicinity of the creek. One such area is in the vicinity of EC-04 and EC-05. Site EC-04 is located near a developed spring approximately 50 feet from the creek. Site EC-05 is located

Table A1. (Continued)

	VEGETATION TYPE and ECODATA PLOT NUMBER					
		ABIES LASIOCARPA / CALAMAGROSTIS CANADENSIS habitat type			ABI LAS / STR AMP h.t.	ABIES LASIOCARPA BOTTOMLAND series
	INDICATOR STATUS	92	94	Mean n=2	106	Mean n=3
NATIVE PERENNIAL FORBS (Continued)						
Listera cordata	FACW	0.5	–	0.3	–	0.2
Mertensia ciliata	FACW+	–	1	0.5	–	0.3
Mimulus guttatus	OBL	–	–	0.0	0.5	0.2
Mitella pentandra	FACW+	3	–	1.5	3	2.0
Osmorhiza chilensis	NI	0.5	1	0.8	0.5	0.7
Parnassia fimbriata	OBL	0.5	–	0.3	2	0.8
Potentilla gracilis	FAC	–	1	0.5	–	0.3
Prunella vulgaris	FACU+	–	–	0.0	1	0.3
Pyrola asarifolia	FACU	1	2	1.5	–	1.0
Pyrola minor	FACU+	–	–	0.0	0.5	0.2
Pyrola secunda	FACU	1	1	1.0	0.5	0.8
Pyrola uniflora	FACU	–	0.5	0.3	0.5	0.3
Ranunculus uncinatus	FAC	–	–	0.0	1	0.3
Saxifraga arguta	FACW+	1	–	0.5	4	1.7
Senecio streptanthifolius	FACU	–	–	0.0	0.5	0.2
Senecio triangularis	FACW+	9	2	5.5	4	5.0
Smilacina racemosa	FAC–	–	–	0.0	0.5	0.2
Smilacina stellata	FAC–	–	–	0.0	0.5	0.2
Streptopus amplexifolius	FAC–	0.5	2	1.3	0.5	1.0
Thalictrum occidentale	FACU	–	2	1.0	0.5	0.8
Trollius laxus	OBL	–	–	0.0	0.5	0.2
Veratrum viride	OBL	3	0.5	1.8	1	1.5
Veronica americana	OBL	–	–	0.0	2	0.7
TOTAL NPF		30.0	38.0	34.0	42.0	36.7
INTRODUCED PERENNIAL FORBS						
Cerastium vulgatum	FACU	–	0.5	0.3	0.5	0.3
Taraxacum officinale	FACU	0.5	0.5	0.5	1	0.7
Trifolium repens	FACU+	–	2	1.0	1	1.0
TOTAL IPF		0.5	3.0	1.8	2.5	2.0
FERNS AND ALLIES						
Cystopteris fragilis	FACU	–	0.5	0.3	–	0.2
Equisetum arvense	FAC	2	1	1.5	4	2.3
Equisetum hyemale	FACW	–	0.5	0.3	–	0.2
TOTAL F&A		2.0	2.0	2.0	4.0	2.7
NATIVE ANNUAL/BIENNIAL FORBS						
TOTAL NAF		0.0	0.0	0.0	0.0	0.0
INTRODUCED ANNUAL/BIENNIAL FORBS						
TOTAL IAF		0.0	0.0	0.0	0.0	0.0

in a saturated area 100 feet from EC-04 and 50 feet from the opposite side of the creek. Hydric soil indicators occur at both of these sites, although no indicators were found near Elkhorn Creek.

Soil excavated on a bench beside Elkhorn Creek near the Turnley Creek confluence (site EC-07) was saturated and showed evidence of reducing conditions (gleying and very faint mottling). Hydric soils are also present in a saturated area at the Twenty-One Gulch confluence (site EC-10) further downstream. The area is densely vegetated and hydric soils occur beneath a surface layer of undecomposed, saturated organic matter on the extreme west side of the drainage. Further to the east, Elkhorn Creek flows in a well-incised channel of coarse material (evidence of historic placer mining), and hydric soils do not occur.

Between Twenty-One Gulch and Greens Gulch, Elkhorn Creek flows in a well incised channel which shows evidence of historic placer activity. Soil drainage along this reach of stream is good and hydric soils do not occur. Some surface water from Elkhorn Creek flows in a secondary channel along the west side of the drainage in the vicinity of and downstream a short distance from Greens Gulch. A developed spring located near a small cabin on the west side of Elkhorn Creek provides additional surface saturation adjacent to this channel. Soils examined near this channel (site EC-11) and on a slightly raised terrace between this channel and Elkhorn Creek (site EC-12) show evidence of poor drainage and reducing conditions and are classified as hydric.

Hydric soils do not occur along the reach of Elkhorn Creek from the small cabin mentioned above to the approximate location where the creek leaves the mountainous area and flows out into the valley. The creek is well-incised and coarse-textured rock material comprises the channel bottom along this portion of the stream.

Further downstream hydric soils become more prevalent as the drainage area widens. Elkhorn Creek flows through a densely-vegetated area where numerous depressions and inactive channels are present. Hydric soil (sites EC-13 through EC-18) occurs on slightly elevated benches adjacent to the creek, and in depressions and inactive channels along this stretch of

Table A1. (Continued)

	VEGETATION TYPE and ECODATA PLOT NUMBER					
		ABIES LASIOCARPA / CALAMAGROSTIS CANADENSIS habitat type			ABI LAS / STR AMP h.t.	ABIES LASIOCARPA BOTTOMLAND series
	INDICATOR STATUS	92	94	Mean n=2	106	Mean n=3
NATIVE PERENNIAL GRAMINOIDS (Continued)						
Glyceria elata	FACW+	–	–	0.0	1	0.3
Glyceria striata	OBL	–	–	0.0	2	0.7
Juncus ensifolius	FACW	0.5	–	0.3	–	0.2
Luzula parviflora	FAC–	0.5	–	0.3	0.5	0.3
Poa interior	FAC	–	1	0.5	–	0.3
Poa nervosa	FACU–	–	4	2.0	–	1.3
Stipa occidentalis	NI	–	0.5	0.3	–	0.2
Stipa richardsonii	NI	–	0.5	0.3	–	0.2
Trisetum spicatum	FACU–	–	0.5	0.3	–	0.2
TOTAL NPG		16.5	60.5	38.5	10.5	29.2
INTRODUCED PERENNIAL GRAMINOIDS						
TOTAL IPG		0.0	0.0	0.0	0.0	0.0
NATIVE ANNUAL GRAMINOIDS						
TOTAL NAG		0.0	0.0	0.0	0.0	0.0
INTRODUCED ANNUAL GRAMINOIDS						
TOTAL IAG		0.0	0.0	0.0	0.0	0.0
NATIVE PERENNIAL FORBS						
Actaea rubra	NI(FAC?)	–	1	0.5	0.5	0.5
Angelica arguta	FACW	0.5	–	0.3	0.5	0.3
Antennaria microphylla	NI	–	1	0.5	–	0.3
Arnica chamissonis	FACW	–	–	0.0	5	1.7
Arnica cordifolia	NI	–	2	1.0	–	0.7
Arnica latifolia	FAC–	4	–	2.0	2	2.0
Aster foliaceus	FACW–	2	4	3.0	2	2.7
Aster modestus	FAC+	–	0.5	0.3	1	0.5
Astragalus miser	NI	–	1	0.5	–	0.3
Campanula rotundifolia	FACU+	–	0.5	0.3	–	0.2
Epilobium angustifolium	FACU+	–	0.5	0.3	0.5	0.3
Epilobium ciliatum	FACW–	1	–	0.5	0.5	0.5
Fragaria virginiana	UPL	–	6	3.0	0.5	2.2
Galium triflorum	FACU	2	1	1.5	1	1.3
Geranium richardsonii	FACU+	–	4	2.0	2	2.0
Geum macrophyllum	FACW+	–	–	0.0	1	0.3
Habenaria dilatata	FACW+	–	0.5	0.3	0.5	0.3
Habenaria saccata	FACW	0.5	–	0.3	0.5	0.3
Heracleum lanatum	FAC	–	1	0.5	0.5	0.5
Hieracium albiflorum	NI	–	2	1.0	–	0.7
Listera borealis	FACW	–	–	0.0	0.5	0.2

Elkhorn Creek to the USFS boundary. Hydric soils in these areas are characterized by the presence of a sulfidic odor, mottling, and gleying. Although the soil drainage is moderate to good in this area, the water table is generally within 18 inches of the surface.

4.1.3 Waters of the U.S. and Wetland Hydrology

The Elkhorn Creek drainage extends the length of the project area (Exhibit 1) and consists of several tributaries in addition to Elkhorn Creek, including Slaughterhouse Gulch, Turnley Creek, and Queen Gulch. All of these are perennial streams within the project area (WUS) with the exception of Elkhorn Creek above its confluence with Slaughterhouse Gulch, which is ephemeral (WUS).

Elkhorn Creek, the headwaters of which are below Elkhorn and Crow Peaks, is ephemeral above its confluence with Slaughterhouse Gulch. The stream channel above and within the town of Elkhorn is moderately well to well-incised and shows no evidence of wetland hydrology. There is evidence of historic placer activity and the 5-10 feet wide creek is composed of very coarse material (boulders and cobbles) showing the textural immaturity of the stream. The north tributary of Elkhorn Creek, located one drainage divide east from Slaughterhouse Gulch, is a well-incised, grassy-bottomed drainage approximately 10-15 feet wide.

Slaughterhouse Gulch contains a perennial stream which supplies surface water flow to Elkhorn Creek just below the townsite. The headwaters of this stream originate from springs and seeps outside of the project area. From the headwaters area downstream to the historic Union Mine, WUS is evident as an active stream channel approximately 2-5 feet wide. Occasionally an adjacent saturated channel diverges from the main channel. The WUS and wetland hydrology in this area is no more than 50 feet wide.

Located east and above the Union Mine is a series of saturated bog-like areas which meet WUS and wetland hydrology criteria. This area drains into a series of small, poorly developed channels which eventually discharge to the creek in Slaughterhouse Gulch.

Table A1. Percent canopy cover of vascular plant species and percent hydrophytic composition for 3 plots sampled in two habitat types in the ABIES LASIOCARPA BOTTOMLAND series, Elkhorn study area, 1993.

		VEGETATION TYPE and ECODATA PLOT NUMBER				
		ABIES LASIOCARPA / CALAMAGROSTIS CANADENSIS habitat type			ABI LAS / STR AMP h.t.	ABIES LASIOCARPA BOTTOMLAND series
	INDICATOR STATUS	92	94	Mean n=2	106	Mean n=3
SITE PARAMETERS						
Slope (percent)		21	9	–	15	–
Aspect (degrees)		110	160	–	188	–
Topography*		Bot.	Bot.	–	Bot.	–
Configuration**		U	V	–	V	–
Elevation (feet)		7320	6240	–	7280	–
GROUND COVER						
Bare Ground		1	0.5	0.8	1	0.8
Rock		2	4	3.0	5	3.7
Gravel		1	0.5	0.8	0.5	0.7
Litter		36	54	45.0	28	39.3
Wood		3	12	7.5	2	5.7
Lichens		2	2	2.0	0.5	1.5
Moss		50	18	34.0	58	42.0
Water		2	5	3.5	1	2.7
Basal Vegetation		5	4	4.5	4	4.3
VEGETATION STRUCTURE (nonstratified cover)						
Total Vegetation		80	86	83.0	84	83.3
Perennial Graminoids		15	54	34.5	10	26.3
Annual Graminoids		–	–	0.0	–	0.0
Perennial Forbs		30	38	34.0	35	34.3
Annual/Biennial Forbs		–	–	0.0	–	0.0
Subshrubs		–	2	1.0	–	0.7
Shrubs		32	48	40.0	8	29.3
Trees		52	30	41.0	64	48.7
CLASS\SPECIES						
NATIVE PERENNIAL GRAMINOIDS						
Agropyron caninum	FAC–	–	0.5	0.3	–	0.2
Agrostis exarata	FACW	2	0.5	1.3	0.5	1.0
Bromus ciliatus	FAC+	–	1	0.5	–	0.3
Calamagrostis canadensis	FACW+	7	18	12.5	1	8.7
Calamagrostis rubescens	NI	–	22	11.0	–	7.3
Carex aquatilis	OBL	–	–	0.0	0.5	0.2
Carex disperma	FACW	6	3	4.5	3	4.0
Carex geyeri	NI	–	3	1.5	–	1.0
Carex microptera	FAC	0.5	–	0.3	1	0.5
Carex rossii	NI	–	0.5	0.3	–	0.2
Carex rostrata	OBL	–	–	0.0	1	0.3
Cinna latifolia	FACW	–	0.5	0.3	–	0.2
Danthonia intermedia	FACU+	–	4	2.0	–	1.3
Elymus glaucus	FACU	–	1	0.5	–	0.3

Downhill from this saturated area, but above and east of the creek in Slaughterhouse Gulch, is another series of springs, some of which are associated with small historic prospects. These springs are from 10-100 square feet in area and drain into poorly developed surface channels. Surface water flow in some of these channels infiltrates the subsurface, while other channels contain water which flows into and out of small ponds and eventually into the creek in Slaughterhouse Gulch. One of the springs in this area has in the past been developed into a surface water supply by the USFS.

The creek in Slaughterhouse Gulch is 1-5 feet wide in the vicinity of the Union Mine and flows on the west side of the drainage. Below the confluence with the surface water flow from the small channels mentioned above, the main creek flows at a steeper gradient and becomes more incised. Further downstream the creek flows through a dense tree covered area where the gradient becomes less steep and surface water flows in three active channels, each approximately 2-4 feet wide. A small seep is present west of the actively-flowing channels. Also located in this area are two small inactive channels, one located below a historic adit (on the Golden Moss mill site claim) and another developed adjacent to the actively-flowing channels.

Downstream from the generally wet area in the vicinity of the Union Mine, WUS in Slaughterhouse Gulch is generally confined to the actively-flowing creek occupying a 5-10 foot wide area in the drainage bottom. Small (100 square feet or less) saturated areas are located adjacent to the main creek approximately 1000 feet downstream from the Union Mine area.

The creek in Slaughterhouse Gulch becomes ponded at an exploration road which accesses the area north of the East Butte pit. Below this road crossing, the creek flows in a well-incised drainage to approximately 400 feet upstream of the main access road crossing. Here the creek splits into two channels, one 5 feet wide and the other 15 feet wide. Below the main access road crossing, surface water flows in an approximately five foot wide channel which occasionally widens to 15-20 feet. An area of saturated soil is present along the creek in Slaughterhouse Gulch approximately 1000 feet from the confluence with Elkhorn Creek.

ATTACHMENT A

Percent canopy cover by ecodata plot for 18 bottomland vegetation types sampled in the Elkhorn study area, 1989 - 1993.

TABLE	VEGETATION TYPES	PAGE
	BOTTOMLAND VEGETATION TYPES	
	Conifer Bottomland	
A1	*Abies lasiocarpa/Calamagrostis canadensis* h.t.	A-14
A1	*Abies lasiocarpa/Streptopus amplexifolius* h.t.	A-14
A2	*Picea engelmannii/Equisetum arvense* h.t.	A-18
A2	*Picea engelmannii/Galium triflorum* h.t.	A-18
A2	*Pinus contorta/Calamagrostis rubescens* Bottom c.t.	A-18
	Mixed Conifer Ephemeral Drainage	
A3	*Juniperus scopulorum/Pseudotsuga menziesii* Bottom c.t.	A-26
A3	*Juniperus scopulorum/Pseudotsuga menziesii/Pinus flexilis* Bottom c.t.	A-26
A3	*Pinus flexilis/Agropyron smithii* Bottom c.t.	A-26
	Upland Forest Drainage	
A3	*Pseudotsuga menziesii/Calamagrostis rubescens* h.t.	A-26
A3	*Abies lasiocarpa/Vaccinium scoparium* h.t.	A-26
	Deciduous Tree Bottomland	
A4	*Populus tremuloides/Poa pratensis* c.t.	A-35
A4	*Populus trichocarpa/Cornus stolonifera* c.t.	A-35
	Shrub Bottomland	
A5	*Salix geyeriana/Carex rostrata* h.t.	A-41
A5	*Salix bebbiana* c.t.	A-41
A5	*Salix exigua* c.t.	A-41
A5	*Alnus incana* c.t.	A-41
A5	*Potentilla fruticosa/Deschampsia cespitosa* h.t.	A-41
	Herbaceous Bottomland	
A6	*Poa pratensis* c.t.	A-49

This saturated area, which contains islands of unsaturated soil, is up to 100 feet wide and extends to the historic East Butte tailings dam 200 feet from the Elkhorn Creek confluence. Below the tailings dam, WUS and wetland hydrology are confined to surface water flow and adjacent saturated soil up to 15 feet from the creek.

Downstream from the Slaughterhouse Gulch confluence, Elkhorn Creek flows in a 5-10 foot wide channel. Infrequent saturated benches located adjacent to the main creek extend up to 20 feet from the channel. Elkhorn Creek flows through primary tailings approximately 1000 feet downstream from the Slaughterhouse confluence. These tailings are composed of fine to medium-grained sand, and were deposited during historic mining and milling (Carmody Mine). Elkhorn Creek flows in a narrow channel through this area where WUS is limited to active surface water flow. A second mill, constructed in the 1930's or 1940's, processed these primary tailings and deposited them further downstream. Elkhorn Creek flows in a narrow, well-incised channel below this more recent mill and into a man-made channel on the east side of the drainage to just above the lower (second generation) tailings area. Elkhorn Creek then crosses under the road in a culvert and emerges on the west side of the road in a 5-10 foot wide channel. Fine to medium-grained tailings from this second generation mill have been transported by, and deposited in, Elkhorn Creek from the culvert downstream for approximately one mile.

Approximately 500 feet downstream from these tails, Elkhorn Creek crosses the Elkhorn Road through a culvert, and continues along the east side of the road. From this road crossing to the Turnley Creek confluence, Elkhorn Creek is confined to a 5-15 foot wide channel which meanders through infrequent aspen-covered areas. Elkhorn Creek flows in a well-defined channel up to 2 feet deep, which is developed in fine to medium, well-drained sand transported downstream from the tailings piles. The wetland hydrology boundary in these areas widens up to 35 feet from the active stream to include areas of saturated soil. Spring flow from a small diameter pipe is directed into a small surface channel which saturates the ground surface and widens the wetland hydrology boundary up to 100 feet approximately 800 feet upstream from the Turnley Creek confluence.

idahoensis and Poa pratensis. Hydrophytic composition is 67 percent (Table 6). Although the stand is hydrophytic, it shows elements of the Potentilla fruticosa/Festuca idahoensis habitat type described by Mueggler and Stewart (1980).

From the Turnley Creek confluence to the Queen Gulch confluence, WUS in the Elkhorn Creek drainage is confined to the active surface water channel which is up to 20 feet wide. This stretch of the stream appears to have been historically placer-mined and no evidence of wetland hydrology, other than active surface water flow, exists.

Queen Gulch contains a perennial stream and also shows evidence of historic placer activity. WUS is generally confined to the active surface water channel. Upstream from the power supply lines which cross the drainage, the creek meanders through a forested area and the wetland hydrology boundary widens up to 100 feet due to the presence of additional saturated channels and debris deposits. Just downstream from this area is another saturated channel which widens the wetland hydrology boundary to approximately 50 feet. Below this area and downstream to the confluence with Elkhorn Creek, the surface water channel is active and ranges from 5-20 feet wide. The south fork of Queen Gulch is ephemeral and is presumed to flow only in response to snowmelt runoff and precipitation events. This drainage is moderately steep and has a dense grass cover.

At the Queen Gulch/Elkhorn Creek confluence, wetland hydrology is evident as a saturated area approximately 50 feet wide and 200 feet long. From this area downstream to Twenty-One Gulch, Elkhorn Creek and WUS/wetland hydrology are confined to a poorly-incised channel up to 25 feet wide. The wetland hydrology boundary increases just above Twenty-One Gulch where a seep saturates an approximately 100 foot wide area west and adjacent to Elkhorn Creek. At the Twenty-One Gulch confluence, wetland hydrology is up to 200 feet wide in an area of soil saturation and several surface water channels. Surface water from Twenty-One Gulch flows along the west side of the Elkhorn Creek drainage before joining the main creek approximately 500 feet downstream.

WUS and wetland hydrology along the reach of Elkhorn Creek from Twenty-One Gulch to Greens Gulch occurs in a maximum 200 foot wide corridor characterized by surface water flow, inactive and active channels, and soil saturation. The main creek flows in a 10-20 foot wide, rocky, moderately-incised channel which meanders along the drainage. Islands of non-wetland hydrology indicated by raised terraces and stream benches exist throughout this

Dominant shrub species are Salix exigua (averaging 63 percent cover), Rosa woodsii, Ribes setosum and Symphoricarpos occidentalis. Dominant species in the herbaceous layer are Poa pratensis, Agrostis stolonifera, Cirsium arvense, Poa palustris and Trifolium repens. Using the 1987 COE determination, Salix exigua stands are marginally hydrophytic (Table 6) probably due in some measure to sustained grazing disturbance. Relative cover of hydrophytic species slightly exceeded 50 percent for each sample stand, and averaged 54 percent for the three stands collectively.

Alnus incana (thinleaf alder) community type:

Alnus incana is a common associate in the Salix geyeriana/Carex rostrata habitat type and a common understory component of various conifer bottomland and deciduous tree bottomland types. However, the Alnus incana community type is very limited in the study area; it was sampled at a spring in the head of a minor tributary to Turnley Creek (plot 72).

Alnus incana is the only important shrub, averaging 60 percent cover in the sample stand. Dominant species in the herbaceous understory are Poa pratensis, Agrostis stolonifera, Cirsium vulgare, Agropyron caninum and Urtica dioica. Hydrophytic composition is 50 percent (1987 COE method) due to compositional changes from sustained grazing disturbance (Table 6). Relative cover of hydrophytic species is 63 percent, however. The Alnus incana community type is widespread in Montana and is considered a persistent seral type induced by natural or man-caused disturbances (Hansen et al. 1991; Boggs et al. 1990), and is generally a reliable wetland indicator.

Potentilla fruticosa (shrubby cinquefoil) community type:

The Potentilla fruticosa community type is very limited in the area inventoried and was sampled at one location in Turnley Meadows. The plot was located on a gently sloping terrace adjacent to Turnley Creek at 5945 feet elevation. Potentilla fruticosa forms a low, open overstory with 20 percent cover. The predominantly graminoid understory is dominated by Deschampsia cespitosa, Juncus balticus, Carex rostrata, Carex praegracilis, Festuca

stretch, although willow and other water-loving vegetation is dense. A spring has been developed to supply a cabin in a small tributary drainage just south of Greens Gulch. Flow from this spring saturates soils to Elkhorn Creek and widens the wetland hydrology boundary up to 125 feet.

For approximately 2,000 feet downstream from Greens Gulch, Elkhorn Creek is confined to a well-incised channel approximately 10-20 feet wide. Small saturated areas adjacent to the creek and on the opposite side of the road indicate the water table is close to land surface along this portion of the creek.

4.2 TURNLEY CREEK DRAINAGE

Turnley Creek flows into Elkhorn Creek south of the Elkhorn townsite. The Turnley Creek drainage is composed of several tributaries in addition to Turnley Creek including Greyback Gulch, Sourdough Creek, Ninety-Cent Gulch, and Seven-Up Gulch.

4.2.1 Hydrophytic Vegetation

The headwaters of Turnley Creek and tributary drainages (Sourdough Creek and Greyback Gulch) supports various seral stages of the Abies lasiocarpa/Calamagrostis canadensis habitat type where hydrophytic vegetation is generally restricted to within 5 to 15 feet of the stream channel. A few seep areas in these upper reaches are more extensively hydrophytic (Exhibit 1), and contain larger stands of Abies lasiocarpa/Calamagrostis canadensis and Picea engelmannii/Galium triflorum habitat types. However, the majority of these drainage bottoms above their confluence are currently in the Pinus contorta/Calamagrostis rubescens Bottom community type (due to historic disturbance) and hydrophytic vegetation is patchy and narrowly confined (5 to 15 feet) to proximity of the stream channels.

Near the confluence of Turnley and Sourdough Creeks, the drainage bottom widens into Turnley Meadows, a mosaic of Salix geyeriana/Carex rostrata bog wetland and the Poa pratensis community type which is generally non-hydrophytic on the peripheries of willow stands. A small stand of Potentilla fruticosa/Deschampsia cespitosa, a hydrophytic type, also occurs in lower Turnley Meadows. Turnley Creek downstream of the meadows is

Picea engelmannii/Galium triflorum (Engelmann spruce/sweet-scented bedstraw) habitat type:

The Engelmann spruce/sweet-scented bedstraw habitat type is a common conifer bottomland habitat type in the northern study area, occurring along incised drainages and adjacent terraces at higher elevations of 6625 to 6960 feet.

Pice engelmannii dominates the overstory averaging 52 percent cover; other important tree species include seral Pinus contorta and Pseudotsuga menziesii. Dominant shrubs include Ribes lacustre and, on some sites, Alnus incana, Rubus idaeus, Salix bebbiana or Vaccinium scoparium. Important species in the herbaceous layer are Calamagrostis rubescens, Aster foliaceus, Mertensia ciliata, Thalictrum occidentale and Arnica cordifolia.

The spruce/sweet-scented bedstraw habitat type is found in southwestern and south-central Montana on cool, moist sites, usually bordering streams, or occasionally on moist toe-slopes (Pfister et al. 1977; Hansen et al. 1991). Within the study area, this type is generally a reliable wetland indicator, however, the type appears to have a fairly wide ecological amplitude extending to moist (not wet) sites within its range in Montana.

In the study area, hydrophytic vegetation composition varied from 25 percent on sample site T21 to 71 percent on sample site 83, averaging only 44 percent for the four stands inventoried using the 1987 COE determination (Table 3). However, using relative cover of all vascular plant species, hydrophytic composition averaged 62 percent; three of the four sites were hydrophytic using either determination. Non-hydrophytic portions of the Picea engelmannii/Galium triflorum type are due to differences in site parameters and history of disturbance, and mapping of hydrophytic vegetation was based on these considerations.

predominantly Salix geyeriana/Carex rostrata wetland with peripheral patches of non-hydrophytic Poa pratensis communities. The Salix geyeriana/Carex rostrata habitat type in the Turnley drainage comprises the most extensive wetland in the northern half of the study area.

4.2.2 Hydric Soils

Numerous soil pits were excavated in the Turnley Creek drainage to identify the presence of hydric soils. Tables 11 and 12 provide descriptions of soils excavated in Greyback Gulch, Sourdough Creek, and the main Turnley Creek drainage (designated GG, SD, and TM, respectively). Hydric soils were not found in either Ninety-Cent Gulch or Seven-Up Gulch.

Hydric soils along Turnley Creek in Turnley Meadows are generally located adjacent to active stream channels or in saturated/inundated areas dominated by low relief and hummocky topography. Soil described at sites TM-01, TM-09, TM-14, and TM-16 did not qualify as hydric. The water table was generally greater than 24 inches at these non-hydric sites and, with the exception of site TM-01, these sites had moderate to good soil drainage. Soils associated with the remaining Turnley Meadows (TM) sites qualified as hydric as a result of seasonal high water tables, saturation, inundation, and usually exhibited some mottling or gleying (Tables 11 and 12).

Hydric soils in the Turnley Creek drainage are generally poorly to very poorly-drained, fine-textured and contain few coarse fragments. Although sandy textures often preclude the formation of mottling or gleying indicators, these soils can still be classified as hydric. A high water table was encountered at site TM-10 and, although the soil was more coarse textured, the soil was classified as hydric. Other sites excavated in this drainage which show hydric soil indicators exhibit a surface horizon of dark, undecomposed organic material overlying a mineral soil with mottling or gleying. In addition, faint olfactory indications of sulfidic material were detected at sites TM-04, TM-11, TM-12, and TM-13.

The Greyback Gulch drainage and the Sourdough Creek drainage below the Greyback Gulch confluence with Turnley Creek have been disturbed by historic placer and underground

Overstory dominants are Populus tremuloides, with minor amounts of Pseudotsuga menziesii and Juniperus scopulorum. Important shrubs are Juniperus communis, Alnus incana and Salix bebbiana. Dominant herbs are Poa pratensis, Agrostis stolonifera and Trifolium repens.

Boggs et al. (1990) and Hansen et al. (1991) have identified a similar Populus tremuloides/Poa pratensis community type throughout Montana. They consider the type to be a grazing-induced seral community. Within the study area, the type is generally not dominated by hydrophytic species and is a rather poor wetland indicator. Hydrophytic vegetation in this type is mostly limited to the proximity of perennial stream flow or seepage. Hydrophytic composition ranged from 22 to 63 percent for the three sampled stands (Table 5), averaging 44 percent (51 percent relative cover of hydrophytic species).

1.4 HERBACEOUS BOTTOMLAND

Poa pratensis (Kentucky bluegrass) community type:

The only herbaceous bottomland type identified in the study area is the Poa pratensis community. This type is generally non-hydrophytic and often represents a degraded sere of various shrub bottomland types or conifer bottomland where the tree overstory has been removed. Five plots were sampled at elevations of 5330 to 6030 feet. For the five plots collectively, only the herbaceous layer was significant, dominated in order by Poa pratensis, Trifolium repens, Agrostis stolonifera, Phleum pratense and Juncus balticus (Table 7). Only one of the five plots was hydrophytic (plot 64 in Queen Gulch). Hydrophytic composition averaged 40 percent for the five plots (36 percent relative cover of hydrophytic species).

mining. As a result, hydric soils in these drainages are limited. Sites which exhibited hydric soil indicators are on saturated benches located directly adjacent to and at the same relative elevation as the surface water flow. Hydric soils occur along Sourdough Creek near the confluence with Greyback Gulch. Soil excavated in this area (SD-02) is poorly-drained, saturated and contains mottles. Soil at sites SD-01 and SD-03 is not hydric because of a lack of positive indicators and depth to groundwater.

Hydric soils along the Greyback Gulch drainage are limited and occur in fine-textured, poorly-drained areas near surface water flow. Site GG-02, which is located on a raised bench above the creek, was not hydric because of a lack of positive indicators and depth to groundwater. Sites GG-01 and GG-03 are located on saturated benches and are classified as hydric because of shallow depth to groundwater and, for site GG-01, the presence of sulfidic odor and mottling.

4.2.3 Waters of the U.S. and Wetland Hydrology

The Turnley Creek drainage consists of several tributaries in addition to Turnley Creek including Greyback Gulch, Sourdough Creek, Ninety-Cent Gulch, and Seven-Up Gulch. All of these are perennial within the project area (WUS) with the exception of Seven-Up Gulch. A spring/seep area forms the headwaters of the creek in Greyback Gulch to the north and beyond the project area boundary. Within the project boundary, Greyback Gulch is a narrow (approximately 20-50 feet wide) U-shaped drainage with surface water flow occurring in a narrow (2-5 feet wide), well-incised channel. Occasional areas of wetland hydrology occur on saturated benches adjacent to the creek, and extend laterally up to 30 feet from the creek.

Greyback Gulch contains a narrow, well-incised creek approximately 2-5 feet wide from the historic Golden Curry Mine downstream to the confluence with Sourdough Creek. The drainage shows evidence of historic placer activity and several long, inactive, boulder and cobble-lined channels are exposed adjacent to the main creek. Wetland hydrology characterized by saturated soil near the Golden Curry Mine area extends up to 100 feet from the main channel. An adit which was observed to discharge 2-6 gpm of water is located on the south side of this creek below the Golden Curry Mine and flows in a very immature and narrow channel (1-2 feet wide).

Pseudotsuga menziesii/Calamagrostis rubescens (Douglas-fir/pinegrass) habitat type:

This and the next type are characteristic of uplands, and occasionally extend into drainage-ways where the water regime permits only very sparse representation of hydrophytic species. One Pseudotsuga menziesii/Calamagrostis rubescens drainage plot (plot 97) was sampled in upper Elkhorn Creek at 6720 feet elevation. This portion of Elkhorn Creek is characterized by a drainage channel with no expression of surface water and much exposed rock indicating seasonal flash-flows. Pseudotsuga menziesii is the only important tree species, averaging 60 percent cover. Dominant shrubs are Juniperus communis and Clematis occidentalis, and important herbs include Calamagrostis rubescens, Carex geyeri, Antennaria racemosa, and Berberis repens. Hydrophytic composition is only 3 percent relative cover (Table 4).

Abies lasiocarpa/Vaccinium scoparium (subalpine fir/grouse whortleberry) habitat type:

The sample site (plot 87) was located in a section of upper Elkhorn Creek similar to the previous type, but at higher elevation (7240 feet). The order of tree dominance is Pinus contorta, Pseudotsuga menziesii and Abies lasiocarpa. Important shrubs are Juniperus communis, Vaccinium scoparium, Ribes lacustre and Spiraea betulifolia. Dominant species in the herb layer include Calamagrostis rubescens, Berberis repens and Arnica cordifolia. Hydrophytic composition is 10 percent (4 percent relative cover) (Table 4).

1.3 DECIDUOUS TREE BOTTOMLAND

Populus tremuloides/Poa pratensis (quaking aspen/Kentucky bluegrass) community type:

This seral community is uncommon in the study area and was sampled at three middle elevations (5790 to 5990 feet) along Elkhorn and Turnley creeks. It occurs as relatively limited stands on mesic or hydric bottoms and mesic lower slopes which generally are significantly affected by historic grazing or mining.

Table 12. Hydric soil pit parameters, Santa Fe Pacific Gold Elkhorn Project Area, September 1993.

Site	Soil Drainag	Surface satura-tion (Yes, No)	Depth to Water table (inches)	Evidence of past surface water inunda-tion (Yes, No	Sulfidic materials present	Depth to Mottles (redoxi-morphic features) (inches)	Moistene color of redox concen-trations (Mottles)	Moistene color of redox depletions or gleying (Matrix)	Depth to gleying (inches)	Thicknes of gleying (inches)	Mineral (M) or Organi (O) soil	Aquic (Yes, No)	Peraquic (Yes, No	Flowing water or ponding over 7 days (Yes, No	Hydric (Yes, No)
TM-01	MW	N	24+	N	N	None	--	--	None	--	M	N	N	N	N
TM-02	P	N	12	Y	N	12	10YR 4/6	10YR 5/1	None	--	M	N	Y	N	Y
TM-03	P	N	21	N	N	19	7.5YR 3/4	10YR 4/2	None	--	M	N	Y	N	Y
TM-04	P	Y	5	Y	F	None	--	N2.5/	16	6+	M	Y	N	Y	Y
TM-05	P	N	23	N	N	12	2.5Y 2/6	2.5Y 2.5/1	None	--	M	N	Y	N	Y
TM-06	P	Y	0	Y	N	None	--	N2.5/	7	17+	M	Y	Y	Y	Y
TM-07	P	Y	4	Y	N	None	--	--	None	--	O/M	Y	Y	Y	Y
TM-08	P	Y	4	Y	N	None	--	--	None	--	O/M	Y	Y	Y	Y
TM-09	P	N	22	N	N	None	--	--	None	--	M	N	N	N	N
TM-10	M	N	13	N	N	None	--	--	None	--	M	N	Y	N	Y
TM-11	P	Y	0	Y	F	--	--	--	--	--	O/M	Y	Y	Y	Y
TM-12	P	N	9	N	F	9	10YR 3/6	5BG 5/1	None	--	M	Y	Y	N	Y
TM-13	VP	N	4	Y	F	9	2.5YR 3/6	5BG 5/1	17	8+	M	Y	Y	N	Y

VP - very poor; P - poor; M - moderate; MW - moderately well; G - good; Y - yes; N - no; F - faint

1.2 MIXED CONIFER EPHEMERAL DRAINAGE

The five mixed conifer ephemeral drainage types are all non-hydrophytic (Table 4) and occur in drainages classified as WUS.

Juniperus scopulorum/Pseudotsuga menziesii (Rocky Mountain juniper/Douglas-fir) Bottom community type:

Two sites were sampled in the southern portion of the study area at 5120 and 5580 feet elevation. The tree overstory is dominated by Juniperus scopulorum and Pseudotsuga menziesii, and the shrub layer by Rosa woodsii, Symphoricarpos occidentalis and Artemisia tridentata. Important herbs are Poa pratensis, Antennaria parvifolia , Taraxacum officinale and Trifolium repens. Using the 1987 COE manual, hydrophytic composition averages 0 percent; using relative cover, hydrophytic composition is 8 percent (Table 4).

Juniperus scopulorum/Pseudotsuga menziesii/Pinus flexilis (Rocky Mountain juniper/Douglas-fir/limber pine) Bottom community type:

Three sites were sampled in the southern study area at elevations of 5125 to 5410 feet. Dominant trees are those in the type name. The shrub layer is insignificant for the three samples sites collectively. Important herbs are Solidargo missouriensis , Festuca idahoensis, Agropyron spicatum, Carex rossii, Poa scabrella and Achillea millefolium. Hydrophytic plants are essentially absent from this type (Table 4). This and the previous type are relatively common communities in the southern study area, occurring in ephemeral and intermittent, incised drainages tributary to Elkhorn Creek.

Pinus flexilis/Agropyron smithii (limber pine/western wheatgrass) Bottom community type:

This uncommon community was sampled at one site in the southern study area at 5110 feet elevation. Pinus flexilis and Juniperus scopulorum dominate the overstory. Important shrubs are Artemisia nova and Rhus aromatica. Dominant species in the herbaceous stratum are Agropyron smithii, Poa pratensis, and Artemisia frigida. No hydrophytic species are present in the sampled stand (Table 4).

Approximately 2,000 feet downstream from the Golden Curry Mine, the Greyback Gulch drainage forms a confluence with the Sourdough Creek drainage in an area which contains evidence of extensive historic placer activity. Surface water from Greyback Gulch is captured in one of these placer channels and continues to flow to the south and topographically above Sourdough Creek. A short distance downstream, several historic placer channels occur between Sourdough Creek and the creek in Greyback Gulch. In this area, the surface water from Greyback Gulch flows into three smaller channels, two of which flow through thick vegetation and discharge into Sourdough Creek. The remaining surface water flowing out of Greyback Gulch is confined to a poorly-incised, narrow, meandering drainage which flows parallel and 100 feet south of Sourdough Creek. This flow terminates in a saturated soil area adjacent to Sourdough Creek approximately 750 feet downstream.

WUS in Sourdough Creek are confined to surface water flow in a well-incised channel approximately five feet wide, although occasional saturated benches extend approximately 25 feet from the main channel. Approximately 1,000 feet downstream from the intersection of the Greyback Gulch drainage and the Sourdough Creek drainage, Sourdough Creek flows through a wide (up to 250 feet) saturated soil area. This riparian area is dominated by willows and grasses growing over hummocky saturated soil. The creek flows through this area in a channel approximately 5-10 feet wide. Sourdough Creek forms a confluence with Turnley Creek approximately 1,300 feet downstream from this area at the north (upstream end) of Turnley Meadows.

Ninety-Cent Gulch is outside of the project area and forms a confluence with Turnley Creek upstream from Turnley Meadows near the project boundary. The surface water channel in Ninety-Cent Gulch drainage is up to 20 feet wide and is confined to a narrow (2-5 foot wide), well-incised channel.

Turnley Creek is perennial throughout its course within the project area. With the exception of one saturated area (up to 40 feet wide and 200 feet long) above the confluence with Ninety-Cent Gulch, surface water flow is confined to a narrow (2-5 foot wide) incised channel. Below this confluence, Turnley Creek flows in a 5-10 foot wide channel for another

Pinus contorta/Calamagrostis rubescens (lodgepole pine/pinegrass) Bottom community type:

This community in most cases represents a seral replacement of the Picea engelmannii/Galium triflorum habitat type in the study area, where logging or other disturbance has significantly altered both overstory and understory vegetation composition. Hydrophytic vegetation is often confined to stream channels and banks, sometimes sparsely. At higher elevations in the northern portion of the study area, the Pinus contorta/Calamagrostis rubescens Bottom community is apparently a seral stage of the Abies lasiocarpa/Calamagrostis canadensis and Abies lasiocarpa/Streptopus amplexifolius habitat types. Due to site parameters and the extensive disturbance history in the area, regeneration of the expected climax tree species, Picea engelmannii and Abies lasiocarpa, is very sparse on many forested drainage bottoms in the study area, hence the Pinus contorta community type name was assigned. This is a relatively common conifer bottomland type in the study area, and was sampled at three sites at 6400 to 6870 feet elevation in Greyback Gulch and a tributary of Sourdough Creek.

Hydrophytic composition varies considerably among sites in the community from 25 to 63 percent (Table 3), depending on the extent of historic disturbance and physical characteristics of the drainage bottom. Overall in the type, hydrophytic composition averaged 38 percent, dominated in the overstory by Pinus contorta and Pseudotsuga menziesii. The shrub layer was dominated by Alnus incana, Vaccinium scoparium, and Ribes hudsonianum. The most important herbs were Calamagrostis rubescens, Poa pratensis and Calamagrostis canadensis. Hydrophytic species were generally confined to narrow (10 to 20 foot wide) stringers along minor perennial creek channels.

(approximately) 1000 feet downstream before reaching the upstream end of Turnley Meadows. In this area, WUS and wetland hydrology are present in the form of inactive channels as well as small isolated saturated areas. The area is very grassy with an extensive cover of dead willows. On the downstream end of this area, a 2-5 foot wide active channel emerges adjacent to the main active Turnley Creek. Both channels flow into an area known as Turnley Meadows.

Turnley Meadows is an extensive area of saturated and inundated soils up to 900 feet wide. The area has WUS and wetland hydrology characterized by multiple active channels, areas of saturated soil, surface water ponding, inundation, and water marks/drift lines at the base of willows within inactive channels. The ground surface is very hummocky with standing water in swales between hummocks. Occasional unsaturated areas stand as islands within the meadows area. Turnley Creek meanders through the meadows area and intermittent ponds as a 5-10 foot wide channel. The meadows area reduces to approximately 20 feet wide just downstream of a reclaimed heap leach pad and then increases to approximately 200 feet wide. The lower area of Turnley Meadows is smaller, although WUS and wetland hydrology are present in the form of multiple active channels, saturated soil, and hummocky topography up to 100 feet from the main creek. Within 500 feet of the confluence of Turnley Creek with Elkhorn Creek, Turnley Creek leaves the Turnley Meadows area and flows in an incised channel approximately 5-10 feet wide. Wetland hydrology occurs in occasional areas of saturated soil extending up to 30 feet from Turnley Creek.

Seven-up Gulch, which is ephemeral, is a grassy-bottomed drainage which presumably flows only in response to snowmelt runoff and precipitation during the Spring. This gulch has its confluence with Turnley Creek on the opposite side but at approximately the same location as the Sourdough/Turnley Creek confluence.

4.3 SOUTHERN ALTERNATIVE TAILINGS IMPOUNDMENT AREAS

The project area south of the USFS boundary encompasses two alternative tailings impoundment sites. Elkhorn Creek flows through this southern area between, but separated from, these two alternative sites.

WATERS OF THE U.S. AND WETLAND VEGETATION TYPE DESCRIPTIONS ELKHORN MINE PROJECT, JEFFERSON COUNTY, MONTANA

(Note: Tables 1 through 7 referenced in the following text of Attachment A refer to the dominant species tables found in Section 3.0 of the main report. Tables A-1 through A-6 of Attachment A provide additional detailed data for all vascular plant species.)

1.0 NON-WETLAND WATERS OF THE U.S. - VEGETATION TYPE DESCRIPTIONS

1.1 CONIFER BOTTOMLAND

Abies lasiocarpa/Calamagrostis canadensis (subalpine fir/bluejoint reedgrass) habitat type:

The Abies lasiocarpa/Calamagrostis canadensis habitat type is primarily limited to drainages at the highest elevations in the northern portion of the study area; one disjunct site (plot 94) was sampled in a cold-air pocket in Sourdough Creek. The two sample sites were at elevations of 6240 and 7390 feet. The higher elevation, wetter site (plot 92) is hydrophytic and the lower elevation site is primarily non-hydrophytic, with mean hydrophytic composition for the two sites at 44 percent (Table 2). Dominance of Pinus contorta in the overstory indicates the seral nature of Abies lasiocarpa/Calamagrostis canadensis in the study area and accounts for relatively low hydrophytic composition in most stands. Hydrophytic vegetation is therefore generally narrowly confined to stream channels and banks where this habitat type occurs in the Elkhorn study area, except at the highest elevations near the north boundary.

In order of canopy cover, dominant trees are Pinus contorta, Picea engelmannii and Abies lasiocarpa. Dominant species in the shrub layer are Vaccinium scoparium, Ledum glandulosum and Juniperus communis. Important herbs are Calamagrostis canadensis, Calamagrostis rubescens and Senecio triangularis.

Mature stands of Abies lasiocarpa/Calamagrostis canadensis in southwestern Montana are generally reliable wetland indicators.

4.3.1 Hydrophytic Vegetation

Elkhorn Creek below the canyon is dominated by the Salix exigua community type on terraces, interspersed with the Populus trichocarpa/Cornus stolonifera community which is generally more centrally located adjoining creek channels. While the Populus trichocarpa type is usually dominated by hydrophytic vegetation, the Salix exigua community type varies, with stand peripheries often representing non-hydrophytic, sub-irrigated riparian zones. Patches of the Poa pratensis community type bordering terraces along lower Elkhorn Creek are composed of non-hydrophytic vegetation reflecting historic grazing disturbance.

Tributary drainages to this section of Elkhorn Creek (e.g., Tacoma and Wood Gulches) are occupied by non-hydrophytic, mixed conifer ephemeral drainage types, the Poa pratensis community type, and upland grassland or shrub/grassland types which are classified as non-wetland WUS Wetlands in these tributary drainages are restricted to a few, small spring and seep sites such as Tacoma Spring (Exhibit 1).

4.3.2 Hydric Soils

With the exception of soil excavated at site SA-01, soils in the alternative tailings impoundment areas are not saturated, and do not show any hydric soil characteristics. Site SA-01, located in a small, saturated seep area in Section 9, did not exhibit hydric soil indicators, although groundwater was encountered at a depth of 12 inches (Table 11).

Hydric soil indicators were found along Elkhorn Creek at sites EH-19 and EH-20. The drainage morphology along this reach of Elkhorn Creek is similar to the morphology north of the USFS boundary with inactive channels, depressions, and dense vegetation. These hydric soil sites have poor to moderate drainage, shallow water table depth, faint sulfidic odor, mottling and gleying. A historic, bouldery placer tailings pile over 2,000 feet long and up to 200 feet wide is located just east of Elkhorn Creek near the southern project boundary. An irrigation ditch branches from the main creek just north of this pile. Verification pits excavated in this area indicate that the soil is well drained and hydric soils do not occur.

ATTACHMENT A

WATERS OF THE U.S. AND WETLAND VEGETATION TYPE DESCRIPTIONS ELKHORN MINE PROJECT JEFFERSON COUNTY, MONTANA

4.3.3 Waters of the U.S. and Wetland Hydrology

WUS and wetland hydrology along the lower reach of Elkhorn Creek to the southern boundary of the project area are characterized by saturated soil, active and inactive surface water channels, and water-loving vegetation. The width of the WUS/wetland hydrology corridor ranges from 50 to 150 feet along this stretch. A 2500 foot stretch of historic placer tailings is located near the southern project boundary and bounded to the west by Elkhorn Creek and to the east by an irrigation ditch. Willows grow around the margin of this pile of cobbles and boulders and small ponds exist within and on the north and south edges. The irrigation ditch to the east is 2-4 feet wide.

Several tributaries, most of which are ephemeral, occur east and west of Elkhorn Creek in the alternative tailings impoundment areas. On the east side, Tacoma Gulch, Wood Gulch, and the other unnamed gulches show no evidence of wetland hydrology. On the west side, evidence of WUS and wetland hydrology is confined to very limited saturation at two spring/seep areas in the north-east corner of section 4, and as surface water flow and limited saturation in the north-central part of section 9. Discharge from this latter area is sufficient to allow a small creek (6-12 inches wide) to flow approximately 3,000 feet before infiltrating into the subsurface.

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