AR WETLANDS PLAN

(March 2015)

Prepared by Atlantic Richfield Company in satisfaction of the requirements of Paragraph 21 of the Streamside Tailings Operable Unit and Federal and Tribal Natural Resource Damages Consent Decree (April 19, 1999) entered in Case Nos. CV-89-039-BU and CV-83-316-H

AR WETLANDS PLAN

(March 2015)

I. Background

In 1999, the U.S. District Court for Montana approved the Streamside Tailings Operable Unit and Federal and Tribal Natural Resource Damages Consent Decree, among the United States, the State of Montana, the Confederated Salish and Kootenai Tribes and the Atlantic Richfield Company ("Atlantic Richfield"). This Plan refers to that agreement as the SSTOU Consent Decree. Pursuant to the terms of the SSTOU Consent Decree, Atlantic Richfield agreed, among other things, to create, restore, or enhance the equivalent of 400 acres of Restored Wetlands in the Upper Clark Fork River Basin. The Restored Wetlands requirement is satisfied by creating, restoring or enhancing wetlands equal to not less than 307 additional Functional Effective Wetlands Area ("FEWA") units.[1]

This AR Wetlands Plan describes the restoration and other actions Atlantic Richfield has completed to date and future actions to be completed under the oversight of the United States Fish and Wildlife Service ("USFWS") and the United States Environmental Protection Agency ("EPA") to fully satisfy Atlantic Richfield's Restored Wetlands requirements under the SSTOU Consent Decree.

This AR Wetlands Plan is submitted to the USFWS for public comment and approval by USFWS, in consultation with the EPA, under the terms of the SSTOU Consent Decree. Following the public comment period and completion of planned maintenance activities, Atlantic Richfield will schedule an inspection by USFWS and EPA. A post-inspection letter will be prepared by Atlantic Richfield and submitted to the agencies to confirm the results of the inspection and completion of any follow-up tasks required from the inspection. Atlantic Richfield's letter will satisfy the requirement for a completion report described in Paragraph 21(h) of the SSTOU CD.

II. Atlantic Richfield's Restored Wetlands Project

The Dutchman Riparian Lands Property

In 2004, Atlantic Richfield purchased approximately 3,750 acres in the Lost Creek and Dutchman Creek drainages. Within this area was a large wetlands

[1] *See* Paragraph 21 of the SSTOU Consent Decree, attached as Attachment 1 to this Plan and Completion Report.

complex that had been degraded over time from various impacts, including overgrazing by long-term cattle operations. A Map showing the Dutchman Riparian Lands Property (the "Dutchman Property") is included as Attachment 2 to this Plan.[2] The property is located within the Anaconda Regional Water Waste and Soils Operable Unit ("ARWW&S OU") of the Anaconda Smelter NPL Site.

Atlantic Richfield will manage the Dutchman Property as a wildlife management area using practices that are consistent with wildlife habitat conservation and which support EPA's selected remedy for this area. Atlantic Richfield's objective is to protect the property's inherent wetland/riparian values. This objective will be accomplished by following the procedures described in a management plan that both protect the wetland resources and acknowledge Atlantic Richfield's obligations to monitor and maintain EPA's selected remedy.[3] The Dutchman Property Management Plan is further described in Section III of this Plan.

Through a property transfer from Atlantic Richfield to its affiliate, ARCO Environmental Remediation LLC ("AERL"), covenants will be created of record for the Dutchman Property that generally prohibit new development and allow the landowner to manage future land use on the property to protect wetland values in perpetuity. For example, residential development, mining and commercial development of the property or subdividing the property for residential, commercial or industrial purposes will be prohibited under the covenants that are set forth in the Special Warranty Deed from Atlantic Richfield to AERL.[4] Any future subdivision of the Dutchman Property must be approved by the USFWS. The covenants referenced in the Special Warranty Deed from Atlantic Richfield to AERL are intended to be covenants which run with the land and are binding upon all subsequent owners of the Dutchman Property.

The property transfers will be completed prior to the end of calendar year 2015. The Deeds thereafter will be recorded in the ADLC real property records, and copies of each Deed will be included as part of the Dutchman Property

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[2] Approximately 50 acres of the parcel purchased in 2004 was transferred to Anaconda Deer Lodge County ("ADLC") in March 2013 and has been incorporated into the County airport. This 50 acre area will not be managed under the Dutchman Wetlands Management Plan, Attachment 3 to this Plan. Wetland areas on Parcel D of the property transferred to the County, as shown on Certificate of Survey 420-A, however, are protected in perpetuity by deed restrictions.

[3] A copy of Atlantic Richfield's Dutchman Property Management Plan is included as Attachment 3 to this Plan.

[4] The form of Special Warranty Deed that will be utilized to impose the described covenants and transfer ownership of the Dutchman Riparian Lands parcel from Atlantic Richfield to AERL is included in Attachment 4 to this Plan.

Management Plan. Once adopted through the real property transfer and of record, the covenants will not be modified without the written approval of the USFWS.

The Restored Wetlands Project – Completed Elements

A comprehensive wetlands assessment for the Dutchman Property (identified as AA 3-3, the Dutchman Creek Expansion Area) was completed in 2005.[5] As shown on the Map (Attachment 2), new fence was installed by Atlantic Richfield in Fall 2008 to supplement the existing perimeter fencing around the Dutchman Property. Installation, repair and replacement of fencing, as necessary, since that time prevents livestock access to the property from neighboring ranches. Improved land and water conservation practices, most specifically through limiting future grazing on the property, have successfully enhanced wetland and riparian habitat features present on the Dutchman Property.

Prior to installation of new fence in Fall 2008, Atlantic Richfield collected wetlands information in June 2008 over a portion of the Dutchman Property. The field work was suspended when cattle and evidence of grazing were found on portions of the property. A report showing the 2008 assessment boundaries and documenting the results of the 2008 field work was submitted to USFWS in February 2010. Comparing the boundaries mapped during the 2008 field investigations with the 2005 assessment results, Atlantic Richfield projected a net wetlands area gain within the Dutchman Riparian Lands from 2005 to 2008.[6]

In 2011, after the perimeter fencing had been established and maintained to provide an opportunity for vegetation recovery, Atlantic Richfield completed extensive data collection on wetlands areas and upland areas within the Dutchman Property. These studies were described in the *Dutchman Riparian Lands Wetlands Assessment Work Plan* (Atlantic Richfield Company, 2011) which was submitted to USFWS and EPA. Data collection activities included the following:

[5] By letter dated February 20, 2007, EPA and the U.S. Fish and Wildlife Service accepted the results in approval of the *Draft Final 2005 Wetlands Mitigation Process Step 3 – Detailed Analysis of the Anaconda Smelter Site, dated October 3, 2006.*

[6] *2008 Survey and Assessment Results for the Dutchman Area*, Anaconda Smelter NPL Site, Anaconda Regional Water, Waste and Soils Operable Unit, prepared for Atlantic Richfield Company by Pioneer Technical Services, February 2010.

- High resolution aerial imagery;
- Jurisdictional wetlands determination; and
- FEWA scoring.

Representatives of the USFWS provided oversight during the 2011 field data collection activities. In the course of the 2011 fieldwork, supplemental vegetation data were collected to define a baseline for vegetation communities within the Dutchman Property (in 2011) that could be used for trend analyses and future decision-making related to property management. A total of 26 transect groups (see Figure 5 of the Dutchman Property Management Plan, Attachment 3) were established along with 139 existing individual, perpendicular 100 meter transects. Sample quadrats were placed at 10-meter increments along each transect for a total of 1,386 individual quadrats. Data recorded included photo logs, plant cover, plant biomass, plant diversity, nested belt transect/cover and diameter, and wildlife habitat. The location of these transects and individual data points were recorded such that these locations can be revisited.[7]

Analysis of the 2011 data was submitted to the USFWS and EPA in the *Dutchman Riparian Lands Wetlands Mitigation Process Step 4 Confirmation of Response Actions* (Atlantic Richfield Company, 2012a) (the "*Dutchman Step 4 Report*"). The *Dutchman Step 4 Report* also contained historic and baseline wetland data collected from the Dutchman Property. The 2011 data will serve as the baseline for comparison to Site data collected as part of future monitoring activities described in the Dutchman Property Management Plan (Attachment 3).[8]

As explained in the *Dutchman Step 4 Report,* Atlantic Richfield quantified a gain in FEWA units across the Dutchman Property from 2005 to 2011. This gain is summarized below:

2011 Assessment:	2,232.22 FEWA units
2005 Assessment:	1,715 FEWA units
Gain [2005 to 2011]:	517.22 FEWA units

[7] Data from the 2011 supplemental vegetation data collection effort appear in Appendix F in the *Supplementary Vegetation Data Report for the Dutchman Riparian Lands. Deer Lodge County, Montana* (Atlantic Richfield Company, 2012b).
[8] The Management Plan included as part of this AR Wetlands Plan was first submitted to USFWS in February 2010 and has been revised in response to Agency comments.

The assessment and wetlands evaluation efforts were approved by the U.S. Fish and Wildlife Service (USFWS) on February 20, 2013 and documented in the *Final Dutchman Riparian Lands Wetlands Mitigation Process Step 4 – Confirmation of Response Actions* (Atlantic Richfield Company, 2013) which has been reviewed and approved by the USFWS.[9] The gain of 517.22 FEWA units from 2005 to 2011 exceeds the 307 FEWA units Atlantic Richfield committed to achieve by creating, restoring or enhancing wetlands, as described in Paragraph 21 of the SST OU CD. Therefore, 307 FEWA units of the total gain are committed to satisfaction of the Restored Wetlands obligation under the SST OU CD, and the remainder of the FEWA unit credits is available for application to other Atlantic Richfield projects. The AR Wetlands Plan commitment is implemented by Atlantic Richfield through the real property transfers, covenants and future management responsibilities described in this Plan and the Dutchman Property Management Plan.

<u>Plan Elements to be Completed</u>

As explained above, Atlantic Richfield has submitted and USFWS has approved the documentation which shows that Atlantic Richfield's efforts to date have created, restored or enhanced the equivalent of 400 acres of Restored Wetlands in the Upper Clark Fork River Basin. The Restored Wetlands requirement has been satisfied by creating, restoring or enhancing wetlands, and documenting an increase of more than 307 additional FEWA units within the Dutchman Property.

To protect the Restored Wetlands in perpetuity, other elements of the AR Wetlands Plan must yet be completed. First, the property transfers described in Section II above, including the creation of covenants that run with the land, will be completed before the end of the 2015 calendar year. Second, the USFWS and EPA have approved Atlantic Richfield's Dutchman Property Management Plan (Attachment 3 to this Plan). The content of the Management Plan is explained more fully below in Section III of this Plan.

In summary, the Management Plan proposes monitoring, maintenance, repair and reporting activities that Atlantic Richfield or its designee, as the land owner, will perform to protect the Restored Wetlands and keep the USFWS and EPA advised of matters related to Site conditions under the AR Wetlands Plan. All

[9] *See* USFWS approval letter, Attachment 5 to this Plan.

such activities described in the Management Plan will begin in 2015, and continue forward in time as described in the Management Plan.

III. Dutchman Property Management Plan

The Dutchman Property Management Plan specifies land management, monitoring, maintenance and reporting activities to be completed within the Dutchman Property by Atlantic Richfield to protect and maintain the property and associated wetlands and other wildlife habitat. The Management Plan is included as Attachment 3 to this Plan. The approved Management Plan, and any future amendments to the Management Plan, will be maintained on file at the Atlantic Richfield offices located at 317 Anaconda Road, Butte, MT 59701. A duplicate copy will be maintained on file at the offices of the United States Department of the Interior, Fish and Wildlife Service located at 585 Shepard Way, Helena, MT 59601-6287.

The improvement in wetlands habitat, as measured by the collection of field assessment data and calculation of the FEWA units, arose from improved conservation practices on the property, most notably the exclusion of cattle and elimination of over-grazing the natural vegetation. Grazing on the Dutchman Property in the near term is not contemplated. However, the Dutchman Property Management Plan provides that a grazing plan may be developed in the future for review and approval by USFWS, in consultation with EPA, as an amendment to the Management Plan.

As described in the Management Plan, repair and enhancement of the perimeter fencing that excludes cattle from the wetland areas will be completed in the first and/or second quarter 2015. Thereafter, Atlantic Richfield will schedule an inspection by USFWS and EPA to confirm the perimeter fencing is satisfactory, subject to on-going inspection and maintenance obligations set forth in the Management Plan. Upon completion of any follow up tasks related to the perimeter fencing inspection, a letter report will be submitted by Atlantic Richfield to the USFWS and EPA to confirm that such tasks have been performed. The perimeter fencing inspection and letter report from Atlantic Richfield will satisfy the inspection and completion report requirements found in Paragraph 21(h) of the SST OU CD.

In addition to describing Atlantic Richfield's property management and land use commitments, the Dutchman Property Management Plan includes requirements for monitoring day use of the area by hunters and others, monitoring vegetation performance, repair of vegetated areas, erosion and weed spraying, and conduct of annual wildlife surveys. The results of monitoring and steps taken by Atlantic Richfield to address any deficiencies identified through monitoring activities will be summarized in annual reports and submitted to USFWSW and EPA.

Improvements to support permitted public access to the Dutchman Property are also described in the Management Plan. Atlantic Richfield reserves the right to restrict public access to the Dutchman Property in the future as necessary to achieve land management goals.

List of Attachments

1. Paragraph 21 of Streamside Tailings Consent Decree

2. Map of Dutchman Riparian Lands

3. Dutchman Property Management Plan

4. Form of Special Warranty Deeds

5. USFWS letter approving *Dutchman Riparian Lands Wetlands Mitigation Process, Step 4 – Confirmation of Response Actions* (February 20, 2013)

Attachment 1 to AR Wetlands Plan

SSTOU CD, Paragraph 21

FILED
APR 19 1999
LOU ALEKSICH, JR. CLERK
BY
Deputy Clerk

IN THE UNITED STATES DISTRICT COURT

FOR THE DISTRICT OF MONTANA

UNITED STATES OF AMERICA,	)	
Plaintiff and Counterclaim Defendant,	)	NO. CV-89-039-BU-PGH
vs.	)	
ATLANTIC RICHFIELD COMPANY, INC.,	)	
Defendant and Counterclaimant,	)	
STATE OF MONTANA,	)	
Plaintiff and Counterclaim Defendant,	)	NO. CV-83-317-H-PGH
CONFEDERATED SALISH AND KOOTENAI TRIBES,	)	
Intervenor,	)	
vs.	)	
ATLANTIC RICHFIELD COMPANY,	)	
Defendant and Counterclaimant.	)	

STREAMSIDE TAILINGS OPERABLE UNIT
AND FEDERAL AND TRIBAL NATURAL RESOURCE DAMAGES
CONSENT DECREE

TABLE OF CONTENTS

that have been injured or lost as a result of the release of Hazardous or Deleterious Substances.

20. Payment by ARCO to the Tribes. Within 30 days of the Effective Date of the Consent Decree, ARCO shall pay to the Tribes $18,300,000 plus Treasury Interest (which shall accrue from the date of entry of the Consent Decree through the Effective Date) in settlement and compromise of the Tribes' claims against ARCO for Natural Resource Damages within All Sites. ARCO shall make such payment by electronic funds transfer in accordance with instructions provided to ARCO by the Tribes upon entry of the Consent Decree. The payment made to the Tribes pursuant to this Paragraph 20 (Payment by ARCO to the Tribes) shall be retained by the Tribes to compensate the Tribes for their claimed Natural Resource Damages related to All Sites which shall be used to restore, replace, or acquire the equivalent of such natural resources.

21. Wetlands Restoration by ARCO.

a. Within 10 years following the entry of the Consent Decree, ARCO shall create, restore, or enhance the equivalent of 400 acres of Restored Wetlands in the Upper Clark Fork River Basin. This requirement shall be met by creating, restoring, or enhancing Restored Wetlands equal to not less than an additional 307 FEWA units in accordance with the requirements of this Paragraph 21 (Wetlands Restoration by ARCO) and the ARCO Wetlands Plan. The Restored Wetlands required by this Paragraph 21 (Wetlands Restoration by ARCO) shall not include any Wetlands acquired, created, restored, or enhanced as mitigation for the net loss of functional wetlands resulting from the implementation of response actions at any of the Clark Fork NPL Sites. Wetlands functions and values that are credited under the Consent Decree to meet the requirements of this Paragraph 21 (Wetlands Restoration by ARCO) shall not be available for credit for any other purpose. In meeting its obligations under this Paragraph 21 (Wetlands Restoration by ARCO), ARCO shall be entitled to credit for Restored Wetlands it has created, restored, or enhanced through performance of response actions within the Clark Fork NPL Sites in excess of those Wetlands acquired, created, restored, or enhanced as mitigation for the net loss of functional wetlands resulting from the implementation of response actions at any of the Clark Fork NPL Sites outside the SST OU, to the extent such Wetlands are created, restored or enhanced after the lodging of the Consent Decree or created, restored or enhanced at the Lower Area One Operable Unit prior to or after lodging of the Consent Decree. However, any mitigation credits available to ARCO from response actions undertaken prior to lodging of the Consent Decree at the Warm Springs Ponds Active Area and Inactive Area Operable Units or any other Operable Units in the Clark Fork NPL Sites, may be used to mitigate the net loss of functional wetlands at ARWWS OU and other Operable Units in the Clark Fork River Basin which result from implementation of response actions.

b. ARCO may request an extension of the deadline set forth in subparagraph 21.a (Wetlands Restoration by ARCO), of up to an additional five years if ARCO has completed the physical actions described in the ARCO Wetlands Plan in accordance with the schedules set forth in that Plan and such extension is necessary to allow time for the Wetlands created, restored, and enhanced in accordance with the requirements of this Paragraph 21 (Wetlands Restoration by ARCO) to achieve the quality of Restored Wetlands.

c. ARCO will assure that all Restored Wetlands created, restored, or enhanced pursuant to this Paragraph 21 (Wetlands Restoration by ARCO) will be protected in perpetuity through deed restrictions, conservation easements, or similar restrictive instruments. At the request of ARCO, FWS will identify a designee who is mutually acceptable to FWS and

ARCO and who shall be the beneficiary of such restrictions and who shall accept and enforce restrictive instruments to protect Restored Wetlands in perpetuity.

d. Contemporaneous with ARCO's submittal of a draft final remedial design and remedial action plan to EPA or within 180 days following EPA approval, in consultation with FWS, of the remedial design, whichever is earlier, for those portions of the ARWWS OU that encompass the Opportunity Ponds, North Opportunity and South Opportunity subareas, ARCO shall submit the ARCO Wetlands Plan to FWS and EPA. The ARCO Wetlands Plan shall include, but not be limited to, provisions for the protection of the Restored Wetlands in perpetuity, a schedule for the creation, restoration, or enhancement of the Restored Wetlands, the measures to be undertaken to achieve Restored Wetlands, the proposed location of the Restored Wetlands, as well as provisions for FWS monitoring of ARCO's implementation of the Wetlands Plan, periodic progress reports, and amendment of the Wetlands Plan as necessary. The schedule set forth in the ARCO Wetlands Plan shall be coordinated with the remedial design and remedial action schedules at the ARWWS OU. To the extent it is practicable, Restored Wetlands shall be located in soil and fill borrow areas for ARWWS OU remedial action, so long as such areas are suitable for Wetlands.

e. FWS, in consultation with EPA, shall either approve or disapprove the ARCO Wetlands Plan. If FWS, in consultation with EPA, disapproves the ARCO Wetlands Plan, FWS shall send ARCO a written notice of disapproval with a statement of the reasons for the disapproval. Upon receipt of a notice of disapproval, ARCO shall, within 60 days, correct the deficiencies and resubmit the ARCO Wetlands Plan for approval. In the event that the resubmitted ARCO Wetlands Plan, or portion thereof, is disapproved by FWS, FWS may correct the deficiencies and approve the Plan as modified. ARCO may dispute FWS's modification of the Plan in accordance with the dispute resolution procedures set forth in Section XIII (Dispute Resolution Procedures for Disputes Involving DOI).

f. Prior to its final approval of the ARCO Wetlands Plan, DOI shall afford the public, including the State and the Tribes, a reasonable opportunity to review and comment upon the ARCO Wetlands Plan.

g. Upon final approval of the ARCO Wetlands Plan by FWS, ARCO shall implement the ARCO Wetlands Plan in accordance with the schedules and requirements of this Paragraph 21 (Wetlands Restoration by ARCO) and the ARCO Wetlands Plan.

h. Within 90 days after ARCO concludes that it has complied with the requirements of this Paragraph 21 (Wetlands Restoration by ARCO) and the ARCO Wetlands Plan, ARCO shall schedule and conduct an inspection to be attended by ARCO and FWS. If, after the inspection, ARCO still believes that it has fully complied with the requirements of this Paragraph 21 (Wetlands Restoration by ARCO) and the ARCO Wetlands Plan, within 90 days of the inspection, ARCO shall submit a completion report describing the completed project to FWS for approval, with a copy to the State and Tribes. In the report, ARCO shall state that the equivalent of 400 acres of Restored Wetlands (equal to 307 additional FEWA units) have been created, restored, or enhanced in full satisfaction of the requirements of this Paragraph 21 (Wetlands Restoration by ARCO) and the ARCO Wetlands Plan.

i. If, after completion of the inspection provided for in subparagraph 21.h. (Wetlands Restoration by ARCO), receipt and review of ARCO's completion report, and consultation with EPA, FWS determines that ARCO has failed to comply with the requirements of this Paragraph 21 (Wetlands Restoration by ARCO) or the requirements of the ARCO Wetlands Plan, FWS shall notify ARCO of the deficiencies FWS has identified and the steps necessary to comply with the requirements of this Paragraph 21 (Wetlands Restoration by

ARCO) or the ARCO Wetlands Plan. Such notice shall be provided to ARCO within 365 days following FWS's receipt of ARCO's completion report. ARCO shall undertake all actions necessary to remedy the deficiencies or, within 10 days of receipt of the notice, initiate the dispute resolution procedures set forth in Section XIII (Dispute Resolution Procedures for Disputes Involving DOI).

j. If, after consultation with EPA, FWS concludes based on the initial or any subsequent completion report, and after a reasonable opportunity for review and comment by the State and Tribes, that ARCO has fulfilled its obligations under this Section, FWS will so notify ARCO in writing.

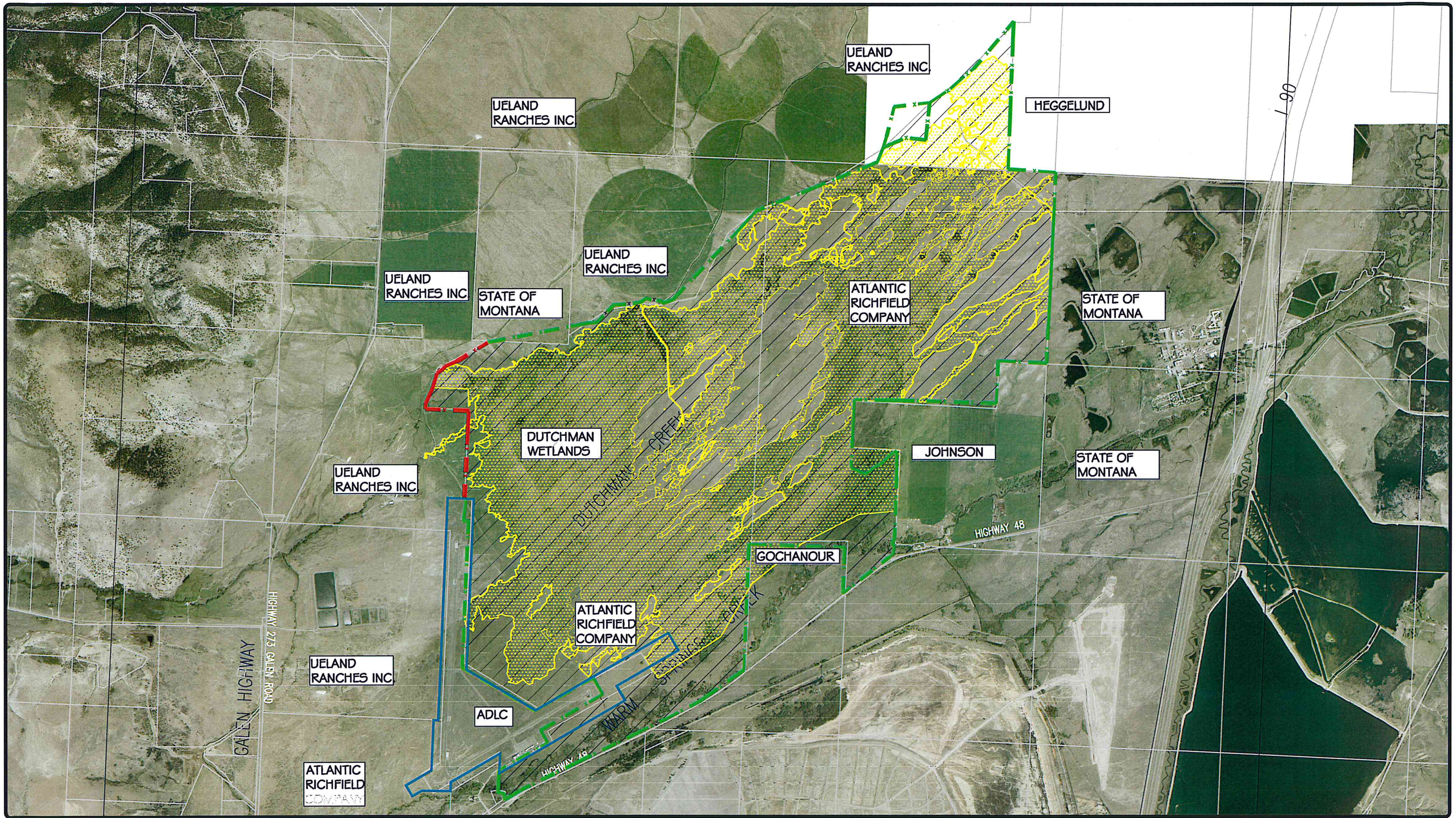
k. FWS will not seek to recover its costs of monitoring and overseeing ARCO's, the State's or the Tribes' performance of the requirements of this Section IV (Federal and Tribal Natural Resource Damages). FWS will track its costs as a technical advisor to EPA as a separate account from any costs incurred by FWS to implement the Consent Decree.

22. Wetlands/Riparian Areas Restoration by the State.

a. Within 10 years of the Effective Date of the Consent Decree, the State shall create up to 400 acres of any combination of the following in the Clark Fork River Basin: (a) newly constructed Wetlands or restoration of destroyed Wetlands; (b) enhancement of existing Wetlands; and (c) enhancement of riparian areas on or along the Clark Fork River or its tributaries. In fulfilling the requirements of this Paragraph, the State shall not be required to incur more than $3,200,000 in Wetlands/Riparian Areas Restoration Costs. The United States will not require the State to acquire land to meet its obligations under this Paragraph, so long as the State can achieve the required 400 acres or $3,200,000 cap on expenditures without such acquisition.

Attachment 2 to AR Wetlands Plan

Map of Dutchman Riparian Lands



LEGEND

- DUTCHMAN WETLANDS PROPERTY TRANSFER BOUNDARY
- EXISTING 5 STRAND BARBED WIRE FENCE (JANUARY 2009)
- DUTCHMAN WETLANDS (DELINEATED IN 2005)
- 5 STRAND BARBED WIRE FENCE CONSTRUCTED BY ATLANTIC RICHFIELD IN 2008
- APPROXIMATE PROPERTY BOUNDARIES
- NEW AIRPORT PROPERTY BOUNDARIES (COS 420A)

NOTE:
DUTCHMAN WETLANDS PROPERTY TRANSFER BOUNDARY IS APPROXIMATE AND DOES NOT REPRESENT A LEGAL SURVEY.

N

PROJECTION: TRANSVERSE MERCATOR
ZONE: 2500
DATUM: MSP NAD 83 NAVD 88
UNITS: FEET
SOURCE: PIONEER

SCALE IN FEET
0 1250 2500

FIGURE 1

ANACONDA DEER LODGE COUNTY AIRPORT BOUNDARY

PIONEER TECHNICAL SERVICES, INC.
Butte, Helena, Anaconda

DATE: 12/17/2009

12/17/2009 1:31:15 PM O:\ANACONDA OFFICE DATA\ADLC AIRPORT BOUNDARY.DWG

Attachment 3 to AR Wetlands Plan

Dutchman Property Management Plan

ANACONDA SMELTER NPL SITE
ANACONDA REGIONAL WATER, WASTE & SOILS OPERABLE UNIT

Final

Dutchman
Property Management Plan

Atlantic Richfield Company

April 2, 2015

ANACONDA SMELTER NPL SITE ANACONDA REGIONAL WATER, WASTE & SOILS OPERABLE UNIT

Final

Dutchman Property Management Plan

Prepared for:

Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701

Prepared by:

Pioneer Technical Services, Inc.
P.O. Box 3445
Butte, Montana 59702

April 2, 2015

TABLE OF CONTENTS

Page

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

PURPOSE

This document is the Property Management Plan (PMP) for the Atlantic Richfield Company (Atlantic Richfield)-owned Dutchman property located in Anaconda-Deer Lodge County, Montana. The Dutchman PMP describes monitoring and maintenance activities for the Dutchman that will be performed to protect wetland habitat and meet Atlantic Richfield's management objectives for the property. The purpose of this PMP is to support Atlantic Richfield's commitments related to the following:

- Streamside Tailings Operable Unit (SST OU) Consent Decree (CD) requirements that wetlands will be "*protected in perpetuity through deed restrictions, conservation easements, or similar restrictive instruments.*" In addition to matters of record that are recorded in the real property records for Anaconda-Deer Lodge County, this PMP describes monitoring and maintenance activities for the Dutchman so the existing wetlands and related habitat are preserved and maintained into the future.

- Anaconda Regional Water, Waste, and Soils Operable Unit (ARWW&S OU) superfund monitoring and maintenance requirements. Monitoring and maintenance of the property is consistent with ARWW&S OU superfund remedy requirements for groundwater, surface water, and the designated High Arsenic Area (HAA).

1.0 INTRODUCTION

In 2011, Atlantic Richfield quantified the Functional Effective Wetlands Area (FEWA) unit gain within the Dutchman from 2005 to 2011. This effort was approved by the U.S. Fish and Wildlife Service (USFWS) on February 20, 2013 and documented in the *Final Dutchman Riparian Lands Wetlands Mitigation Process Step 4 – Confirmation of Response Actions* (Atlantic Richfield Company, 2013) which has been reviewed and approved by the USFWS (see approval letter in appendix A) as well as the *Final Dutchman Riparian Lands Wetlands Mitigation Process Step 4 – Confirmation of Response Actions* (Atlantic Richfield Company, 2012a) and replacement pages dated March 19, 2013.

The 2011 assessment of the Dutchman concluded that wetland FEWA units gained during the period from 2005 to 2011 were 517.2 units and that 307 of these units will be utilized to satisfy Atlantic Richfield's obligation to generate 307 FEWA units under Paragraph 21 of the SST OU CD through creating, restoring or enhancing wetlands. Therefore, Atlantic Richfield has applied 307 units of the FEWA gain at the Dutchman, through protection of such wetlands areas from development, to satisfy the SST OU CD wetlands restoration requirement. This Dutchman Property Management Plan specifies land management, monitoring, and maintenance activities to be completed within the Dutchman by Atlantic Richfield to maintain the property and associated wetlands into perpetuity.

In September 2012, the U.S. Environmental Protection Agency (EPA) published the *Dutchman Creek High Arsenic Area Final Design Report* (EPA, 2012). The report specified the final superfund remedy for the Dutchman was designation of an HAA that will require maintaining a permanent vegetative cover, Institutional Controls (ICs), monitoring, and compliance with Applicable or Relevant and Appropriate Requirements (ARARs). This PMP specifies land management, monitoring, and maintenance activities to be completed within the Dutchman by Atlantic Richfield to maintain the property and satisfy the requirements in the *Dutchman Creek High Arsenic Area Final Design Report* (EPA, 2012).

This PMP is consistent with the June 19, 2012 discussion with USFWS and EPA where Atlantic Richfield presented their approach for managing the Dutchman (see meeting minutes provided in Appendix B). It is anticipated that this PMP will be updated periodically as necessary and approved by the USFWS and EPA.

1.1 Background

The Dutchman is the largest remaining contiguous wetland/riparian habitat in the Upper Clark Fork River Basin (see Figures 1 and 3). The Dutchman covers about 3,459 acres and is northeast of the former smelter site and in the northern section of the ARWW&S OU. Three streams are associated with the site: Lost Creek, Warm Springs Creek and Dutchman Creek.

1.1.1 Site History

The site has been altered for agricultural purposes and numerous ditches, ponds and remnants remain. Lost Creek and Dutchman Creek have been diverted historically for irrigation purposes.

Uses of the Dutchman included summer pasture and spring calving. Following Atlantic Richfield's purchase of the Dutchman in 2004, cattle grazing and calving continued at reduced levels through 2008. In fall of that year, cattle were excluded from this area.

1.1.2 Site Location

The area is located west of Anaconda and bordered by the Anaconda Airport and a private party on the west and north sides, Montana Fish, Wildlife, and Parks (FWP) Warm Springs Management Area to the east, and Montana Highway 48 and a private party on the south (Figures 1, 2, and 3). The property includes portions of Sections 10, 11, 14, 15, 16, 20, 21, 22, 23, 26, 27, 28 and 33 Township 5 North, Range 10 West within Deer Lodge County.

1.1.3 Land Ownership and Public Access

The Dutchman is owned by ARCO Environmental Remediation, LLC (an affiliate of Atlantic Richfield). Figure 2 shows the surrounding landowners. Atlantic Richfield acquired the Dutchman from Ueland Ranches, Inc. in October 2004. As a component of the land transfer, a public access road easement to the Dutchman Pond access located on the northern side of the property (see Figure 5) was also established (see quick claim deed ownership transfer provided in Appendix C1 and Road Easement provided in Appendix C2). The road to the Dutchman Pond access location will be developed into a designated trailhead under this PMP. Historically, the Dutchman has been a part of the Ueland and Atlantic Richfield Block Management Area #49, under the FWP Program, and received 1,025 hunter days during the 2011-2012 big game and waterfowl seasons (FWP, 2012). Atlantic Richfield plans to continue to enter the Dutchman into the Block Management Program, but reserves it right to further restrict or prohibit public access in the future to meet land management objectives.

1.1.4 Site Conditions

The landscape is open grassland, wetland, and riparian habitat located along Warm Springs, Dutchman and Lost Creeks. Approximately two-thirds of the site is jurisdictional wetland (Figure 3). Within wetland areas, the emergent vegetation class (Cowardin et.al., 1979) was the most common (approximately 67%), followed by scrub-shrub (approximately 31%), and forested and aquatic bed (approximately 1% each).

1.1.5 Site Hydrology

Lost Creek originates west of the site and is the major hydrological influence within the northern half of the Dutchman. Warm Springs Creek also originates west of the site and borders the Dutchman along the south side of the site. Dutchman Creek daylights near the airport and is partially diverted by a dike that transfers water to Lost Creek as well as creates a pond on the upstream side of the dike at the Dutchman irrigation diversion dike.

Parent soil materials are provided by valley fill. The parent material is mostly calcareous (limestone) with alkaline areas common in the east. Organic material is high in the west due to a history of wet grasslands. No tailings are present on the site, but the soil has been impacted by historic emissions from the region's smelters, and EPA has designated much of the area as an HAA under the ARWW&S OU *Record of Decision* (ROD) (EPA, 1998).

1.1.6 Existing Wetlands Areas

The Dutchman contains jurisdictional wetlands that in 2011 covered approximately 2,409 acres (see Figure 3) of the 3,459 acre property. In 2011, the wetlands within the Dutchman had an average functional score (FEWA) of 2.78.

1.1.7 Anaconda Regional Water Waste and Soils Operable Unit

The Dutchman is located within the ARWW&S OU of the Anaconda Smelter National Priorities List (NPL) Site. The ARWW&S OU ROD (EPA, 1998) includes the Dutchman as a component of the North Opportunity Subarea. Later, as remedy designs progressed, the area comprised by the Dutchman became its own superfund subarea referred to as the Dutchman Creek HAA. The EPA and Montana Department of Environmental Quality (DEQ) classified the majority of land within the Dutchman as a designated HAA (see HAA boundary on Figure 2) because surficial soil arsenic concentrations exceeded the 1,000 milligrams per kilogram (mg/kg) open space/recreational/agricultural land use clean up level for arsenic established in the ARWW&S OU ROD (EPA, 1998). The ARWW&S OU remedy requirements for the Dutchman are described in the *Dutchman Creek High Arsenic Area Final Design Report* (EPA, 2012). The selected remedy for soils includes the HAA requirements for maintaining the existing vegetation cover, ICs, and long-term monitoring. The selected remedy for surface water includes monitoring and management activities of surface water within Warm Springs Creek along the southern boundary and Lost Creek along the northern boundary of the Dutchman. The selected remedy for groundwater includes groundwater monitoring within the North Opportunity Groundwater/Surface Water Technical Impracticability (TI) Zone in which the Dutchman is located (see TI Zone boundary shown on Figure 2).

1.1.8 Site Data

1.1.8.1 Wetlands Data

In 2011, Atlantic Richfield implemented the *Dutchman Riparian Lands Wetlands Assessment Work Plan* (Atlantic Richfield Company, 2011) which included extensive data collection on wetlands areas and upland areas within the Dutchman including the following:

- High resolution aerial imagery;
- Jurisdictional wetlands determination; and
- FEWA scoring.

The *Dutchman Riparian Lands Wetlands Mitigation Process Step 4 Confirmation of Response Actions* (Atlantic Richfield Company, 2012a) also contains historic and baseline wetland data collected from the Dutchman. Data collected in 2011 will serve as the baseline for comparison to future monitoring under this PMP.

1.1.8.2 Vegetation Baseline Data

As a component of the *Dutchman Riparian Lands Wetlands Assessment Work Plan* (Atlantic Richfield Company, 2011) fieldwork, supplemental vegetation data were collected to define a baseline for vegetation communities within the Dutchman (in 2011) that could be used for trend analyses and future decision making on the property. A total of 26 transect groups (see Figure 6) were established along with 139 existing individual, perpendicular 100 meter transects. Sample quadrats were placed at 10-meter increments along each transect for a total of 1,386 individual quadrats. Data recorded included photo logs, plant cover, plant biomass, plant diversity, nested belt transect/cover and diameter, and wildlife habitat. The location of these transects and individual data points were recorded such that these locations can be revisited. Data from the 2011 supplemental vegetation data collection effort appear in Appendix F in the *Supplementary Vegetation Data Report for the Dutchman Riparian Lands, Deer Lodge County, Montana* (Atlantic Richfield Company, 2012b).

Additional baseline soils and vegetation data have also been collected within the Dutchman as part of the ARWW&S OU Land Reclamation Evaluation System (LRES) process. Data from the Dutchman appear in the *Post-Remediation Land Reclamation Evaluation System (LRES) Study Results for the Dutchman Creek Area Located in the Anaconda Regional Water, Waste and Soil Operable Unit (*Atlantic Richfield Company, 2009).

1.1.8.3 Soil, Surface Water, and Groundwater Data

The *Dutchman Creek High Arsenic Area Final Design Report (*EPA, 2012) presents existing data, data summaries, and data analyses on surface water, groundwater, and soils within the Dutchman as it relates to the ARWW&S OU superfund remedy. These data will be used as the baseline for comparison of future monitoring data and management decisions.

1.2 Land Management Plan

Management requirements for the Dutchman are summarized below:

- SST OU CD Wetlands
  - Manage the Dutchman as a wildlife management area by protecting the existing wetlands and related habitat values into perpetuity; and
  - Monitor the Dutchman Creek Diversion structure for weeds, erosion, and general stability.

- ARWW&S OU HAA
  - Maintain permanent vegetative cover;
  - Implement ICs;
  - Monitor impacted media including soils, surface water, and groundwater; and
  - Comply with ARARs or "waived to" requirements.

Management activities for the Dutchman to protect wetland values include managing noxious weeds and soil erosion, and establishing ICs. To satisfy the ARWW&S OU HAA requirements, management activities include maintaining the permanent vegetative cover, monitoring soil/vegetation, and establishing ICs; while surface water and groundwater will be monitored separately. Management activities for groundwater and surface water within the Dutchman will be completed under the most current editions of the Anaconda Smelter NPL Site Groundwater Management Plan and Anaconda Smelter NPL Site Surface Water Management Plan. Therefore this PMP contains no further discussion of groundwater or surface water management, monitoring, and maintenance activities within the Dutchman related to water quality.

By managing noxious weeds and soil erosion within the Dutchman, Atlantic Richfield believes that existing vegetation communities and wildlife habitat will not only be maintained, but will improve over time. Maintaining the existing vegetative cover in both uplands and wetlands areas in current or better condition will enable the Dutchman to continue to meet ARARs. Therefore, the focus of the monitoring and maintenance activities under this PMP are as follows:

- Access: public access trailheads and the perimeter fence;
- Vegetation: annual qualitative inspections for weeds and five-year quantitative vegetation surveys;
- Erosion: Dutchman Creek, Dutchman Diversion, Lost Creek and Warm Springs Creek; and
- Wildlife: big game, water fowl, migratory birds, and threatened and endangered species.

1.2.1 Schedule

With the completion of the *Final Dutchman Riparian Lands Wetlands Mitigation Process Step 4 Confirmation of Response Actions* (Atlantic Richfield Company, 2012a) and the *Dutchman Creek High Arsenic Area Final Design Report (*EPA, 2012), the Dutchman is ready to enter the long-term management phase. Accordingly, Atlantic Richfield anticipates implementing this PMP in 2015 upon receipt of Agency comments and approval of the PMP.

1.2.2 Fire Suppression

The Lost Creek/Antelope Gulch Volunteer Fire Department (VFD) provides initial response to fire calls within the Dutchman. If necessary, the Montana Department of Natural Resources Conservation (DNRC) is the second fire agency dispatched. Trailheads, internal road locations, and secondary accesses will be communicated to the Lost Creek VFD and DNRC to improve fire response times and effectiveness.

1.2.3 Institutional Controls

The Dutchman includes ICs to control and inform public users of the site and ICs to protect wetland values and prohibit future development of the Dutchman, as required in the SST OU CD and in the *Dutchman Creek High Arsenic Area Final Design Report (*EPA, 2012).

1.2.3.1 Public Access Institutional Controls

Consistent with management of the Dutchman as a wildlife management area, Atlantic Richfield intends to allow non-motorized public recreational use of the Dutchman. Anticipated use includes access by hunters, hikers, fisherman, and general outdoor enthusiasts. Dutchman users will also include irrigation water users and Atlantic Richfield, EPA, DEQ, USFWS, Montana FWP, and other administrative personnel that will have walk-in or vehicle access, as necessary to properly monitor and maintain the property. To facilitate public access and also administrative access, this PMP designates three public access points: two public access points will be improved into established trailheads by Atlantic Richfield (see Figure 5) and the third access point is already an existing trailhead located on State of Montana property (managed by the Montana FWP). Other secondary access points are present in the Dutchman; however, the use of those accesses by the public or for administrative use will not be promoted, but will be available if needed.

Trailheads to be constructed and maintained by Atlantic Richfield are located as follows:

- Dutchman Pond Trailhead (north side); and
- Highway 48 Trailhead (south side).

The Dutchman Pond Trailhead location is on land owned by Atlantic Richfield with an existing public access easement in place (Appendix C2). The Highway 48 Trailhead is located on Atlantic Richfield property at an existing turn out on Highway 48, and no further easements or agreements are required to construct this trailhead.

Atlantic Richfield will develop and maintain the Highway 48 Trailhead and the Dutchman Pond Trailhead, if acquired, into permanent, year-round public access trailheads. Improvements to be developed and maintained at these facilities (see Figures 7 through 16) include the following:

- Gravel access road constructed to Anaconda-Deer Lodge County single lane gravel road specifications.
- Gravel parking area.
- Permanent handicap accessible restroom facility to be maintained monthly.
- Permanent information sign with Dutchman sitemap, information signs on HAA, use restrictions, information handouts, etc. This PMP does not specify the language on signs or information brochures to be provided. These items will be specified, reviewed, and approved by all appropriate parties once the trailheads are being constructed.
- Check in box.
- Walk-through handicap accessible gates to allow non-motorized public use.
- Locked metal gates to provide vehicular administrative access.

Atlantic Richfield will not improve or maintain the existing Montana FWP Warm Springs Trailhead located on the east side of the property just west of the Warm Springs Hospital facility. The location contains an access road, parking area, and information sign; Montana FWP maintains this trailhead.

1.2.3.2 Private Land Use Institutional Controls

Atlantic Richfield will establish through deed restrictions and other means (e.g., signage) permanent use restrictions that generally prohibit development of the Dutchman (see Deeds in

Appendix G) and protect wetland habitat, as required in the *Dutchman Creek High Arsenic Area Final Design Report (*EPA, 2012) including:

- Prohibiting motorized public use with use of signs located at access locations.
- Prohibiting future residential and commercial development.
- Prohibit new development of groundwater except as approved through amendment of the PMP.
- Restricting over grazing by cattle. Cattle grazing may be allowed in the future under this Property Management Plan as long as the intent of the grazing is to control vegetation biomass build up, suppress fire danger, or otherwise assist with management of the Dutchman. Grazing will also be managed such that over grazing does not occur. Installing and maintaining internal fences may be necessary if grazing is used in the future as a management tool. Refer to section 3.2.2.1 Grazing Management Plan for further details.

Once the deeds are executed and recorded, copies will be included in this PMP. This PMP and copies of the executed deeds will be maintained on file at the Atlantic Richfield offices located at 317 Anaconda Road, Butte, MT 59701. A duplicate copy will be maintained on file at the offices of the United States Department of the Interior, Fish and Wildlife Service located at 585 Shepard Way, Helena, MT 59601-6287.

1.2.4 Internal Fences

As requested by the USFWS during the June 19, 2012 meeting, Atlantic Richfield will remove all the old, dilapidated internal fences located within the Dutchman, including wire and wood fences, to the extent practical and safe without creating further land damage. Atlantic Richfield currently anticipates removing these internal fences during the first year this PMP begins. Figure 5 shows the internal fences to be removed, estimated at approximately 4 to 5 miles in length.

2.0 MONITORING

Site inspections and monitoring of the following areas (summarized in Table 1) will be conducted in accordance with this PMP:

- Access;
- Vegetation;
- Erosion; and
- Wildlife.

Determinations will be made on the overall condition of individual components. Recommendations for actions of the individual constituents will be as follows:

1. **No action required.** Site is in good condition and no actions are necessary in the near future.
2. **Minor action required** (e.g., weed spraying, fence repair, etc.). Site is relatively stable and only minor actions are required in the near future.

3. **Some action required.** Site requires some evaluation in order to make best management decisions for corrective action(s) of identified problems. Site maintenance activities may be necessary.
4. **Significant action required.** Site maintenance activities are necessary or previous corrective actions have been ineffective and maintenance is required in the near future.

Site inspections will require completing standardized inspection forms (Appendix E) and include a photographic record and Global Positioning System (GPS) coordinates (when appropriate). These photographs will be in addition to the permanent photographic points to be collected under vegetation monitoring. Photos will allow for comparison of conditions over time.

Site inspections will include an inspection form (Appendix E) and a site inspection map. Site inspectors will identify any items needing maintenance and document the item on the form. The map will assist in locating the deficiencies during maintenance and referencing problem areas in the annual report and during future inspections.

The monitoring schedule will be as follows:

- Access: Monitor public access points quarterly or after receiving a complaint or being informed of a deficiency. Monitor the perimeter fence lines quarterly or upon notice of a breech in the fence or of cows being in the Dutchman.
- Vegetation: Complete qualitative noxious weeds inspections annually. Complete quantitative vegetation monitoring every five years in advance of the five-year review.
- Erosion: Monitor streambanks within the Lost Creek, Dutchman Creek, and Warm Springs Creek corridors annually following spring runoff and high water.
- Wildlife: Monitor wildlife annually. The anticipation is that the wildlife monitoring frequency may be reduced after five years of annual wildlife monitoring.

2.1 Access

Access monitoring includes monitoring of designated trailheads and the existing perimeter fence network that excludes cattle from entering the property.

2.1.1 Trailheads

A qualitative inspection of trailheads will occur quarterly each year. The inspection will include checking access points for vehicle tracks, livestock grazing, unauthorized access, vandalism, and other items at the Dutchman Pond and the Highway 48 Trailheads; checking signs and updating and/or replacing them as necessary; and checking gates and locks. Atlantic Richfield will not monitor the Warm Springs Trailhead located on state of Montana property; the Montana FWP manages that trailhead.

2.1.2 Perimeter Fence

All perimeter fences will be monitored quarterly to control livestock ingress into the Dutchman and to manage public access (Figure 5). Inspections would take place during the months of

January (prior to February calving season on neighboring and adjoining ranches), April, July, and October, or as weather and snow conditions allow.

2.2 Vegetation Monitoring

Vegetation monitoring is required within the Dutchman to properly manage and maintain the site. Qualitative monitoring for noxious weeds will be conducted annually by Atlantic Richfield or designee to collect data necessary for weed management and vegetation assessments will be completed every five years per the ARWW&S OU Vegetation Management Plan, as further discussed below.

2.2.1 Noxious Weed Inspection

Weeds present on the Dutchman must be managed. The most common on the property include Canada thistle, spotted knapweed and whitetop. Non-native grass species (i.e., redtop, smooth brome) are prevalent within the Dutchman boundary and are generally not considered problematic. Appendix D contains the noxious weed species designated by the State of Montana and Anaconda-Deer Lodge County. Atlantic Richfield will meet with the Deer Lodge County Weed District prior to May 1 of each year to review the weed list and determine if any new species have been added.

Noxious weeds inspection could require several surveys per year during the first years of management and, depending on control results, become less frequent in subsequent years. Initial years would require a general walk-through survey, targeting areas where State and County listed noxious weeds appeared in the 2011 fieldwork. Subsequent visits to the Dutchman (e.g., access, wildlife, and vegetation) would map other weed populations as they are located, that can be monitored and/or treated. All populations will be delineated by recording GPS coordinates.

Atlantic Richfield will conduct qualitative weed inspections of the Dutchman during the first two weeks of June, focusing on the species whitetop which must be treated early. Knapweed and Canada thistle bud later and can be inspected later. For the first few years, weed inspections will focus on whitetop, knapweed, and thistle with the focus changing to other weed species less prevalent on the Dutchman as the primary weeds are controlled. Appendix E contains forms for completing the weed inspections. During the qualitative weed inspections, permanent photo points will be established and photo-documented annually. There will be 23 initial data points, with photo points located at the first point of each transect established during 2011 survey (i.e., 1A, 2A, 24AA). The photo will be taken in the transect direction (Figure 6).

Weed spraying methods will be consistent with methods used on the Anaconda Smelter NPL Site and in compliance with all applicable local, state and federal laws and regulations as well as the chemical manufacturer's specification, requirements and recommended application rates.

2.2.2 Five Year ARWW&S OU Vegetation Management Plan Monitoring

The Dutchman is located within the ARWW&S OU superfund site and within a designated HAA. As a component of the HAA, vegetation must be monitored to demonstrate that a permanent vegetative cover is being maintained within the HAA. This will be determined by conducting vegetation monitoring under the ARWW&S OU Vegetation Management Plan every five years, to support the five-year reviews to be conducted by EPA and Atlantic Richfield, in addition to the annual noxious weed inspections described in Section 2.2.1. The Dutchman is considered a Category 5 property under the ARWW&S OU Vegetation Management Plan and will be monitored accordingly.

2.3 Erosion Monitoring

Erosion monitoring tasks will focus on existing waterways within the Dutchman and consist of annual, qualitative streambank inspections and additional inspection tasks and/or more frequent inspections as determined by Atlantic Richfield to account for site-specific factors, weather conditions, floods, or unforeseen circumstances. The annual, qualitative inspection will take place along the Dutchman Dike and associated irrigation channel, Dutchman Creek below the Dutchman Dike, and Warm Springs Creek and Lost Creek within the Dutchman (see Figure 4).

2.4 Wildlife Monitoring

Atlantic Richfield will survey big game populations and all birds protected by the Migratory Bird Treaty Act, annually. Big game observations will occur once in the spring, anticipated in April, along six designated transects (Figure 3) that cross the site. Observers will note richness (number of species), breeding density (number of breeding pairs by species), and spatial and habitat-use (mapped use relative to habitat types). During all fieldwork, observers will also note any Federal- or state-sensitive, rare, threatened, or endangered species. Depending on weather, snow, high water, or other factors, observers may not walk every lineal foot of each transect. Generally, the intent is to use the six designated transects to collect wildlife and migratory bird numbers in the same areas annually. Migratory bird surveys will occur in April (coinciding with big game surveys in April) to June (during nesting season) along the wildlife transects and within the Dutchman Pond. An additional migratory bird survey of just the Dutchman Pond will occur in October during fall migration. This additional migratory bird monitoring will only be completed within the Dutchman Pond and will note migratory birds using the general area. Due to the mobility of wildlife and migratory birds, wildlife data will be recorded on aerial photographs and within logbooks.

The anticipation is that over time, the frequency of wildlife surveys/monitoring (initially annually) will decrease as baseline information is developed. The frequency of monitoring will be a topic for discussion during five-year reviews, and the frequency for wildlife monitoring may be reduced to one survey every five years (or less).

3.0 MAINTENANCE

Site maintenance activities will address deficiencies found during site monitoring (Section 2.0) including access, vegetation, and erosion. Atlantic Richfield does not anticipate any maintenance activities required due to wildlife monitoring.

3.1 Access Maintenance

3.1.1 Trailheads

Based on the qualitative analysis form completed during inspections, sites requiring maintenance will be scheduled for corrective measures as soon as reasonably possible. Potential maintenance tasks may include repairing fences, repairing vandalism, road grading, parking lot grading, sign repair or replacement, fence or gate repair, restroom repair, etc. Atlantic Richfield and regulatory agencies will determine and approve additional repairs that may become necessary.

3.1.2 Perimeter Fence

Atlantic Richfield or designee monitoring the perimeter fence can make necessary repairs if possible, otherwise the repairs will be scheduled as soon as reasonably possible. If Atlantic Richfield or designee find cattle on the Dutchman, they will immediately notify the owner to remove the livestock and then locate the breach in the fence(s).

3.2 Vegetation Maintenance

3.2.1 Noxious Weed Control

Based on information received from monitoring activities, Atlantic Richfield or designee will spray State-listed Priority 1 and 2 species as well as those added by the Anaconda-Deer Lodge County Weed District (Appendix D). In the early years of spraying, priority will be given to whitetop, knapweed and thistle areas that contain in excess of 20% cover and are larger than 200 square feet. Small, less established populations will also be sprayed as weeds are brought under control on the property. As small weed patches are identified, they will be added to the spray list. The spraying will target areas with less than 20% cover showing expansion into outlying areas or areas along perimeter fences expanding into the Dutchman.

The most cost effective method of treating weed populations is with chemicals. Plant species, time of year, and ground conditions (high water table) dictate the herbicide used. Multiple and varied applications may be necessary. Generally, annuals such as whitetop must be treated early (late spring and early summer), while other species, such as leafy spurge, are best treated in the fall. Weed spraying procedures will be in accordance with the latest technology and accepted practices and in accordance with all local and federal regulations. In time, biological measures could become available. Atlantic Richfield may implement these on the recommendation of the local weed district or technology advancement. Mechanical treatments (pulling, tilling, and mowing) will be used infrequently because of their limited long-term effectiveness and access issues.

When Atlantic Richfield or designee observe weeds on adjacent lands, Atlantic Richfield will communicate the location and type of weeds observed to the local weed district personnel such that the weed district personnel can coordinate with adjacent property owners to treat the weeds on their property. This will help minimize weed invasion from adjacent areas into the Dutchman.

3.2.2 Vegetation Maintenance

Atlantic Richfield does not expect that any maintenance activities (i.e., seeding, disking, planting, etc.) will be required as a result of qualitative five-year vegetation monitoring. It is Atlantic Richfield's intent that through the noxious weed control measures and the continued exclusion of over grazing by cattle, vegetation within the Dutchman will only improve over time. However, if vegetation maintenance is required, Atlantic Richfield and regulatory agencies will develop and approve a work plan for maintenance.

3.2.2.1 Grazing Management Plan

Atlantic Richfield believes grazing is an acceptable vegetation management tool for the Dutchman. Atlantic Richfield is not intending to graze the Dutchman to the extent of previous owners or on a full time basis, rather, Atlantic Richfield requests that a managed grazing approach be allowed as an additional land management tool within the Dutchman. Atlantic Richfield believes that controlled grazing would help with litter buildup and suppressing fire danger. Prior to any grazing implemented, Atlantic Richfield would submit to the USFWS for review a detailed Grazing Management Plan with the number, location, rotation and monitoring/management requirements specific to the gazing season. This includes providing USFWS with the stocking rate, internal fence locations, and timing duration of grazing. All Dutchman perimeter and internal fences will be constructed under the guidelines described in *A Landowner's Guide to Wildlife Friendly Fences: How to Build Fence with Wildlife in Mind Second Editions* (Paige C., 2012). The details are not included in this PMP at this time, but will be developed and approved as an amendment to this PMP prior to implementing the Grazing Management Plan.

3.3 Erosion Maintenance

Erosion control is associated with streambanks. With removal of cattle, streambank erosion and degradation is not expected to be an issue. The water courses are dynamic, moving laterally across the landscape due to natural erosion and depositional events as well as beaver activity. Atlantic Richfield will address accelerated erosion due to unnatural events such as failure of the Dutchman irrigation structure or culverts. Natural stream migration caused by erosion/ depositional and beaver activities will not be controlled unless the stream migration will eventually cause other, more significant issues.

Based on qualitative surveys to be completed annually, Atlantic Richfield will review areas recommended for streambank stabilization with Agency personnel. Prior to any maintenance efforts, a Work Plan would be developed and approved by Atlantic Richfield and regulatory agencies as an amendment to this PMP. Actions will be implemented by Atlantic Richfield following the recession of high waters after spring runoff and timed to minimize excess erosion.

3.4 Wildlife Maintenance

Atlantic Richfield does not anticipate any maintenance activities required due to wildlife monitoring. If a wildlife-related maintenance item is determined necessary, Atlantic Richfield and regulatory agencies will review and approve the item.

4.0 REPORTING

Following implementation of the PMP, Atlantic Richfield will complete the annual reports detailing the previous year's activities by June the following year. The reports will include locations, monitoring dates, site inspections, and management efforts undertaken as well as specific monitoring data. The annual report will provide an assessment of the success of actions taken as well as recommendations for the upcoming year. Annual reports will be prepared and copies distributed to the EPA, USFWS, Montana DEQ, and Montana FWP.

5.0 REFERENCES

Atlantic Richfield Company. 2013. Final Dutchman Riparian Lands Wetlands Mitigation Process Step 4 Confirmation of Response Actions. Butte, MT. Prepared by Pioneer Technical Services, Butte, MT. February 8, 2013.

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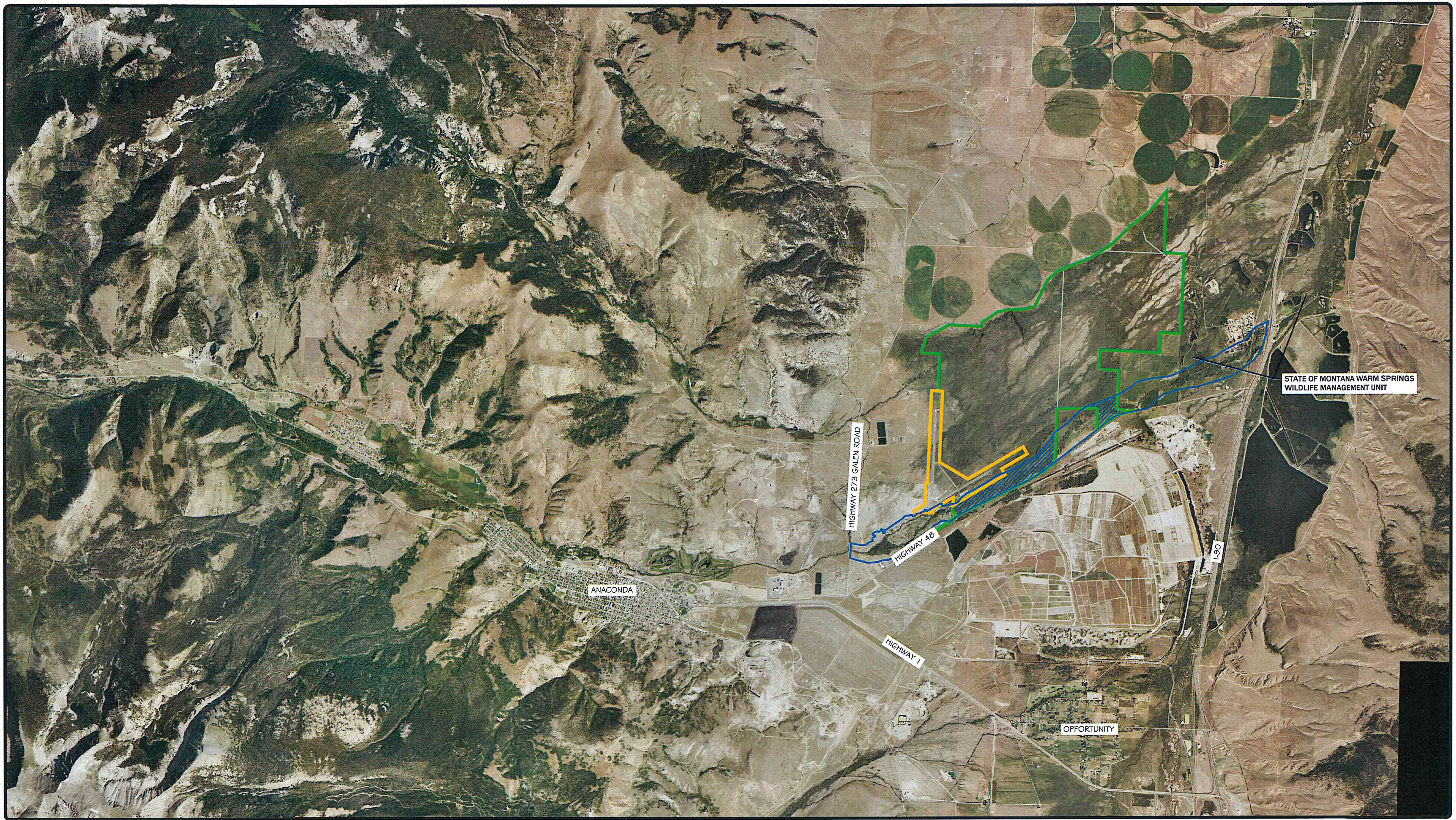
FIGURES



LEGEND

- DUTCHMAN PROPERTY BOUNDARY
- WETLANDS PART OF RDU 10 WARM SPRINGS CREEK WAS NOT ASSESSED UNDER THE 2011 WORK PLAN
- AIRPORT PROPERTY BOUNDARY (COS 420A)

N

DISPLAYED AS:	
COORD SYS/ZONE:	MSP
DATUM:	NAD83
UNITS:	FEET
SOURCE:	2011 NAIP AERIAL

SCALE IN FEET
0 3000 6000

FIGURE 1

PIONEER
TECHNICAL SERVICES, INC.
307 E. PARK AVE., SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DUTCHMAN
SITE LOCATION
MAP

DATE: 4/15/13

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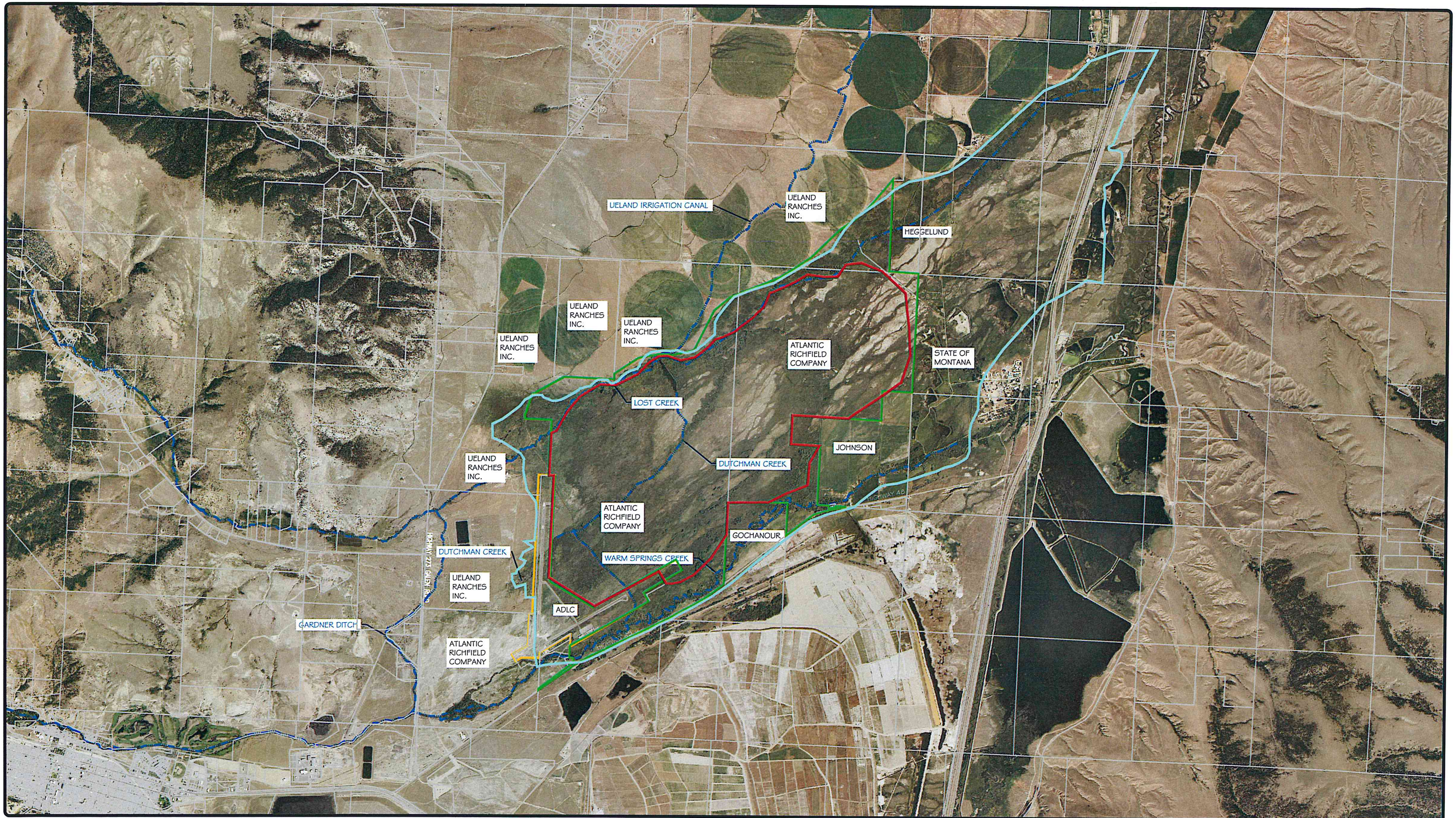


LEGEND

- WATER WAYS
- PROPERTY BOUNDARIES
- DUTCHMAN PROPERTY BOUNDARY
- AIRPORT PROPERTY BOUNDARY (COS 420A)
- DUTCHMAN HIGH ARSENIC BOUNDARY
- NORTH OPPORTUNITY GROUNDWATER TI ZONE BOUNDARY

N

DISPLAYED AS:	
COORD SYS/ZONE:	MSP
DATUM:	NAD83
UNITS:	FEET
SOURCE:	2011 NAIP AERIAL

SCALE IN FEET
0 2000 4000

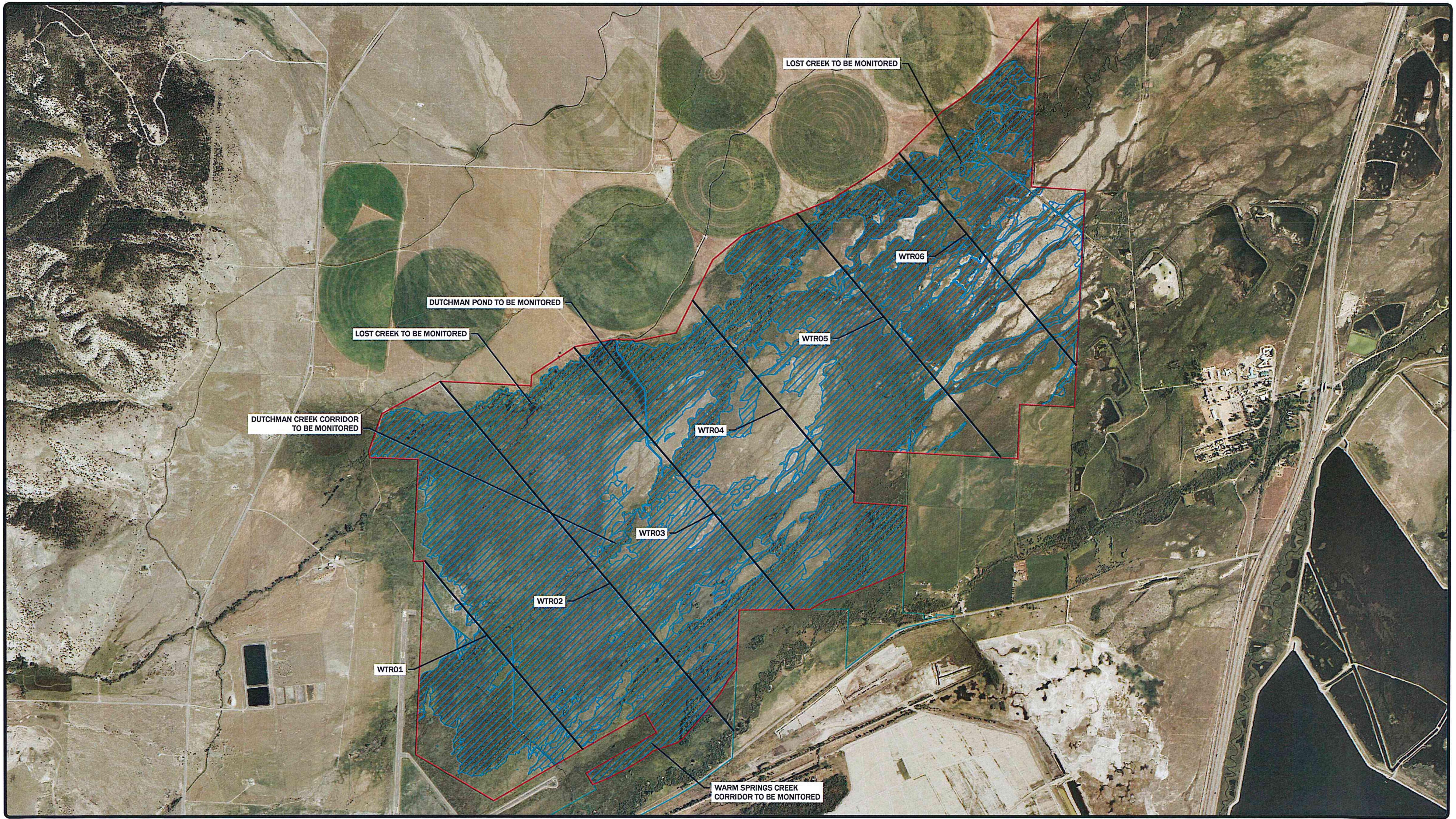
FIGURE 2

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE., SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DUTCHMAN SITE MAP

DATE: 4/15/13

2/24/2015 4:04:49 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-PLN-002-12.DWG



LEGEND:

2011 WETLAND BOUNDARIES = 2,409 ACRES

2011 ASSESSMENT AREA BOUNDARIES = 3,459 ACRES

WILDLIFE SURVEY TRANSECTS

NOTE:
WTR: STANDS FOR WILDLIFE TRANSECT.

N

DISPLAYED AS:	
COORD SYS/ZONE:	MSP
DATUM:	NAD83
UNITS:	FEET
SOURCE:	2011 AES AERIAL

SCALE IN FEET
0 1100 2200

FIGURE 3

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE., SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DUTCHMAN WETLANDS AREA/ WILDLIFE SURVEY

DATE: 4/15/13

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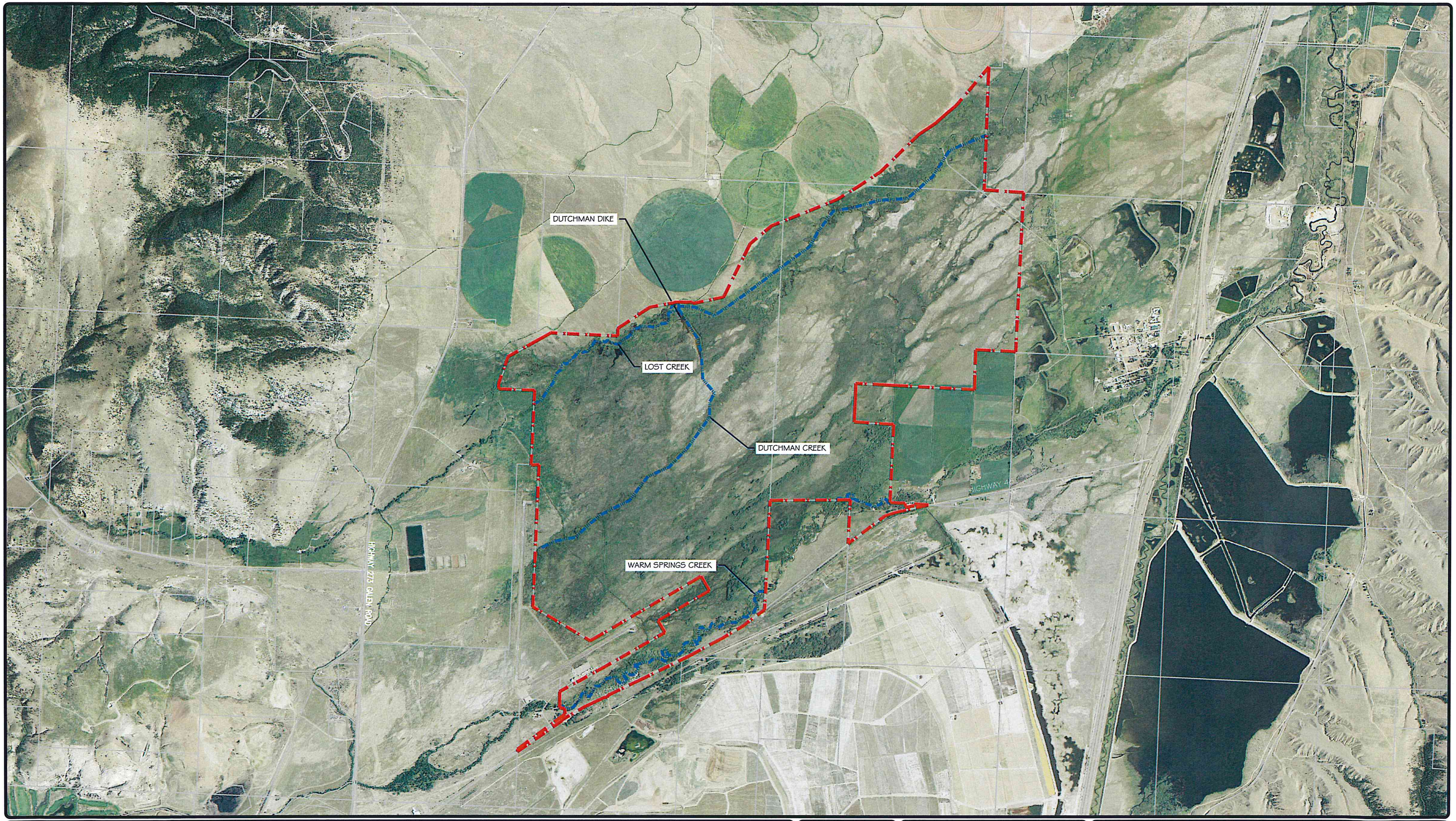


LEGEND

DUTCHMAN HIGH ARSENIC BOUNDARY

WATER WAYS

N

DISPLAYED AS:	
COORD SYS/ZONE:	MSP
DATUM:	NAD83
UNITS:	FEET
SOURCE:	2011 NAIP AERIAL

SCALE IN FEET
0 1500 3000

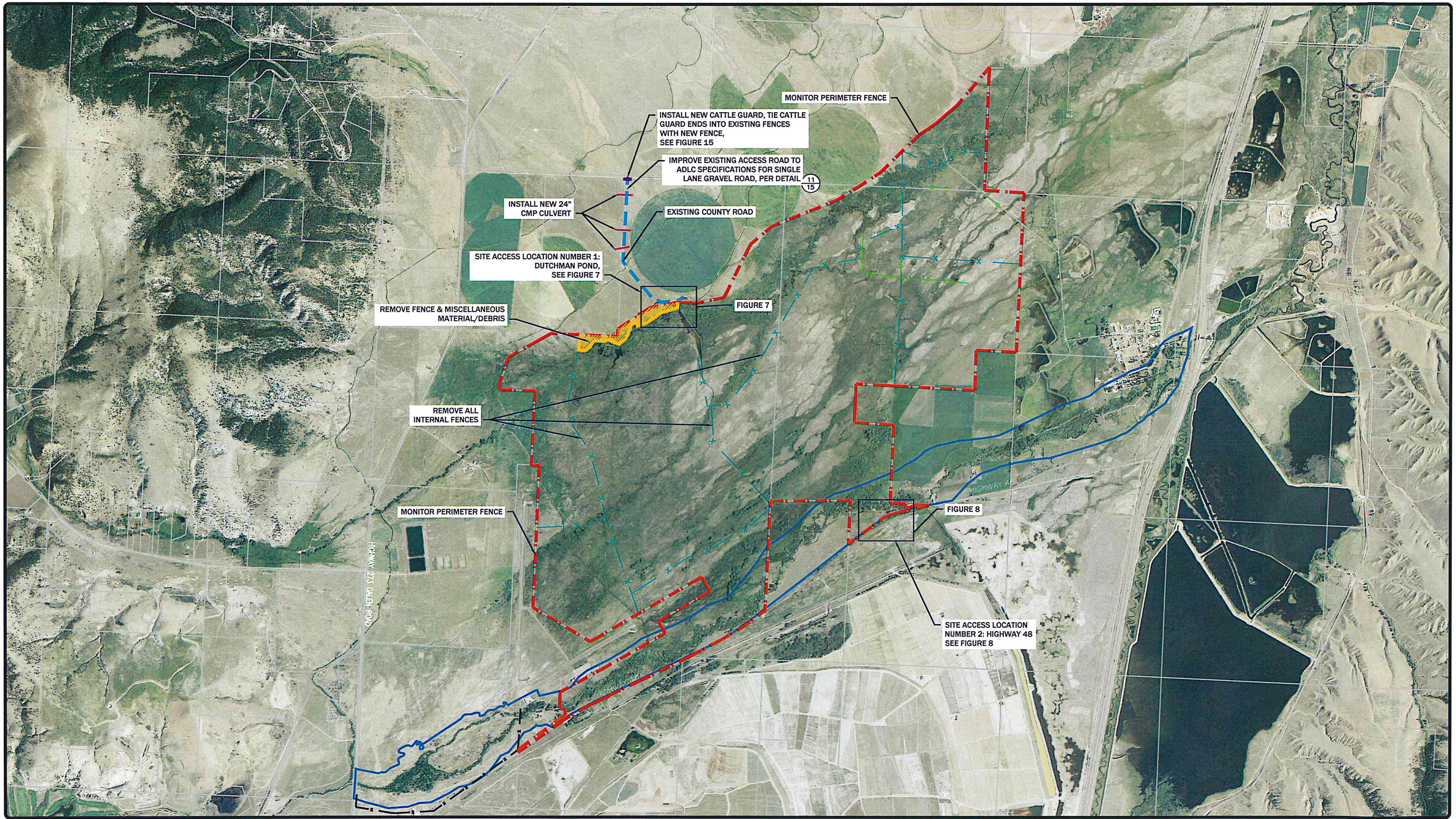
FIGURE 4

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE., SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DUTCHMAN EROSION MONITORING LOCATIONS

DATE: 4/15/13

3/6/2015 11:18:23 AM \\192.168.247.13\PROJECT$\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-PLN-008-12.DWG



LEGEND

- RDU 10 BOUNDARY
- PERIMETER FENCE TO BE MONITORED
- INTERNAL BARBED WIRE FENCE TO BE REMOVED
- INTERNAL JACK LEG FENCE TO BE REMOVED
- EXISTING FENCE
- PROPOSED CMP CULVERT
- PROPOSED CATTLE GUARD
- MISCELLANEOUS MATERIAL/DEBRIS REMOVAL

N

DISPLAYED AS:

COORD SYS/ZONE:	MSP
DATUM:	NAD83
UNITS:	FEET
SOURCE:	2011 NAIP AERIAL

SCALE IN FEET
0 1500 3000

FIGURE 5

DUTCHMAN ACCESS AREAS

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE., SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DATE: 4/15/13

2/24/2015 4:45:33 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-PLN-004-12-2.DWG

LEGEND:

TRANSECTS

PHOTO DOCUMENTATION POINTS

SAMPLING POINTS

DUTCHMAN PROPERTY BOUNDARY

NOTE:
VTR: STANDS FOR VEGETATION TRANSECT

N

DISPLAYED AS:	
COORD SYS/ZONE:	MSP
DATUM:	NAD 83
UNITS:	FEET
SOURCE:	2011 NAIP AERIAL

SCALE IN FEET
0 1500 3000

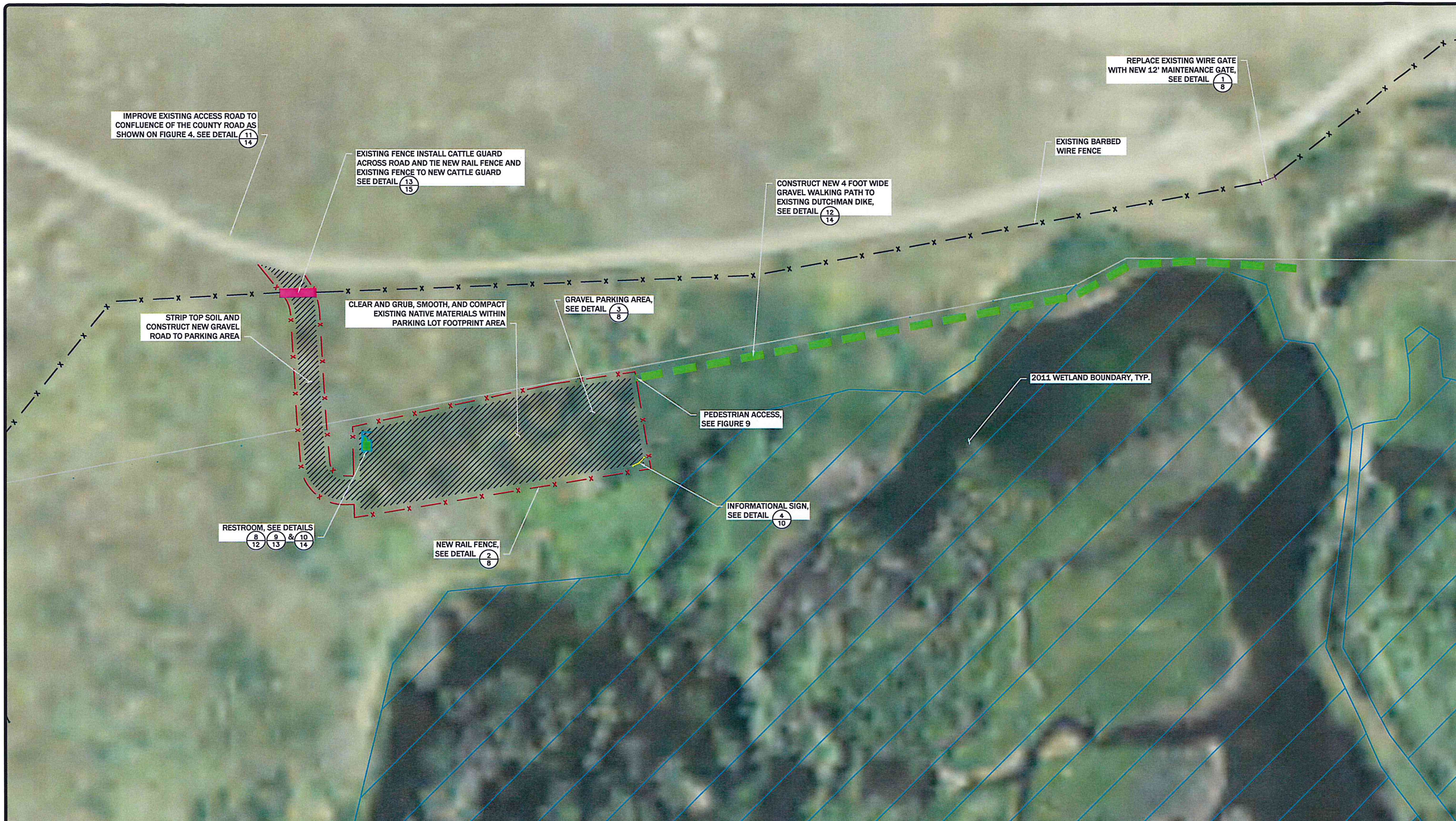
FIGURE 6

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE., SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DUTCHMAN VEGETATION MONITORING

DATE: 4/15/13

2/24/2015 3:25:17 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-PLN-005-12.DWG



RAIL FENCE	12' MAINTENANCE GATE
GRAVEL PARKING	PEDESTRIAN ACCESS
RESTROOM	PROPOSED WALKING PATH
INFORMATIONAL SIGN	EXISTING BARBED WIRE FENCE
CATTLE GUARD	2011 WETLAND BOUNDARY

N

DISPLAYED AS:
COORD SYS/ZONE: MSP
DATUM: NAVD 88
UNITS: FEET
SOURCE: AES

SCALE IN FEET
0 20 40

FIGURE 7

DUTCHMAN POND TRAILHEAD

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DATE: 4/15/13

2/24/2015 3:26:58 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-PLN-006B-12.DWG

—x—	PROPOSED RAIL FENCE
////	GRAVEL PARKING
	RESTROOM
	INFORMATIONAL SIGN
	12' METAL ACCESS GATE
	PEDESTRIAN ACCESS
—x—	EXISTING BARB WIRE FENCE
—TEL—	EXISTING TELEPHONE LINE
—WTR—	EXISTING WATER LINE

N

DISPLAYED AS:
COORD SYS/ZONE: MSP
DATUM: NAVD 88
UNITS: FEET
SOURCE: AES

SCALE IN FEET
0 20 40

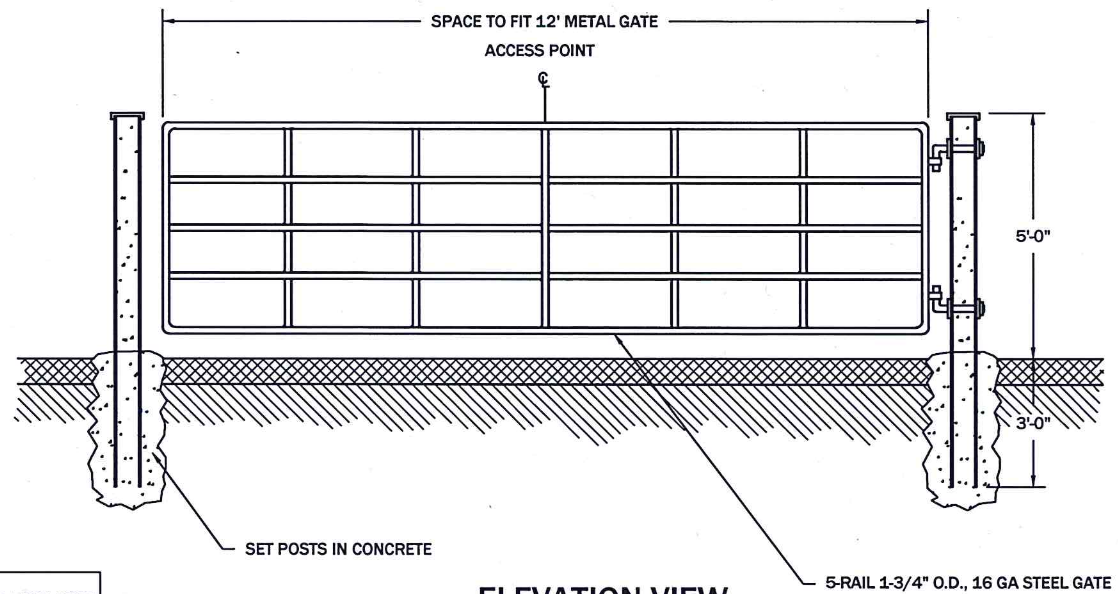
FIGURE 8

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DUTCHMAN HIGHWAY 48 TRAILHEAD

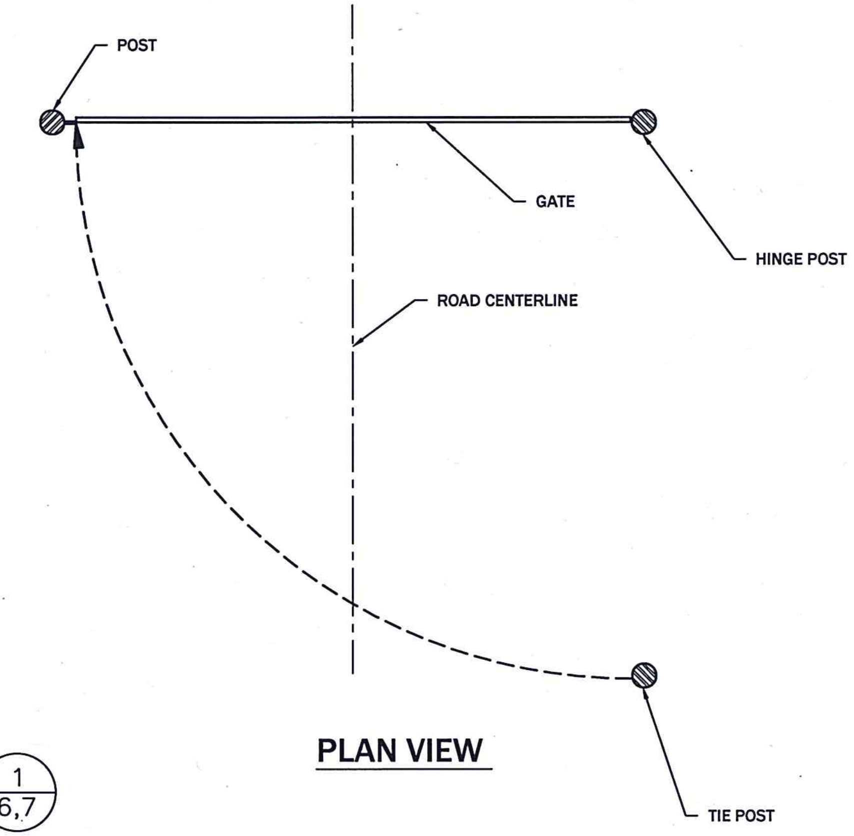
DATE: 4/15/13

2/24/2015 3:28:27 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-PLN-007B-12.DWG



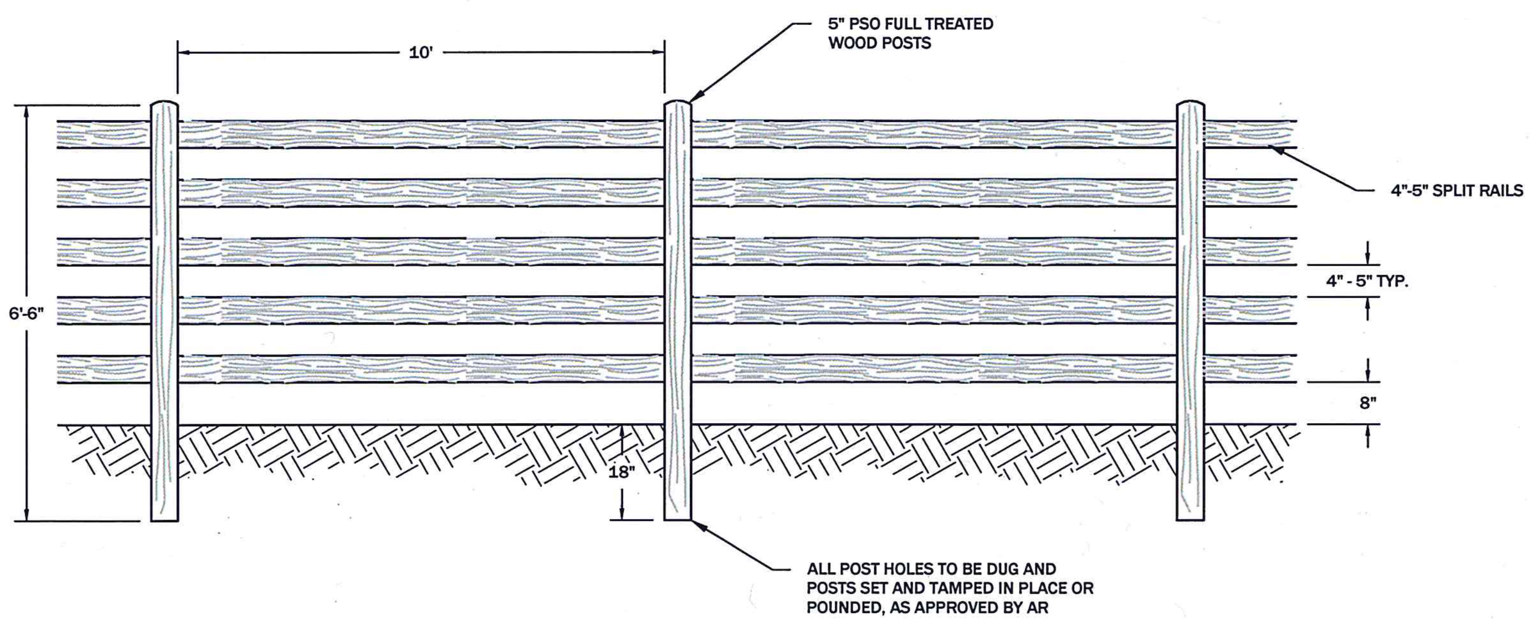
ELEVATION VIEW

GATE NOTES:
1. ENSURE HINGE POST AND LOCK POST ARE STRAIGHT AND VERTICAL.
2. GATE COLOR SHALL BE BROWN.
3. INSTALL END CAPS ON STEEL POSTS.
4. PAINT POSTS TO MATCH GATE.
5. INSTALL TEMPORARY CHAIN TO KEEP GATE CLOSED.

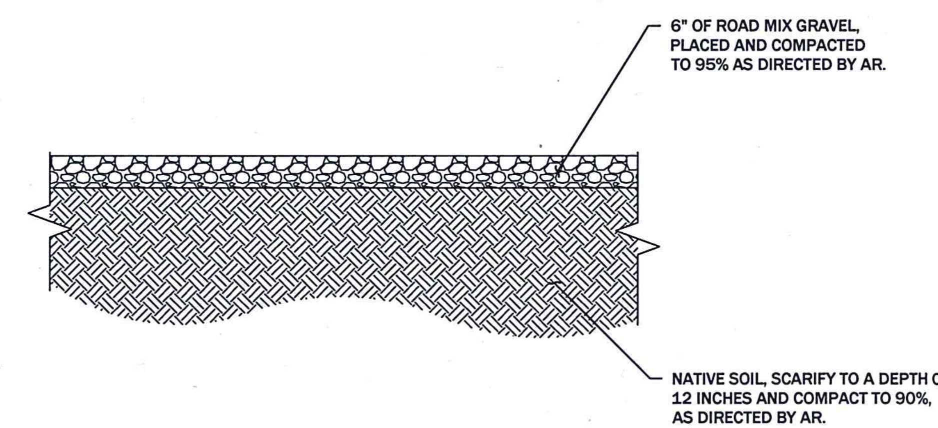


PLAN VIEW

12' SINGLE METAL GATE INSTALLATION DETAIL 1 / 6,7



SPLIT RAIL FENCE DETAIL 2 / 6,7



GRAVEL PARKING LOT SECTION 3 / 6,7

DISPLAYED AS:	
COORD SYS/ZONE:	NA
DATUM:	NA
UNITS:	FEET
SOURCE:	PIONEER

SCALE IN FEET
0 NTS

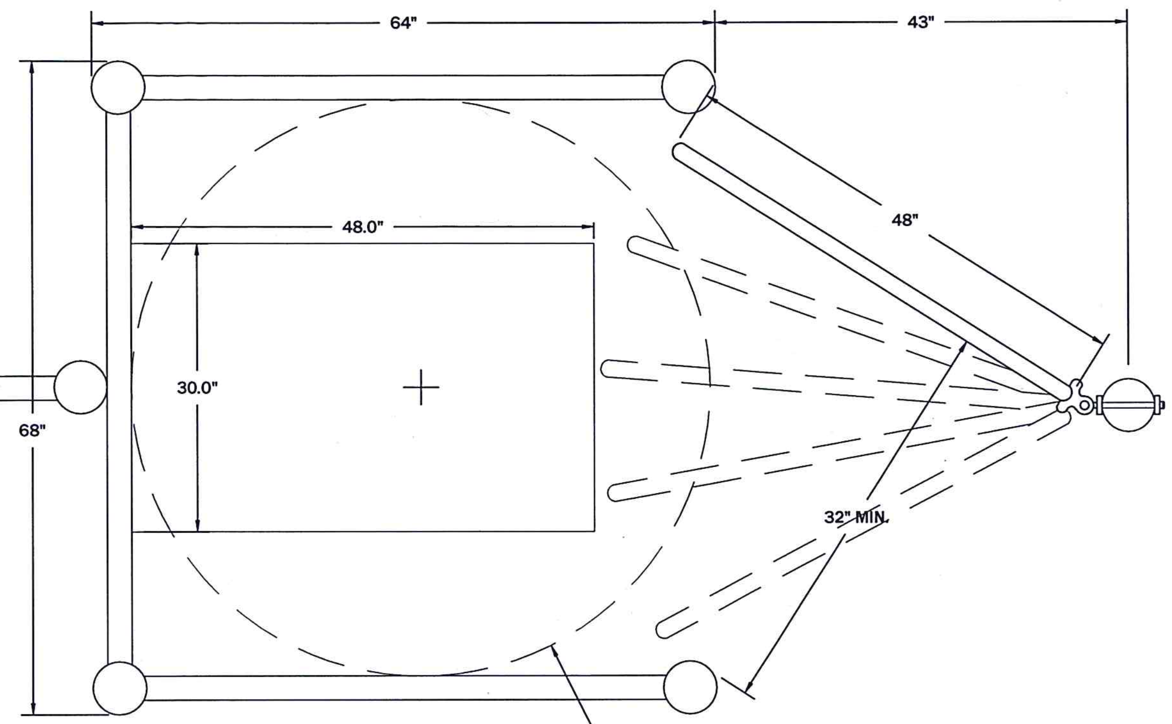
FIGURE 9

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

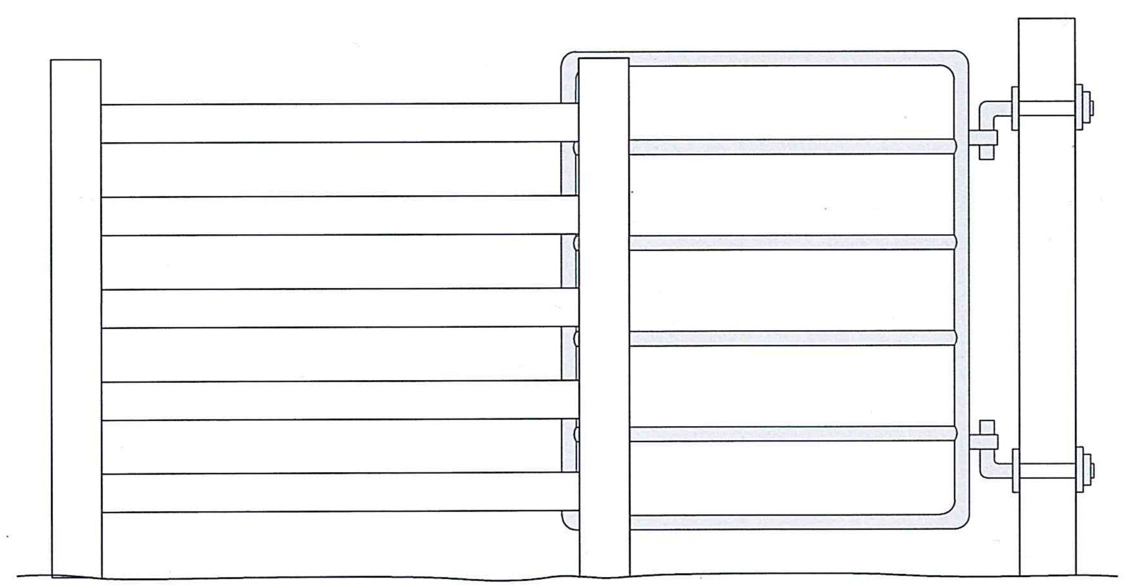
DUTCHMAN FENCE, GATE AND PARKING LOT DETAILS

DATE: 4/15/13

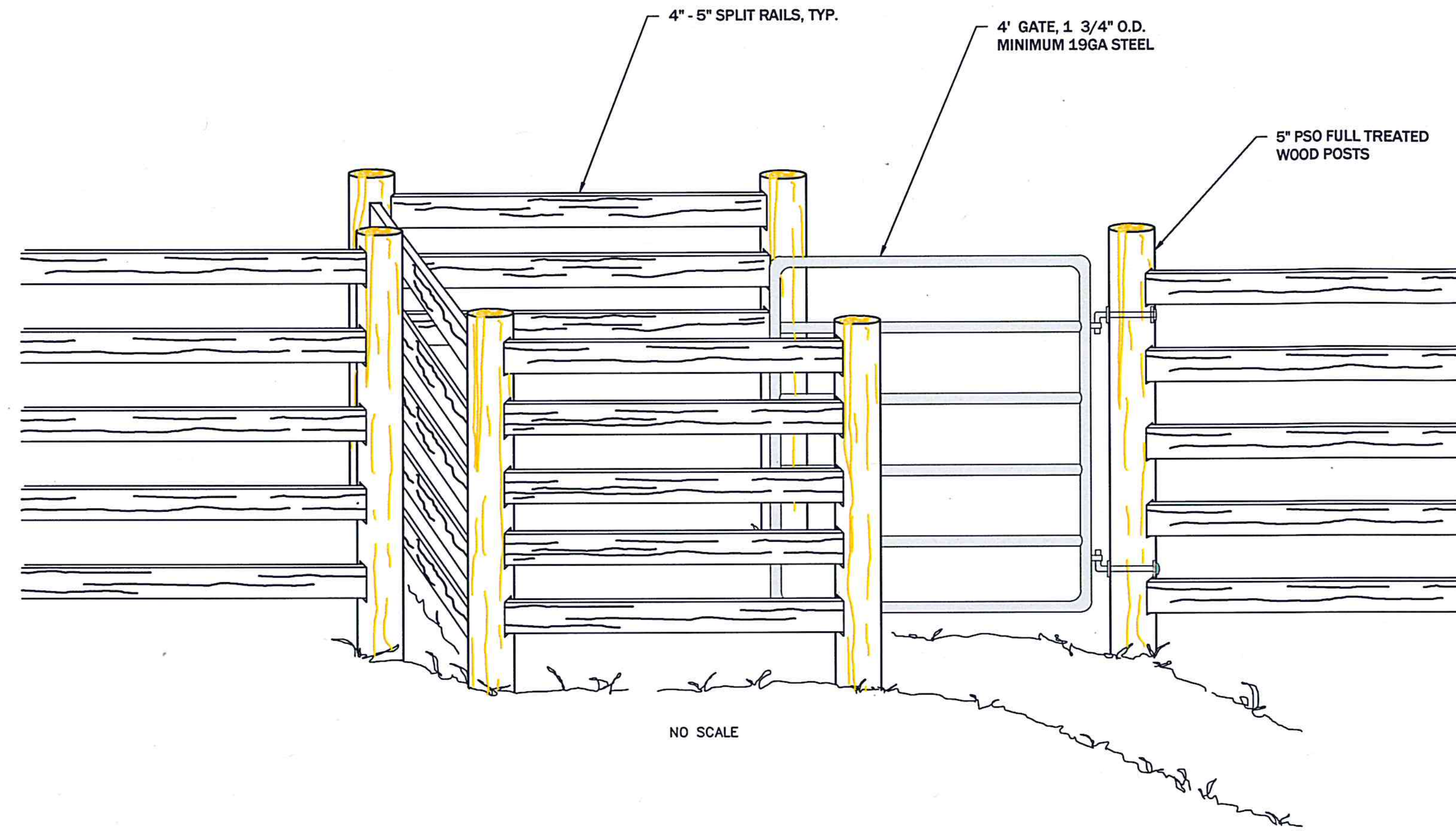
2/24/2015 3:30:10 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-DET-001-12.DWG



PLAN VIEW



ELEVATION VIEW



NO SCALE

NOTES:

1. INSIDE DIMENSIONS ARE MINIMUM CLEAR DISTANCES REQUIRED TO MEET ACCESSIBILITY STANDARDS.
2. THESE DRAWINGS ARE TYPICAL DRAWINGS AND MAY REQUIRE MINOR MODIFICATION FOR INSTALLATION.
3. ADAPTED FROM THE SCOTTISH NATIONAL HERITAGE TIMBER KISSING GATE.

UNLESS OTHERWISE SPECIFIED	DATE	REVISION	BY
TOLERANCES: FRACTIONS +/- ___ DECIMALS +/- ___ ANGLES +/- ___ DIMENSIONS ARE IN INCHES BREAK SHARP EDGES		U. S. DEPT. OF AGRICULTURE FOREST SERVICE	
DRAWN D.MUCCI	TITLE	TIMBER KISSING GATE FOR WHEELCHAIR ACCESSIBILITY	
DESIGNED J.GROENIER			
CHECKED J.GROENIER			
APPROVED J.GROENIER			
SCALE 1/8 & NOTED			
DATE NOV 2005	SHEET ___ OF ___		

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: FEET
SOURCE: USFS

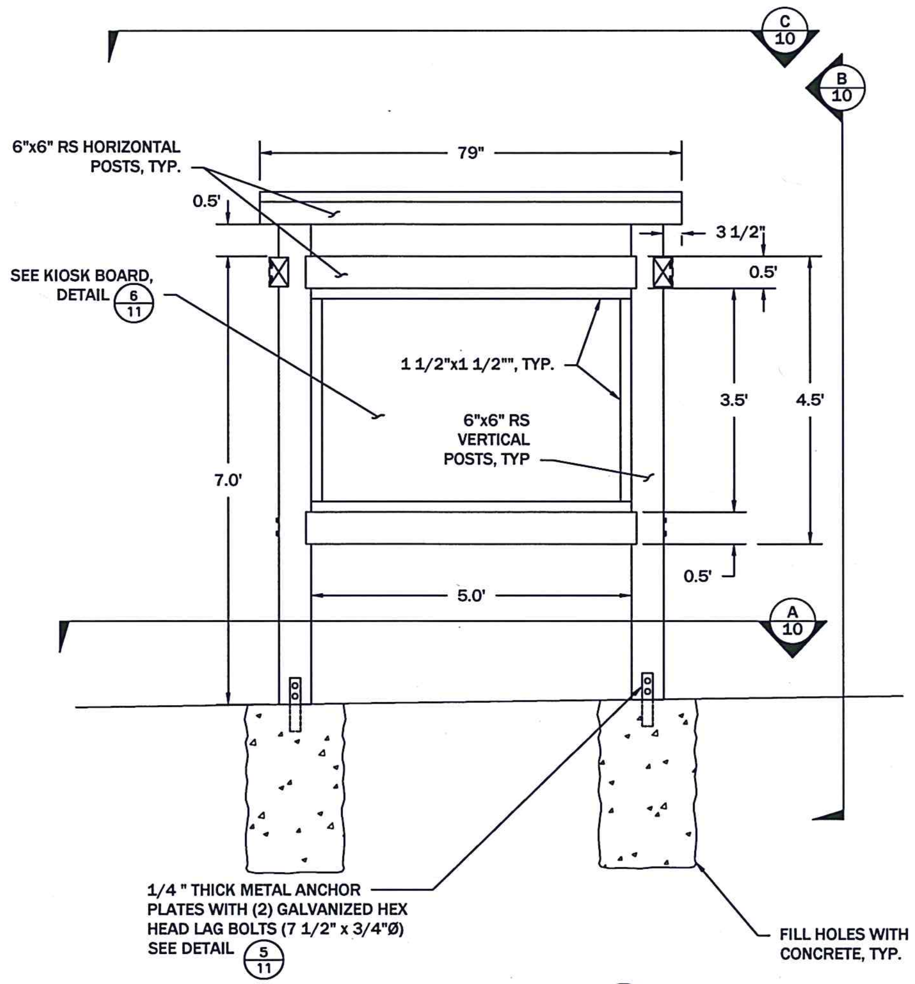
SCALE IN FEET
0 NTS

FIGURE 10

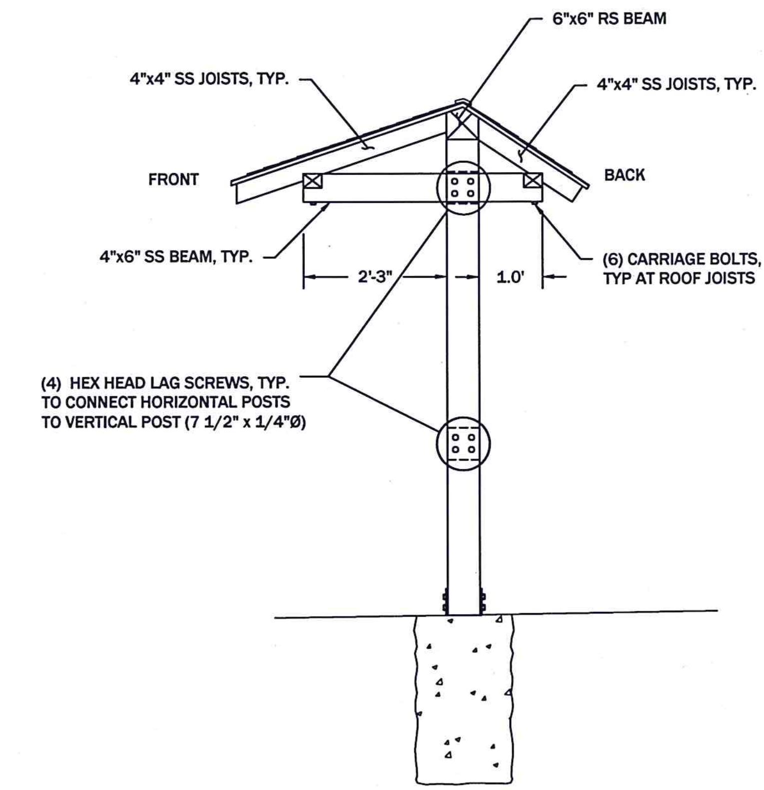
DUTCHMAN PEDESTRIAN ACCESS DETAILS

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

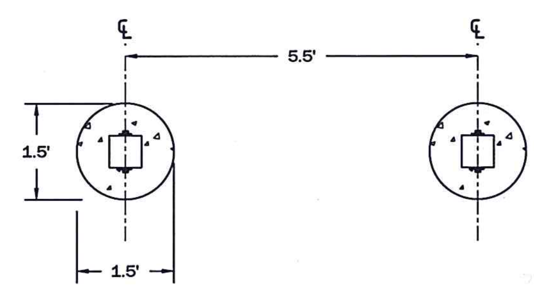
DATE: 4/15/13



PANEL KIOSK 4 / 6,7

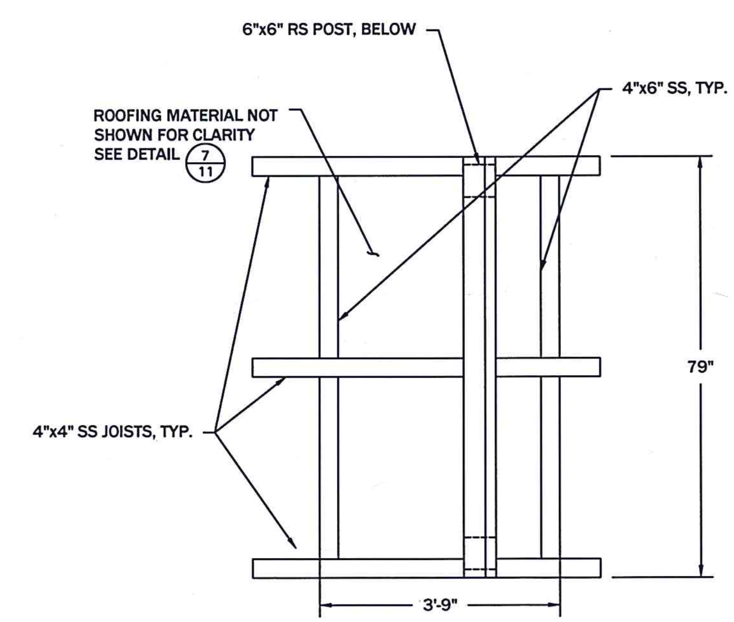


KIOSK SECTION B / 10



PANEL KIOSK SECTION A / 10

POST PLACEMENT



KIOSK TOP VIEW C / 10

NOTES
1. RS INDICATES ROUGH SAWN LUMBER.
2. SS INDICATES SOLID SAWN LUMBER.

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: FEET
SOURCE: PIONEER

SCALE IN FEET
0 NTS

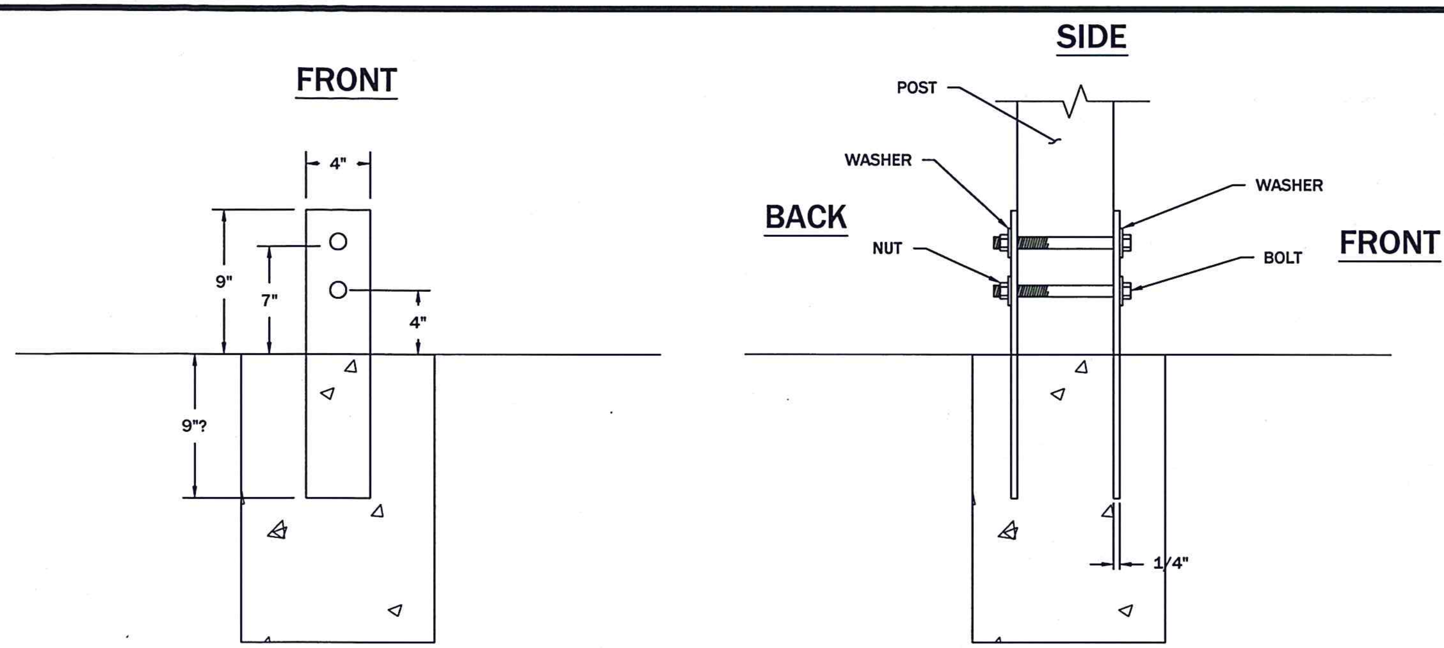
FIGURE 11

DUTCHMAN KIOSK DETAILS

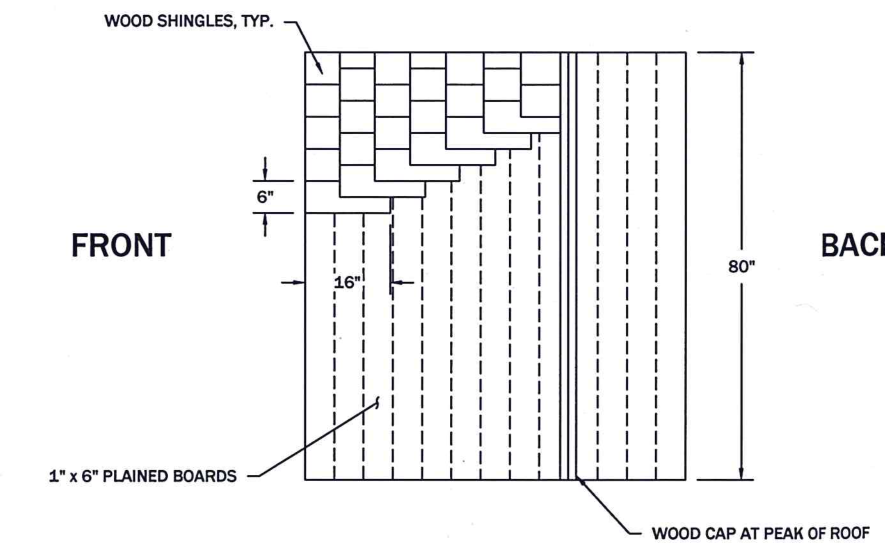
PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DATE: 4/13/13

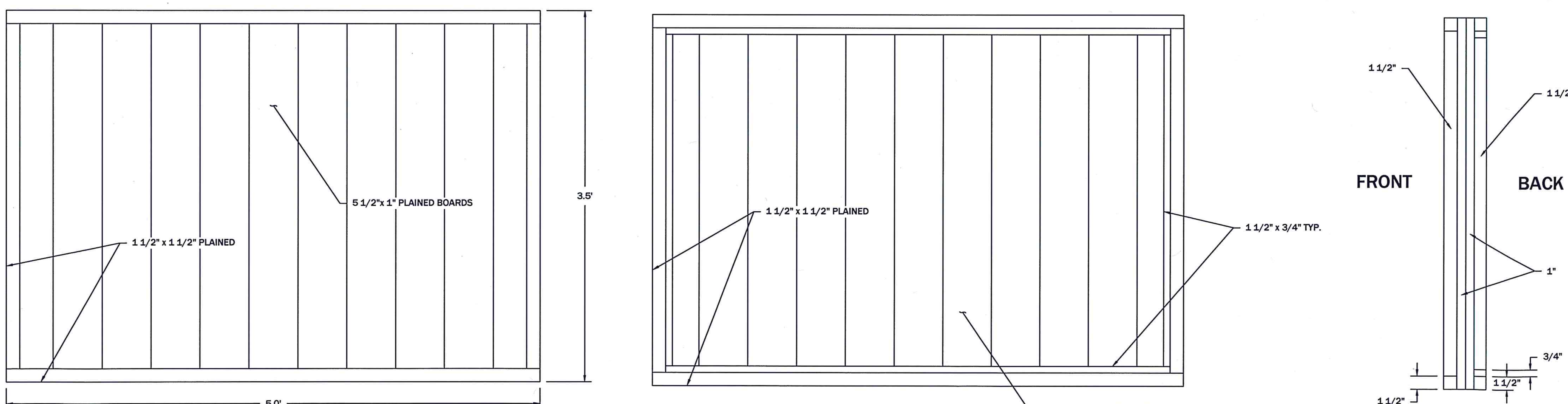
2/24/2015 3:31:00 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-DET-001-12.DWG



ANCHOR PLATE DETAIL 5/10



KIOSK ROOF SECTION 7/10



KIOSK BOARD SECTION 6/10

NOTE:
1. KIOSK BOARD ASSEMBLED AND ATTACHED WITH #10x3" COARSE YELLOW ZINC-PLATED STEEL FLAT-HEAD COMBINATION SCREWS.

DISPLAYED AS:	
COORD SYS/ZONE:	NA
DATUM:	NA
UNITS:	FEET
SOURCE:	PIONEER

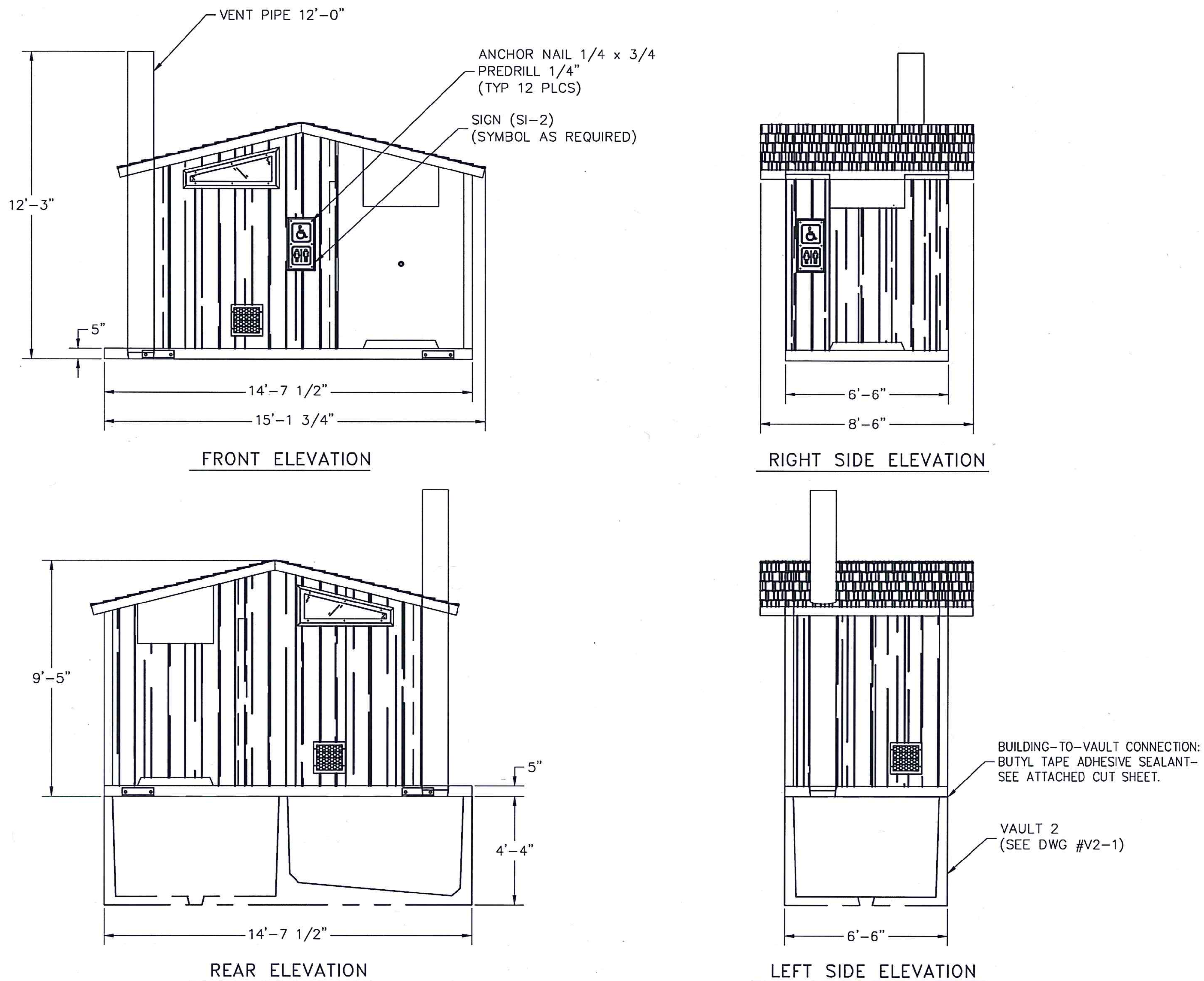
SCALE IN FEET
0 NTS

FIGURE 12

DUTCHMAN KIOSK DETAILS

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DATE: 4/15/13



CXT Precast Products

VAULT RESTROOM ELEVATIONS 8 / 6,7

DISPLAYED AS:	
COORD SYS/ZONE:	NA
DATUM:	NA
UNITS:	FEET
SOURCE:	CXT

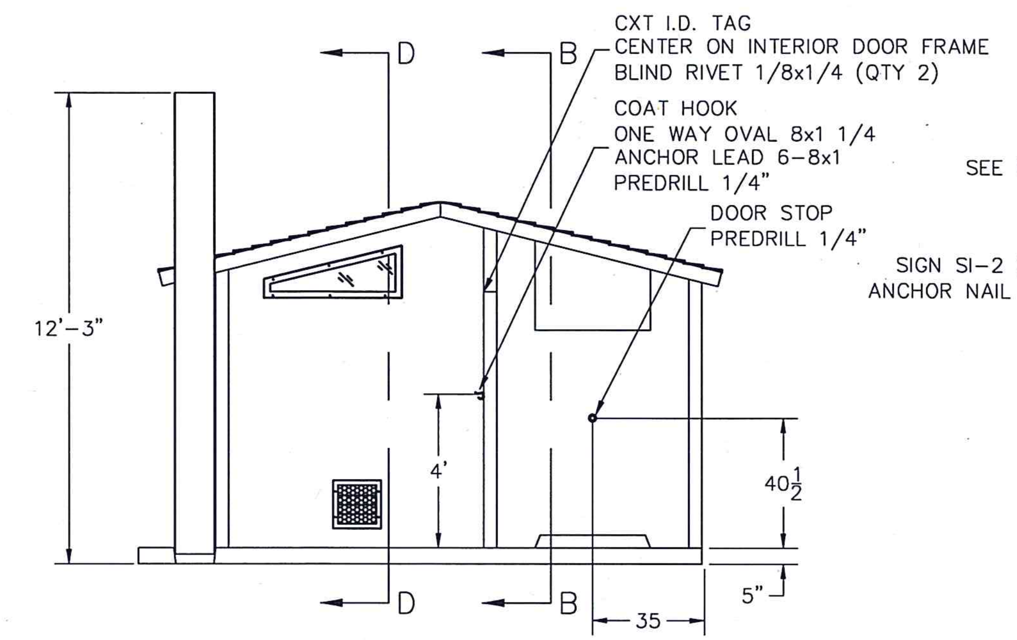
SCALE IN FEET
0 NTS

FIGURE 13

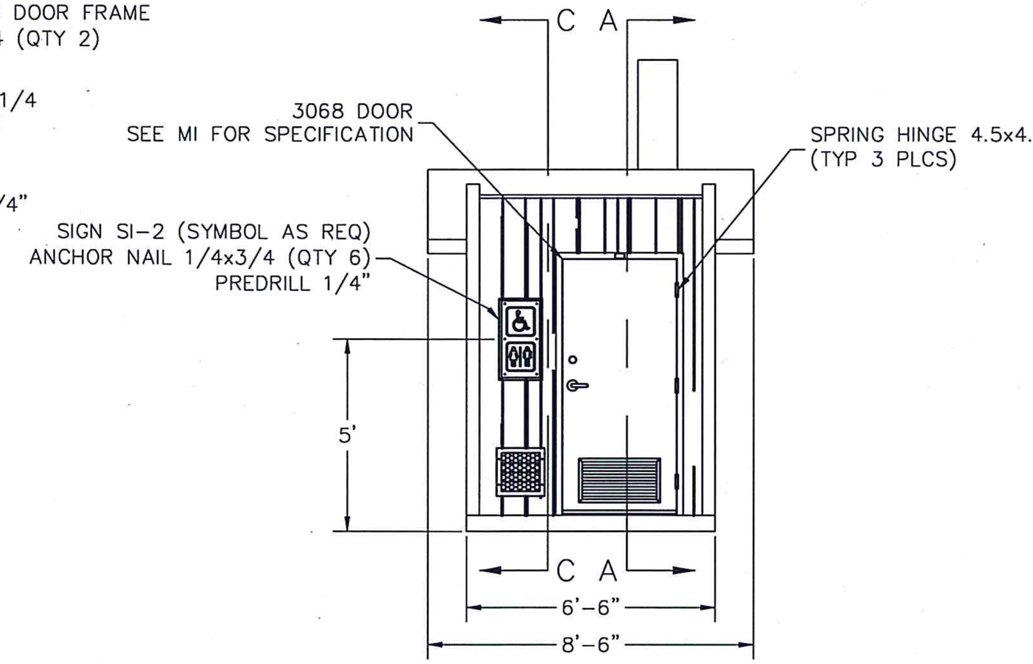
DUTCHMAN VAULT BATHROOM DETAILS

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

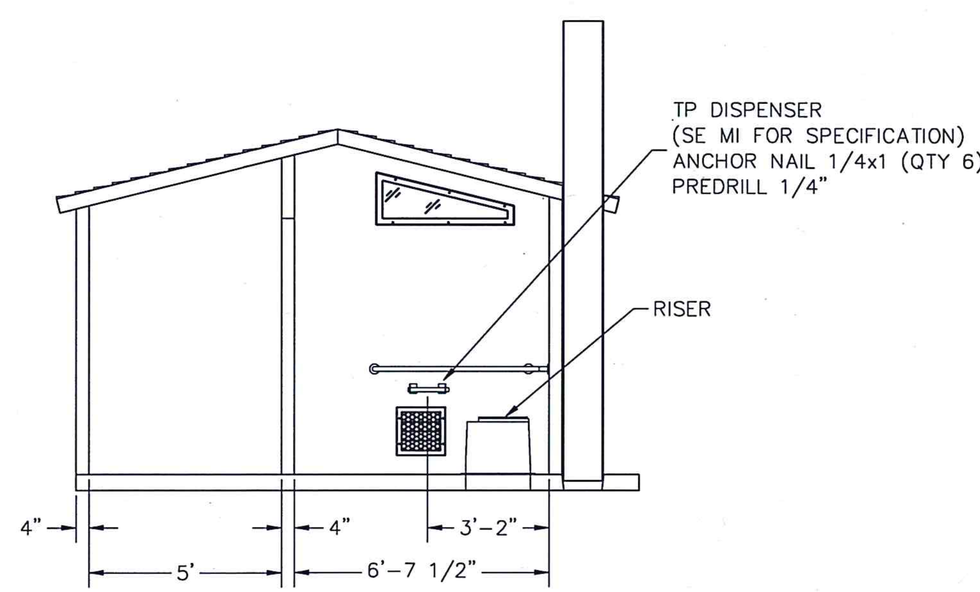
DATE: 4/15/13



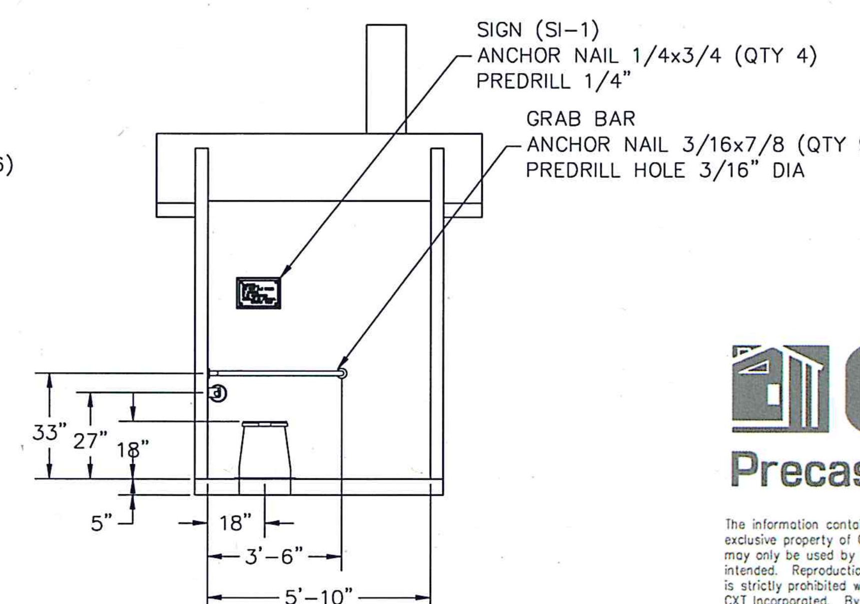
SECTION A – A



SECTION B – B



SECTION C – C



SECTION D – D

CXT Precast Products

VAULT RESTROOM SECTIONS 9 / 6,7

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: FEET
SOURCE: CXT

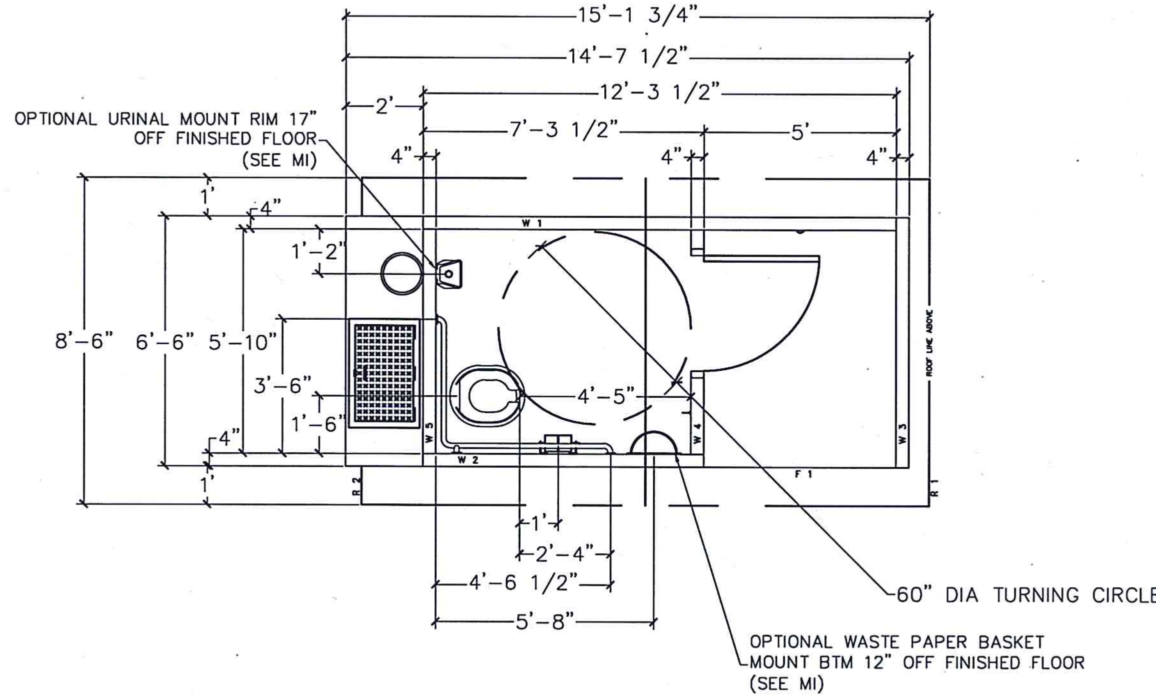
SCALE IN FEET
0 NTS

FIGURE 14

DUTCHMAN
VAULT BATHROOM
DETAILS

PIONEER
TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DATE: 4/15/13



VAULT RESTROOM PLAN VIEW 10 / 6,7

CXT
Precast Products

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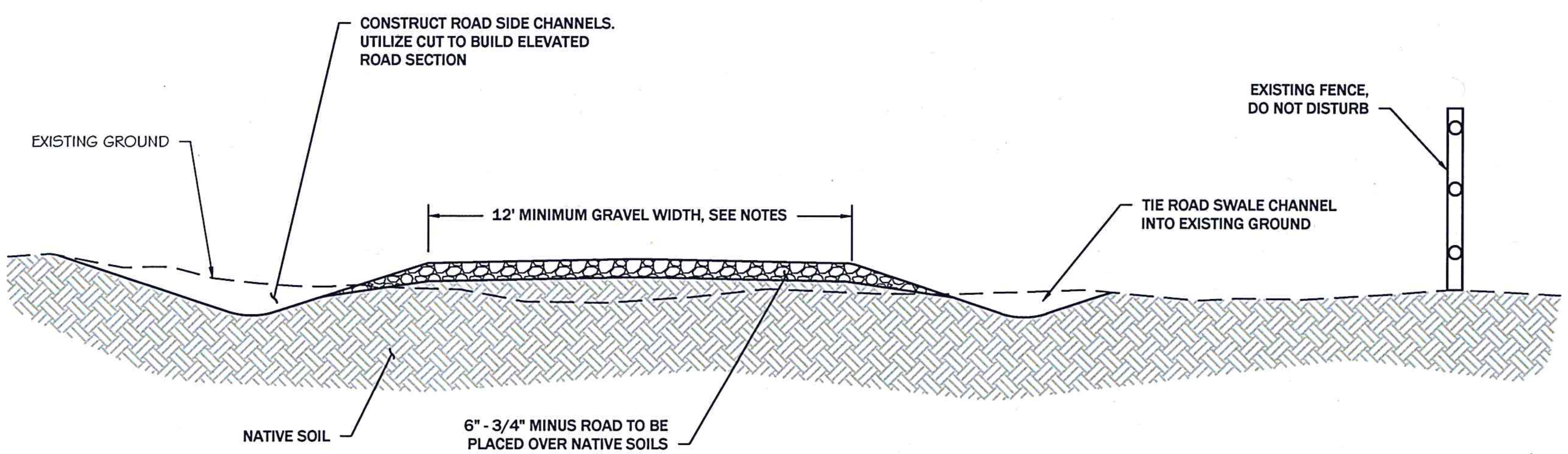
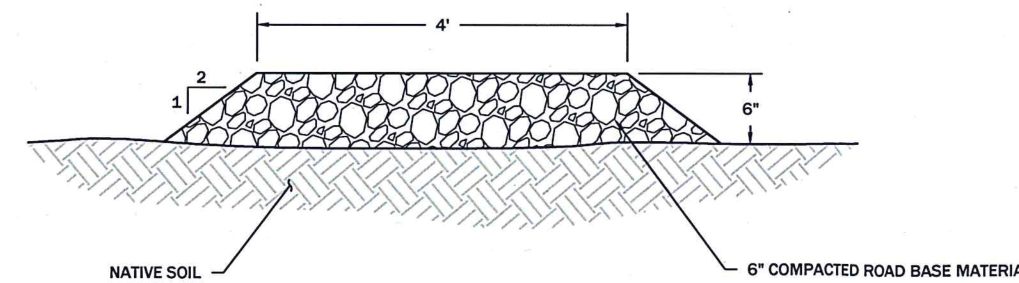


SINGLE LANE GRAVEL ROAD 11 / 4



WALKING TRAIL 12 / 6

DISPLAYED AS:	
COORD SYS/ZONE:	NA
DATUM:	NA
UNITS:	FEET
SOURCE:	CXT

SCALE IN FEET
0 NTS

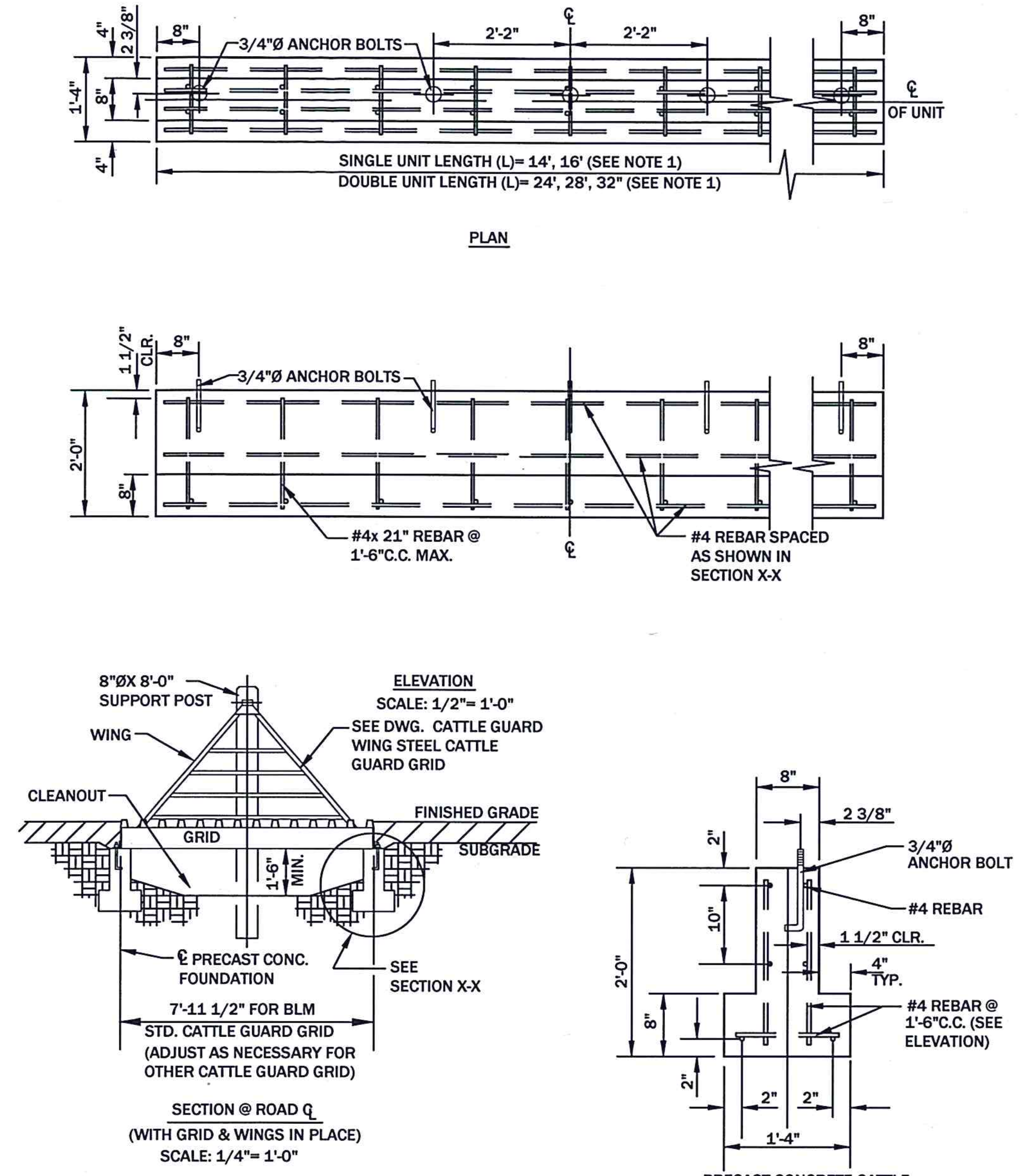
FIGURE 15

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DUTCHMAN VAULT BATHROOM/ ROAD & TRAIL DETAILS

DATE: 4/15/13

2/24/2015 3:32:56 PM \\192.168.247.13\PROJECTS\ARCO\ANACONDA\2012\DUTCHMAN WETLANDS\DRAWINGS\10-23-2014\DUTCH-I&M-FG-DET-001-12.DWG

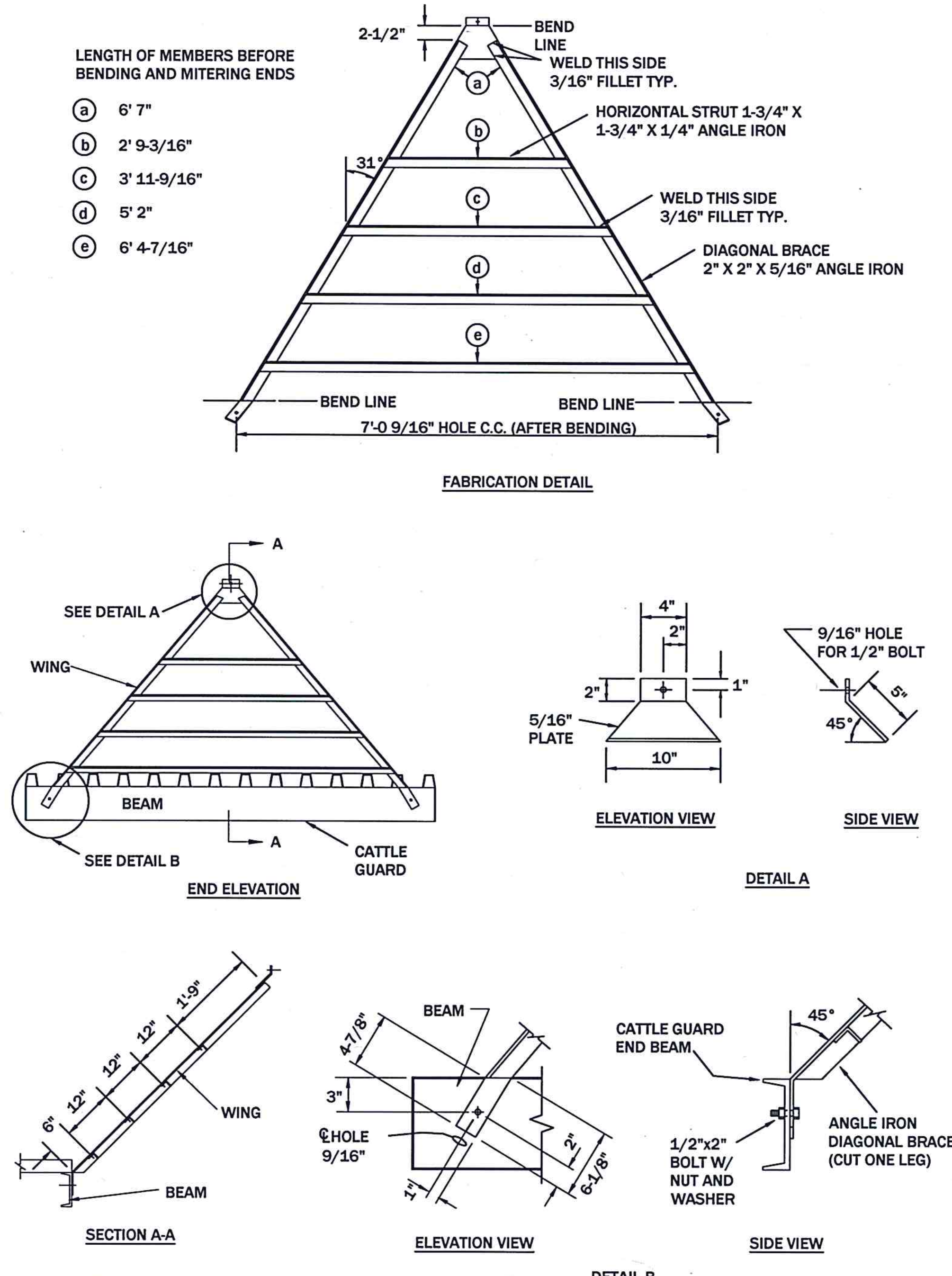


NOTES:
1. SEE BID SCHEDULE FOR LENGTH (L).
2. STANDARD BOLT & WASHER SHALL BE FURNISHED WITH EACH FOUNDATION UNIT, INCLUDING ANGLE BRACKETS. WELD OR BOLT ANGLE BRACKETS TO CATTLEGUARD HEADER PLATE.
3. ON EARTH-SURFACED ROADS, SET TOP OF CATTLEGUARD 8" ABOVE SUBGRADE, UNLESS PLANS OR STAKES INDICATE ANOTHER ELEVATION. TAPER FILL BACK FROM CATTLEGUARD APPROX. 50' IN BOTH DIRECTIONS.
4. #4 REINFORCING BARS MAY BE SPLICED WITH 24" LAP UNLESS PROHIBITED.

ESTIMATED QUANTITIES FOR FOUNDATION

DESCRIPTION	QUANTITIES				
Unit Lengths	14'	16'	24'	28'	32'
Concrete	1.85cy	2.2cy	3.2cy	3.7cy	4.3cy
#4 reinforcing bar	256LF	287LF	437LF	505LF	580LF

CATTLE GUARD FOUNDATION

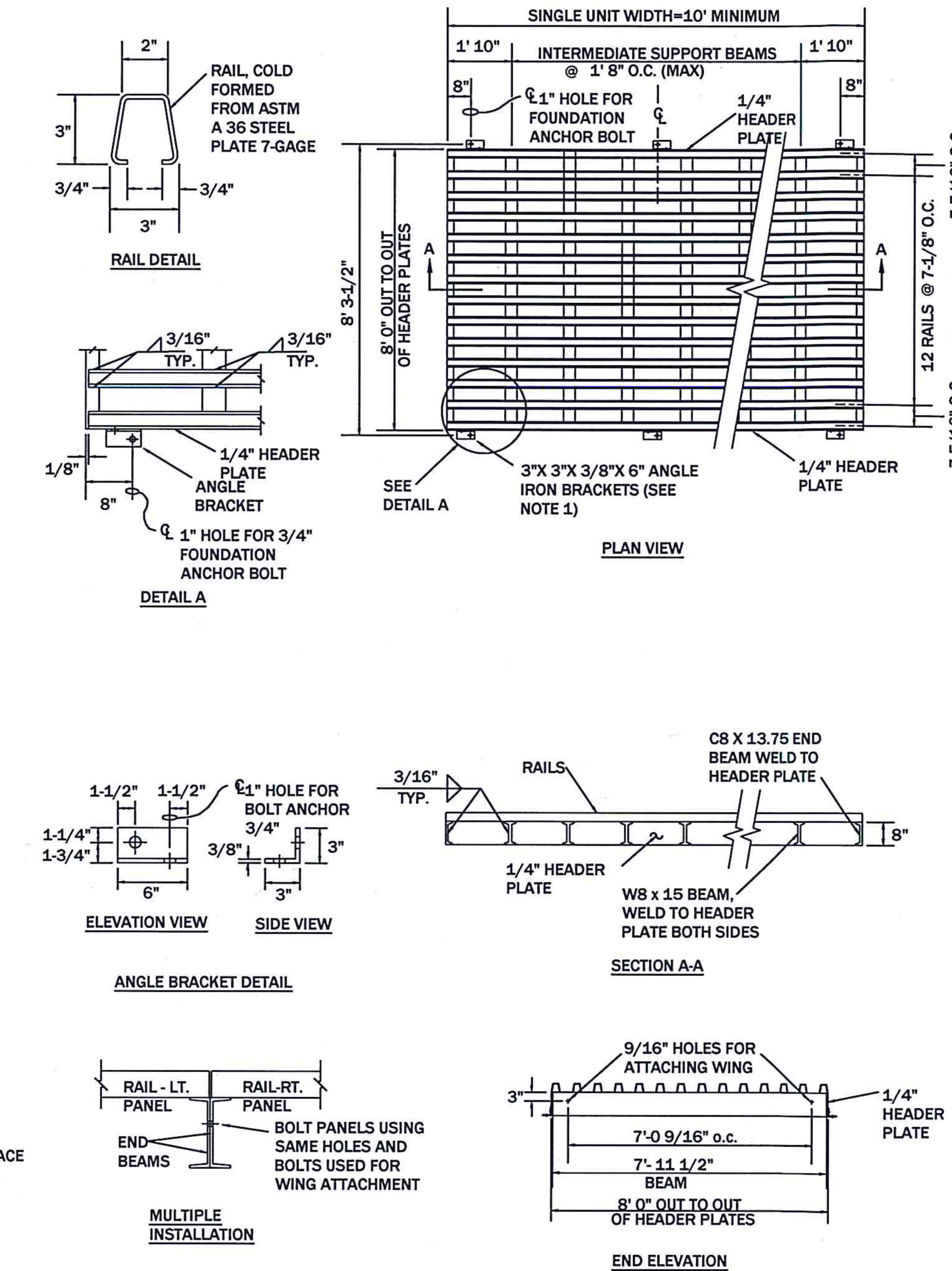


NOTE:
FURNISH TWO 1/2" DIA. X 2" BOLTS WITH STANDARD NUTS, WASHERS AND LOCKWASHERS WITH EACH WING

CATTLE GUARD WING

CATTLE GUARD DETAILS

13 / 4,6



NOTES:
1. FURNISH LOOSE, SIX ANGLE BRACKETS AND SIX 3/4" DIA. X 2" ANCHOR BOLTS WITH STANDARD NUTS, WASHERS AND LOCK WASHERS, WITH EACH GRID.
2. STEEL FOR COMPONENTS SHALL BE ASTM A 36 UNLESS INDICATED OTHERWISE ON DRAWING.
3. DESIGN LOADING OF GRID SHALL CONFORM TO AASHTO H-20.

WELDING SYMBOL LEGEND

WELD BOTH SIDES

WELD THIS SIDE

STEEL CATTLE GUARD GRID

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: FEET
SOURCE: BLM STANDARD DRAWING

SCALE IN FEET
0 NTS

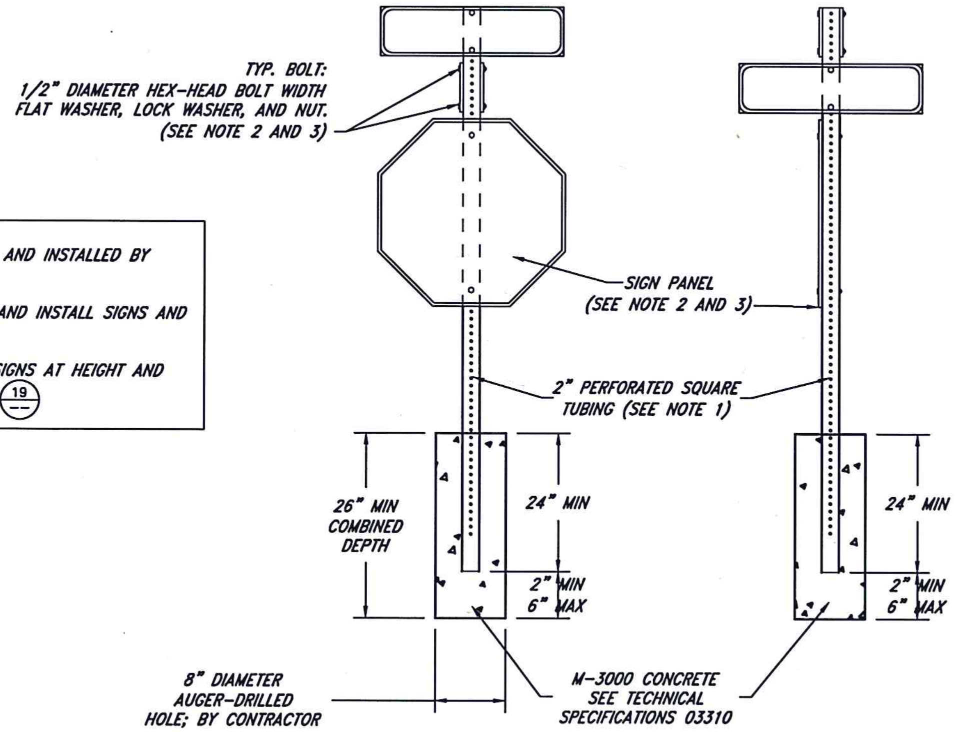
FIGURE 16

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

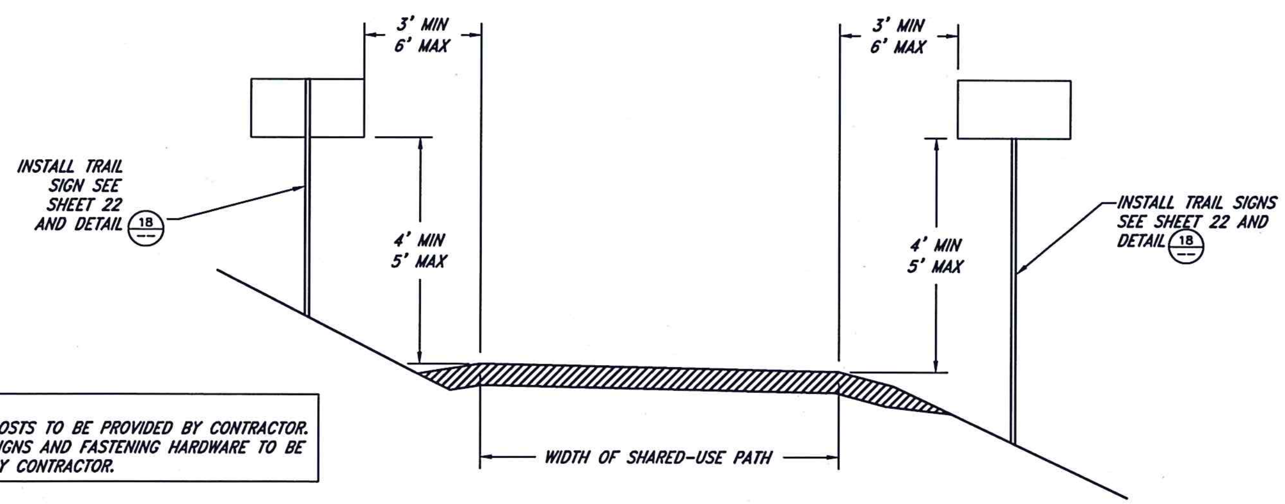
DUTCHMAN CATTLE GUARD DETAILS

DATE: 4/15/13

NOTES:
1. ALL POSTS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
2. CONTRACTOR WILL PROVIDE AND INSTALL SIGNS AND FASTENERS.
3. CONTRACTOR WILL INSTALL SIGNS AT HEIGHT AND OFFSET SPECIFIED IN DETAIL 19



TYPICAL TRAIL SIGN DETAIL 14



NOTES:
1. SELECTED POSTS TO BE PROVIDED BY CONTRACTOR.
2. REQUIRED SIGNS AND FASTENING HARDWARE TO BE PROVIDED BY CONTRACTOR.

SIGN PLACEMENT ON SHARED-USE PATHS DETAIL 15

SIGN TYPE AND MUTCD NUMBER	QUANTITY	SIGN TYPE AND MUTCD NUMBER	QUANTITY
 R5-3	5	 W2-5	3
 R5-6	2	 W1-2	4
 18"x24" H.I.P.	6	 W2-2	2
 W1-2R	5	 W1-5	5
 R1-1	9	 W2-4	1
		 W7-5	1

DISPLAYED AS:
COORD SYS/ZONE: NA
DATUM: NA
UNITS: FEET
SOURCE: BLM STANDARD DRAWING

SCALE IN FEET
0 NTS

FIGURE 17

DUTCHMAN SIGN DETAILS

PIONEER TECHNICAL SERVICES, INC.
307 E. PARK AVE. SUITE 421
ANACONDA, MONTANA
(406) 563-9371

DATE: 4/15/13

TABLES

TABLE 1
YEARLY MONITORING SCHEDULE SUMMARY
DUTCHMAN RIPARIAN LANDS PROPERTY

	Jan. - March	April - June	July – Sept.	Oct. – Dec.
Scheduled Management Activity				
Access				
Fence Line Survey	Perimeter Survey	Perimeter Survey	Perimeter Survey	Perimeter Survey
Public Access	Qualitative survey of access points.	Qualitative survey of access points.	Qualitative survey of access points.	Qualitative survey of access points.
Vegetation				
Noxious Weed Survey	Meet w/ County Weed District.	Survey/Treatment. Survey coordinated with annual qualitative vegetation monitoring.		
Vegetation Monitoring		Quantitative June 15-July 31, every 5 years.		
Photo-Documentation		Done with vegetation monitoring.		
Fire Suppression	2013 - Add Dutchman Property to DNRC fire suppression agreement.			
Erosion Control				
Stream bank Stabilization		Qualitative survey – June (post runoff)		
Wildlife Monitoring				
Wildlife Monitoring	Big Game & Waterfowl survey – March/April. Breeding survey - June.			Waterfowl migration survey - October.

APPENDIX A

USFWS APPROVAL FINAL DUTCHMAN RIPARIAN LANDS STEP 4 CONFIRMATION OF RESPONSE ACTION

United States Department of the Interior

Fish and Wildlife Service

Ecological Services
Montana Field Office
585 Shepard Way
Helena, Montana 59601-6287
Phone: (406) 449-5225 Fax: (406) 449-5339

February 20, 2013

10,089A

Atlantic Richfield Company
Attn: Roy Thun
4 Centerpointe Drive
LaPalma, CA 90623-1066

Dear Mr. Thun:

In September of 2012, Atlantic Richfield Company (ARCO) submitted a final copy of the Dutchman Riparian Lands Wetlands Mitigation Process Step 4 -Confirmation of Response Actions report to the U.S. Fish and Wildlife Service (Service). This Dutchman Step 4 document incorporated comments that the Service and Ecological Solutions Group LLC (ESG) provided previously. The Service reviewed the final report and approves of the document becoming final.

During the review, the Service did note the following minor errors that do not affect the accuracy of the report:

- In the reference section, several references vary in the spacing after a period. The formatting should be consistent, and;
- In the meeting minutes for the June 9, 1012 meeting, in the 9th bullet on page 3 "wildlife" should be one word, and in the 10th bullet, "biomonitoring" should not be hyphenated.

Thank you for the opportunity to comment on this report and we look forward to our continued work with you on protection of the wetlands and other matters associated with compliance of the Consent Decree. Should you have any questions concerning these comments or desire

additional information please contact me at 406-449-5225 extension 215, or Ms. Karen Nelson of this office at extension 210.

Sincerely,

Brent Esmoil
Acting Field Supervisor

cc: John Sither (DOJ, DC)
Dana Jacobsen (DOI, Denver)
Kristine Edwards (USEPA, Helena)
Mary Capdeville (MT NRDP, Helena)
Paul Hansen (ESG, Stevensville)

APPENDIX B

JUNE 19, 2012 MEETING MINUTES

MEETING MINUTES FOR THE
JUNE 19, 2012 DUTCHMAN RIPARIAN LANDS WETLANDS MEETING
HELENA, MT
USFWS OFFICE
1:00 PM TO ~3:30 PM

Attendees

Roy Thun (AR); Tim Hilmo, Tony Wesche (Pioneer); Steve Apfelbaum (AES), Karen Nelson (USFWS); Paul Hansen, Gant Massey (ESG), Kris Edwards (USEPA); Dana Jacobsen via phone (DOI); John Sither via phone (DOJ).

Subject

Dutchman Riparian Lands

Purpose

1. Resolve outstanding issues on the April 6, 2012 USFWS comments to the October 17, 2011 Dutchman Riparian Lands Step 4 Report.
2. Discuss Atlantic Richfield strategy for the Dutchman Riparian Lands Management Plan.

Summary of Meeting Discussion

1. Discussion of the April 6, 2012 USFWS Comments and Final Dutchman Riparian Lands Step 4 Report.

- The attached PowerPoint presentation was utilized during the meeting.
- Atlantic Richfield Company (Atlantic Richfield) will prepare and submit a Final Dutchman Step 4 Report that incorporates USFWS comments and discussion from the meeting. Currently anticipate July 2012 submittal of the Final.
- USFWS anticipates approximately 30 days for review of the Final document and provide an approval of the Final report.
- Atlantic Richfield stated that only comments with questions or issues would be discussed in the meeting. Editorial or minor comments that will be incorporated will not be discussed.
- Clarification was requested by Atlantic Richfield on the USFWS comment stating that: "Finally, there are multiple important issues that are raised within the Dutchman Step 4 document that need to be addressed by ARCO. USFWS clarified that the statement was referring to the comments provided in the USWS April 6, 2012 letter and that no other issues or question exist.
- Clarification was requested by Atlantic Richfield on the USFWS comment stating that: "Since this is the first Step 4 document to be submitted by ARCO to the service for an area within the Upper Clark Fork Basin Superfund Sites that actually contains wetlands…" USFWS stated that they do not believe that any of the other Step 4 reports (Warm Springs Ponds, Old Works, Rocker) have been approved or finalized. It was agreed that Atlantic Richfield would look for approval letters on the status of the Step 4 reports that have been submitted by Atlantic Richfield. This discussion led to the EPA distributing (see attachment) a technical memorandum written by EPA's contractor titled

Status of the Review and Synopsis of Clark Fork Basin OUs Wetland Mitigation, dated August 15, 2011. Atlantic Richfield will review this memorandum.

- USFWS contractors stated that the Dutchman Riparian Lands Step 4 Report is the format for all future reports and that there is no intention to force Atlantic Richfield to rewrite or reformat historic reports into the Dutchman format, as all the reports are fairly consistent in format and content.
- Atlantic Richfield accepted the USFWS comment stating that: "*The USFWS believes that this question should be answered Yes in AA-1 due to the presence of the diversion ditch.*" This results in FEWA score reduction in AA1 from 2.95 to 2.73 and a reduction in FEWA Units from 192.40 to 178.06 acres. Overall reduction in Dutchman FEWA average score from 2.79 to 2.78 and FEWA Units from 2,244.10 to 2,232.22. The final report will be updated accordingly.
- Clarification was requested by Atlantic Richfield on the USFWS comment stating that: "Page 6 Second Main bullet. Comment on PDF pages 543, 569, 594, 618, 643, and 667. Rating for Wildlife Diversity and Abundance: Breeding should read "18 is no and #19 is yes." USFWS contractors clarified that the comment was referring to the question in the FEWA form being miss-numbered #20 instead of #19, not in changing the way the question was answered. The FEWA form will be updated accordingly.
- No additional questions or comments were discussed on the Step 4 report.

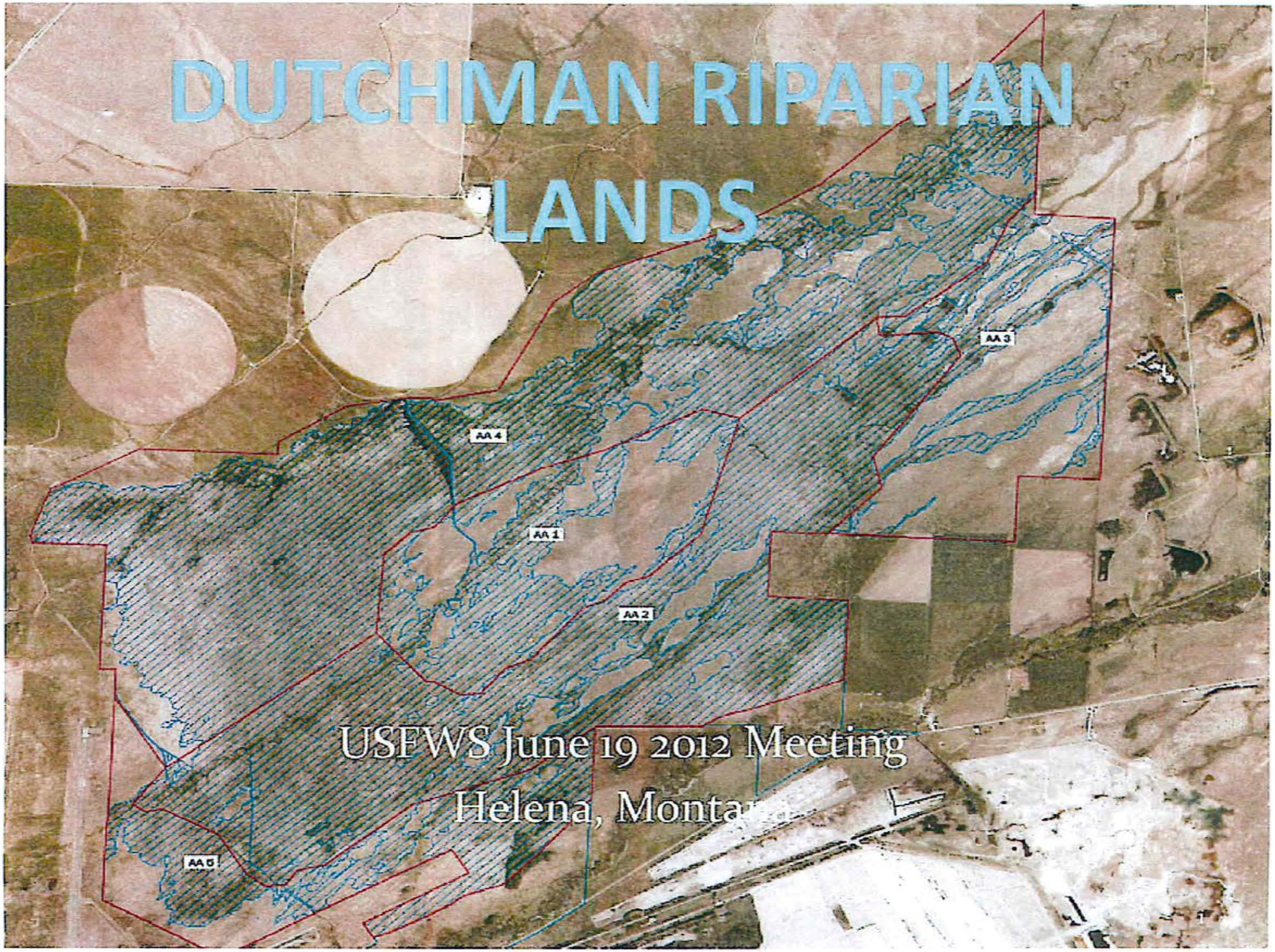
2. Discussion of Dutchman Management Plan Strategy
   - The attached PowerPoint presentation was utilized during the meeting.
   - Currently Atlantic Richfield has no plan to transfer the property to the State of Montana; therefore, Atlantic Richfield will be responsible for management. In the future, Atlantic Richfield may select a land management entity to manage the land on behalf of Atlantic Richfield.
   - Atlantic Richfield intends the Dutchman Management Plan to be the governing document that puts forth all management requirements for the property that must be met, including both the requirements for managing the wetlands and meeting superfund requirements.
   - Atlantic Richfield will prepare a Dutchman Management Plan that generally follows the PowerPoint presentation topics, for submittal to the USFWS for review.
   - The two objectives of the Management Plan discussed and agreed to during the meeting are as follows:
     1. SST OU CD: Manage property to protect the existing wetlands into perpetuity.
     2. ARWWS OU: Manage property consistent with ARWW&S OU superfund requirements for ground water, surface water, and designated high arsenic area.
   - The 3 components of the management plan consisting of monitoring, maintenance, and reporting were discussed and agreed to.
   - The quarterly property access monitoring was discussed and that Atlantic Richfield currently intends to allow public access. USEPA requested signs be placed at trailheads.
   - The number of trailheads was discussed. Atlantic Richfield is proposing two trailheads, one at the Dutchman Dike and the second near the Warm Springs Hospital. Both with designated parking and a restroom facility. Walk in access will be allowed through manway gates or fence walkthroughs such that gates do not have to be opened and closed, or inadvertently left open.

- USFWS contractors suggested that internal fences within the Dutchman area be removed, or at least the wire removed and posts left behind. This will reduce the impacts on local wildlife.
- The status of the historic well was discussed. Atlantic Richfield will install a temporary 2 rail fence around the well for safety.
- Vegetation monitoring was discussed. It was agreed that annual monitoring will be qualitative and will focus on weeds and 5 year monitoring will be quantitative at 10% of the 2011 transect locations. USFWS contractors recommended establishing as part of the annual monitoring photo points where photo documentation can be collected each year to show vegetation changes.
- The superfund requirement to monitor vegetation to show protectiveness and support the 5 year reviews was discussed. It was agreed that monitoring 10% of the 2011 transects will provide qualitative data for supporting the wetlands and superfund vegetation monitoring.
- USFWS contractors suggested that the possibility of using weed wipes for weed control instead of weed spray may be an effective way to target weeds around wetlands areas where over spray of chemicals may be of concern. It was discussed that the majority of weed control will most likely be around the perimeter of the Dutchman property where weeds are invading from surrounding properties with poor weed management. It was also discussed that weed control is more likely on the uplands islands than within actual wetlands, than within wetland areas themselves.
- Annual erosion monitoring and maintenance on Lost Creek, Warm Springs Creek, and the Dutchman Diversion was discussed in that the monitoring will be qualitative. USFWS contractors suggested that the maintenance activities be used sparingly and that mother nature be allowed to work. If maintenance is determined necessary, less invasive alternatives are considered first before the use of heavy equipment.
- The superfund requirement to monitor the Dutchman Diversion was discussed. The erosion monitoring that will be conducted as part of the wetlands monitoring will address the superfund requirement to monitor the Dutchman Diversion.
- Annual wildlife monitoring was discussed and that it is Atlantic Richfield's intent to document wildlife and birds that are observed onsite while conducting other monitoring and maintenance activities. It was agreed that no maintenance activities are necessary for wild life monitoring.
- The USFWS stated that they will consult with EPA to determine if more bio-monitoring (uptake modeling) is required as part of the management plan to determine protectiveness within the high arsenic area.
- It was suggested that moose crossing signs be put up along Montana Highway 48 between the Opportunity Ponds and Dutchman property since this area appears to be a frequent moose crossing and 1-2 moose are being struck by vehicles annually. Atlantic Richfield will follow up with ADLC/MDT to see if moose crossing signs can be installed.
- It was discussed and agreed that the Management Plan will reference the ARWWS site wide surface water and ground water management plans and will not specifically detail out those requirements.
- Annual reports will be prepared and submitted to document and communicate the work each year.

- USFWS contractors requested clarification on what boundary will be protected and included under the Management Plan. Atlantic Richfield stated that they need to determine if the Warm Springs Creek Remedial Design Unit (RDU) 10 area that is within the Dutchman Property will be included or not.
- DOJ asked for clarification if Atlantic Richfield will state who is managing the property in the management plan. Atlantic Richfield clarified that the management plan will state that Atlantic Richfield will initially be responsible for implementing the management plan. Atlantic Richfield may transfer that responsibility in the future to a third party.

Attachments to Meeting Minutes

- PowerPoint Presentation Slides utilized during meeting.
- August 15, 2011 Status of the Review and Synopsis of Clark Fork River Basin OUs Wetland Mitigation Technical Memorandum provided by Kris Edwards.
- Meeting Sign-in Sheet.


DUTCHMAN RIPARIAN
LANDS
AA 4
AA 1
AA 2
AA 3
AA 5
USFWS June 19 2012 Meeting
Helena, Monta

Meeting Purpose

- Resolution of USFWS Step 4 Report Comments
- Management Plan Approach

Dutchman Step 4 Report Status

- 10/17/11 - Submitted Step 4 Report
- 4/6/12 - Received Comments
- 6/19/12 – Step 4 Report Meeting with USFWS
- July 2012 – Final Step 4 Report to USFWS
- USFWS approval of Final Step 4 Report

USFWS Comments Summary Dutchman Step 4 Report

- DOI comments convey general agreement with Step 4 Wetland Report. Comments request Final Report be submitted.
- Minor change in FEWA Score and FEWA Units as result of comments on AA1
- Text - edits are minor, editorial in nature.
- Figures - Request one additional figure with vegetation classes.
- Data Forms – Fill in remaining blanks.

Detailed Comment Discussion Dutchman Step 4 Report

- Discuss comments where Atlantic Richfield has questions or concerns. All other comments will be incorporated into final report.

Detailed Comment Discussion
Dutchman Step 4 Report

- Page 1 Bottom Paragraph – Please explain the comment: *"Finally, there are multiple important issues that are raised within the Dutchman Step 4 document that need to be addressed by ARCO."*

Detailed Comment Discussion
Dutchman Step 4 Report

- Clarification to the last sentence on page 1. "*Since this is the first Step 4 document to be submitted by ARCO to the service for an area within the Upper Clark Fork Basin Superfund Sites that actually contains wetlands...*" This is the first ARWWS OU step 4 report with wetlands but not the first Step 4 report for the basin.

Detailed Comment Discussion Dutchman Step 4 Report

- Assessment Area 1 – Pg 4. PDF Page 532, Question B13: *"The USFWS believes that this question should be answered Yes in AA-1 due to the presence of the diversion ditch."* Atlantic Richfield will incorporate the comment. Results in FEWA score reduction in AA1 from 2.95 to 2.73. Reduction in FEWA Units from 192.40 to 178.06 acres. Overall reduction in Dutchman FEWA average score from 2.79 to 2.78 and FEWA Units from 2,244.10 to 2,232.22

Detailed Comment Discussion
Dutchman Step 4 Report

- Page 6 Second Main bullet. Comment on PDF pages 543, 569, 594, 618, 643, and 667. Rating for Wildlife Diversity and Abundance: Breeding should read "*18 is no and #19 is yes*". For this to be yes, which of the 5 statements does USFWS say are true?

Detailed Comment Discussion Dutchman Step 4 Report

- No additional comments require discussion.

Dutchman Management Plan

- No present plan to transfer property to the State of Montana.
- Atlantic Richfield will submit Management Plan to USFWS for review
- Schedule Submittal of Management Plan - to be determined

Objectives of the Dutchman Management Plan

- *SST OU CD: Manage property to protect the existing wetlands into perpetuity.*
- *ARWWS OU: Manage property consistent with ARWWS OU superfund requirements for ground water, surface water, and designated high arsenic area.*

Dutchman Management Plan Components

- Monitoring Requirements
- Maintenance Requirements
- Reporting

Dutchman Management Plan

- SST OU CD Wetlands Monitoring Requirements
  - Quarterly Property Access Monitoring (trailheads and fences)
  - Vegetation
    - Annual Qualitative Vegetation Monitoring (weeds)
    - 5 Year Quantitative Vegetative Monitoring – 10% of the baseline 2011 transects (randomly determined).
      - Support ARWWS OU Superfund vegetation monitoring and 5 Year Reviews
      - Vegetation Trends compared to 2011 baseline (Supplemental Data)
  - Annual Erosion Monitoring of WSC, LC, Dutchman Diversion
  - Annual Wildlife Monitoring

Dutchman Management Plan

- SST OU CD Wetland Maintenance Requirements
  - Property Access – Implement repairs as soon as possible following notification
  - Vegetation
    - Noxious Weeds – spray as needed, anticipated to be annually for first few years at least, then less. Coordinate with ADLC Weed Program for weed lists, species of concern, spray alternatives, etc.
    - Quantitative Vegetative Monitoring – no action anticipated as part of regular maintenance.
  - Erosion - Stream Bank Stabilization if necessary and as approved by Atlantic Richfield and Agencies
  - Annual Wildlife Monitoring – No maintenance activities anticipated

Dutchman Management Plan

- ARWWS OU Superfund Monitoring Requirements (From Dutchman FDR)
    - Long Term Surface Water – to be completed as part of the ARWWS Surface Water Management Plan
    - Long Term Ground Water – to be completed as part of the ARWWS Ground Water Management Plan
    - Dutchman Creek Diversion
    - Vegetation

Dutchman Management Plan

- ARWWS OU Superfund Maintenance Requirements
  - GW and SW per ARWWS site wide plans
  - Dutchman Diversion per wetlands erosion monitoring (SST OU CD)
  - Vegetation per wetland vegetation monitoring (SST OU CD)

Dutchman Management Plan

- Reporting
  - Annual Report
    - Including monitoring results
    - Maintenance activities
    - Recommendations

Dutchman Management Plan

- The End
- Comments?

Status of the Review and Synopsis of Clark Fork Basin OUs Wetland Mitigation Documents

PREPARED FOR:	Kristine Edwards/USEPA
PREPARED BY:	Dennis Smith/CH2M Hill Paul Hansen/ESG Gant Massey/ESG
COPIES:	ESG USFWS Montana Department of Environmental Quality
DATE:	August 15, 2011

This memorandum was prepared by Ecological Solutions Group LLC (ESG LLC) and presents a summary of the status of Four Step wetland mitigation process for the four National Priority List (NPL) sites of the Clark Fork Basin (CFB). This summary is based upon the collection and review of over 80 legal and technical documents from the Environmental Protection Agency (EPA) and the USDI Fish and Wildlife Service (USFWS), as well as other sources.

This work concentrates its discussion on 10 major Operable Units (OUs) within the CFB, as well as the Yankee Doodle tailings impoundment, which lies within the Active Mining and Milling OU. OUs are geographic and/or contaminant specific areas in the Basin that have been designated by the EPA. In its 1999 report on delays in the cleanup of the Clark Fork Basin, the Government Accounting Office (GAO) listed 23 OUs. Further, this review has identified at least 30 separately named OUs across the cleanup history of the CFB. Many of these sites, however, have been renamed, subdivided, reapportioned, or (primarily) consolidated under the auspices of the Anaconda Regional Water and Waste NPL Site.

Overview

- The "No Net Loss" status of wetlands within the four NPL sites of the CFB is currently governed by the Four Step process developed and agreed to by ARCO, USFWS, State of Montana, Corps of Engineers, and EPA in a 1992 memo titled "Regional Wetlands Issues." The original intent of the Four Step Process is detailed in ARCO's letter to the U.S. Environmental Protection Agency, dated January 27, 1992, the most pertinent sections of which are reproduced in *italics* below.
    - *Step 1: Wetland Delineation and Functional Evaluation*
        - *The purpose of Step 1 is to quantify baseline (prior to response action) wetlands area, value and function.*
        - *Task No.1: ARCO will delineate wetlands (using the 1987 Manual until the Federal Manual is published in final form) and other special aquatic sites at each site where work is performed under an administrative order or judicial decree. This task should occur early in the RI or EE/CA process as part of site characterization studies.*

- *Task No.2: In addition to delineation of jurisdictional wetlands using the 1987 Manual criteria, wetland habitat will be delineated, value and function assessed following the method adopted by the U.S Fish and wildlife service (Cowardin et al. 1979). As has been done for the WSP Study, wetlands data will be digitized into the Geographic Information System (GIS).*
- *Task No.3: For each area, maps and narrative discussion summarizing the results from the delineation task and quality assessment described in Tasks 1 and 2 will be prepared as a separate submittal for agency review. The assessment will both quantify and characterize wetland areas present prior to response actions, separately identifying those areas having value and function, and those which do not in their present condition provide the value and function normally associated with wetland habitat.*

Step 2: Preliminary Analysis of Impacts

- *The purpose of step 2 is to forecast changes to wetland area and function related to response action at a site. The baseline data developed in Step 1 will be used in preparation of a preliminary analysis of potential impact to wetlands from fill activities, which may be part of response actions under consideration.*
- *Task 1: As part of the development and analyses of response action alternatives, alternative actions under consideration will be assessed and potential impacts to physical, chemical, and biological components of wetlands and the associated aquatic environment described. Both quantitative and qualitative impacts to wetlands will be described. Where applicable to the actions under consideration, the factual determinations described at 40 C.F.R. 230.11 which are useful in understanding- the effect upon the environment from a proposed discharge will be presented in development of this analysis.*
- *Task 2: The analysis of alternatives conducted during the FS or EE/CA will include a comparative analysis of projected impacts and/or improvements to wetland acreage, value and function from implementation of the alternative actions under consideration and proposed mitigation measures.*

- *Step 3: Detailed Analysis of Impacts*
  - *Following publication of a Record of Decision or Action Memorandum at a site, a more detailed analysis of potential impacts from construction activity will be submitted during the design phase. In this document, a Mitigation Plan will be presented which addresses the substantive ARAR requirements for protection of wetlands and associated aquatic habitat. The Mitigation Plan will propose practicable mitigation measures to minimize potential adverse impacts following the guidelines set forth at 40 C.F.R. Par 230, Subpart H. Further discussion of replacement of wetland areas as a mitigation requirement is presented below. The Mitigation Plan will be submitted to the agency for review as part of the ARARs Report generally required during remedial design, or as part of a Design Report where work will be performed under the EPA's removal action authority.*
- *Step 4: Confirmation of Response Action Impacts*
  - *There is potential that a proposed final remedial or response action design may be modified as construction proceeds to accommodate site-specific conditions. For sites where such changes are made, ARCO suggests that it is appropriate to prepare a final analysis' of impacts following construction. This final analysis would be submitted at the completion of remedial action prior to Certification of completion." In this submittal, a final accounting of acreage totals, and conclusions presented in the previous analyses regarding anticipated changes in wetland values and functions would be revised to conform with the as-built design of the selected remedy or response action.*

- In practice, however, the Four Steps have been applied in the Clark Fork Basin as follows:
  - Step 1: Wetland Delineation and Functional Evaluation

    Step 1 has generally involved a broad-brush determination of jurisdictional wetlands acres present within an Operable Unit (OU) and their functional status.
  - Step 2: Preliminary Analysis of Impacts

    Step 2 has generally involved an acknowledgement that the "No Net Loss" policy for wetlands applies to remedial action. Nonetheless, many OUs have omitted this formal step and informally acknowledged this policy. Quantification of impacts wetland acres, however, often has been omitted from this step on many OUs.
  - Step 3: Detailed Analysis of Impacts

    Step 3 involves an assessment of wetlands acres and functions that may be affected by remedial activities. This accounting process is generally more accurate than that achieved in Step 1.
  - Step 4: Confirmation of Response Action Impacts

    Step 4 involves an assessment of wetlands acres and functions following remedial actions. While this step may occur at any point following the completion of remedial actions, precedent has been set by ARCO that a finalization of this step should occur 10 years following the conclusion of remedial activities. This precedent is documented in the 1999 Upper Clark Fork River Wetlands Mitigation Process Status Summary Report prepared by ARCO, the most pertinent paragraph of which is presented in *italics* below.

    The draft Step 4 wetland reports have been completed for the Rocker, OW/EADA, and WSP OUs based on field evaluations conducted in summer 1998, which evaluated wetland area and functional value present at that time. In the draft Step 4 reports, the results of the 1998 evaluations are compared to those from Step I (Wetland Identification and Delineation). The draft Step 4 reports provide an interim quantification and assessment of wetland area and function. It is anticipated that habitat provided by wetland areas within the sites will improve over time as vegetation matures. Thus, ARCO proposed to reassess wetland area and function and finalize the Step 4 analysis at 10 years following completion of remedial action construction at the sites.

- Per the 1992 agreement, the status of wetlands in the CFB is quantified by two factors:

1. The acres of jurisdictional wetlands and shallow water habitat present in the CFB (shallow water habitat is defined as those areas less than 6.6 feet in depth [< 2 m] lacking emergent vegetation); and,

2. Determination of wetlands functional values per the Functionally Effective Wetland Area (FEWA) process. This process assesses ten wetland function categories using the methodology provided in the modified version of the Wetland Evaluation Form (EA Engineering 1992). Modifications incorporated into the Wetland Evaluation Form

include some language clarification and modest structural changes determined through interaction with ARCO, Dr. Chapin of EA Engineering, Science, and Technology, and the Riparian and Wetland Research Program (RWRP). The ten wetland function categories are:

- Hydrologic support;
- Flood flow alteration;
- Sediment stabilization and sediment control;
- Water purification;
- Production export/food chain support;
- Aquatic diversity/abundance;
- Wildlife diversity/abundance: breeding;
- Wildlife diversity/abundance: migration;
- Wildlife diversity/abundance: wintering; and
- Threatened and endangered species habitat.

- The FEWA process results in a FEWA score determined using the scoring format provided by the Wetland Evaluation Form (EA Engineering 1992). Overall function ratings range from 0.5 to 3.0. The higher the FEWA score, the more highly functioning a wetland area.

- For each area of jurisdictional wetland and/or shallow water area, a FEWA equivalent acre is then determined by the following formula (see below). The FEWA equivalent acre is a relative value and does not actually represent actual acres of physical area, although it is quantified in acre units.

$$\text{FEWA equivalent acre} = \text{FEWA score} \times \frac{(\text{jurisdictional wetland acres} + \text{shallow water habitat acres})}{3}$$

- Per the 1992 agreement, ultimate compliance with the "No Net Loss" policy is evaluated across the entire CFB, not on an OU by OU basis. "No Net Loss" means that FEWA equivalent acres calculated for the CFB must either stay the same or increase from before to after remedial actions.

- The "No-Net-Loss" of wetlands in the CFB is based upon a comparison of FEWA equivalent acres calculated before and after remedial actions, i.e., from Step 3 to Step 4.

- Whatever entity is responsible for completing remedial actions within an OU (i.e., ARCO, EPA, or the State of Montana) is also responsible for ensuring "No Net Loss" of wetlands. Historically, compliance oversight has fallen upon the USFWS, with a final sign-off by the USFWS and the EPA.

- The wetlands mitigation process for CFB is in progress, thus the total number of pre-remedial action FEWA equivalent acres within the CFB has not been finalized as of the drafting of this memorandum. Step 4 sign-offs have been made for only a few areas within the CFB, none of which have contained any jurisdictional wetlands or shallow water habitats. The first opportunity for Step 4 sign-offs for areas with jurisdictional wetlands or shallow water habitats were supposed to have occurred in 2009 at the

Rocker and Old Works/East Anaconda Development Area OUs. (Please note that while the wetland status of the Warm Springs Ponds OU could have been evaluated in 2005, ARCO has asked for a delay in this evaluation pending completion of upstream remedial activities.)

- Table 1 presents a quantitative history of jurisdictional wetland acres and FEWA equivalent acres that were determined in each of the Four Steps completed for ten of the OUs of the CFB, plus the Yankee Doodle tailings impoundment.
- Table 2 presents a qualitative summary of the current status of wetland mitigation in ten of the OUs in the CFB, plus the Yankee Doodle tailings impoundment.

TABLE 1
History of Wetland Area Determinations, CFB OUs

Operable Unit	Methodology (units)	Step 1	Step 2	Step 3	Step 4
Anaconda Regional Water Waste and Soils	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	10,661.9	Done, but not quantified	5,212.5 (accounting incomplete)	Accounting incomplete
	FEWA (equivalent acres)	7,608.4	Done, but not quantified	3,682.0 (accounting incomplete)	Accounting incomplete
Butte Priority Soils	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	110.3	Not yet done	Not yet done	Not yet done
	FEWA (equivalent acres)	69.0	Not yet done	Not yet done	Not yet done
Clark Fork River	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	Currently in process		Not yet done	Not yet done
	FEWA (equivalent acres)	7,159.0	4,306.3 (Reach A only)	Not yet done	Not yet done
Lower Area One	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	42.1	Done, but not quantified	Not yet done	Not yet done
	FEWA (equivalent acres)	15.7	Done, but not quantified	Not yet done	Not yet done
Milltown Reservoir	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	421.7	Done, but not quantified	400.5	Not yet done
	FEWA (equivalent acres)	379.5	Done, but not quantified	358.6	Not yet done
Montana Pole	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	Done, but not quantified	Done, but not quantified	Done, but not quantified	Not yet done
	FEWA (equivalent acres)	Done, but not quantified	Done, but not quantified	Done, but not quantified	Not yet done

TABLE 1
History of Wetland Area Determinations, CFB OUs

Operable Unit	Methodology (units)	Step 1	Step 2	Step 3	Step 4
Old Works/East Anaconda Development Area	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	78.9	Done, but not quantified	Done, but not quantified	84.3 (prelim. est.)
	FEWA (equivalent acres)	53.3	Done, but not quantified	Done, but not quantified	60.2 (prelim est.)
Rocker	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	6.7	Done, but not quantified	Done, but not quantified	0.5 (prelim est.)*
	FEWA (equivalent acres)	3.2	Done, but not quantified	Done, but not quantified	0.3 (prelim est.)*
Streamside Tailings	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	1,595.3	Done, but not quantified	130.5 (accounting incomplete)	44.7 (accounting incomplete)
	FEWA (equivalent acres)	926.9	Done, but not quantified	60.1 (accounting incomplete)	42.5 (accounting incomplete)
Warm Springs Ponds Active and Inactive Areas	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	1,969.5	Depends on Design Alternative	1,788.6	1,750.3 (prelim est.)
	FEWA (equivalent acres)	1,493.0	Depends on Design Alternative	1,542.0	1,474.8 (prelim est.)
Yankee Doodle tailings impoundment	Jurisdictional Wetlands plus Shallow Water Habitat (acres)	Not yet done	Not yet done	Not yet done	Not yet done
	FEWA (equivalent acres)	Not yet done	Not yet done	Not yet done	Not yet done

* Reflects the fact that 5.8 acres and 2.7 FEWA equivalent acres transferred to Streamside Tailings OU between Steps 3 and 4, leaving 0.9 acres of jurisdictional wetlands and shallow water habitat and 0.5 FEWA equivalent acres in the Rocker OU.

TABLE 2
Summary of Wetland Mitigation Status, CFB OUs

Operable Unit	Last Step Completed	Year of Report(s) for Last Step Completed	Comments and Next Steps
Anaconda Regional Water Waste and Soils	Step 3 continues to be ongoing; 5 new assessment units identified in 2007	2005a, 2005b, 2006, 2007, 2009	Construction of wetland mitigation ongoing (2010)
	Step 4 completed for RDU 4, 11 and 12	2005	
Butte Priority Soils	Step 1 completed.	1993	Steps 2, 3, and 4 remain to be done.
Clark Fork River	Step 2 completed	2002	Step 1 is in the process of being redone for Reach A of Clark Fork River OU as earlier work could not access entire floodplain.
	Step 1 rework in process	2006-2008	Step 3 to follow remedial design process.
Lower Area One	Step 1 completed	1993	Responsibility for completing Steps 2, 3, and 4 Transferred to Butte Priority Soils process (EPA 2006).
Milltown Reservoir	Step 3 completed	2003	Step 4 review needed 10 years after remediation completed.
Montana Pole	No Steps fully completed; Steps 1, 2 and 3 partially completed	1993	Responsibility for completing Steps 2, 3, and 4 Transferred to Lower Area One process.
Old Works/East Anaconda Development Area	Preliminary Step 4 completed	1999	Step 4 review needed in 2009. Gain of 0.2 jurisdictional wetlands acres and 5.6 FEWA equivalent acres expected.
Rocker	Preliminary Step 4 completed	1999	Step 4 review needed in 2009. Loss of 0.4 jurisdictional wetlands acres and 0.2 FEWA equivalent acres expected.
Streamside Tailings	Step 2 completed for entire OU, including Subarea 3	1995	Step 3 needed for Subarea 3 prior to remedial actions.
	Step 3 completed for Subareas 1, Subarea 2, and Subarea 4	2004 2004 2006	Step 4 review needed for entire OU 10 years after remediation completed.

TABLE 2
Summary of Wetland Mitigation Status, CFB OUs

Operable Unit	Last Step Completed	Year of Report(s) for Last Step Completed	Comments and Next Steps
Warm Springs Ponds	Preliminary Step 4 completed	1999	Step 4 review needed in 2009, with loss of both 219.2 jurisdictional wetlands acres and 18.2 FEWA equivalent acres addressed.
Yankee Doodle tailings impoundment	No Steps Completed	n/a	Wetlands maintenance issues under responsibility of the State of Montana

Wetland Details by Operable Unit

Anaconda Regional Water Waste and Soils Operable Unit (ARWWS OU)

- As of 2009, Steps 1, 2, and 3 have been completed for most of the Remedial Design Units (RDUs) within the ARWWS OU, although five new areas were identified in 2009 as needing assessment. These five RDUs include:
    - RDU I - Old Works/Stucky Ridge (drainage north of AA7-3);
    - RDU 3 - Lost Horse Creek (Mansanti Property) (requested by the USFWS);
    - RDU 3 - North Face-Smelter Hill Uplands (Mountain Lion, LLC Propel1y) (requested by the EPA);
    - Mill Creek middle reach between Cabbage Gulch and the Mill Creek Highway (requested by the USFWS); and
    - Mill Creek lower reach - Anaconda Country Club (requested by the EPA).
- Step 1 resulted in the delineation of 10,526.2 jurisdictional wetland acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 10,661.9 acres. FEWA equivalent acres equaled 7,608.4 acres.
- The Feasibility Study (1997) affirms the applicability of the "No Net Loss" policy to the ARWWS OU, thereby partially fulfilling the requirements of Step 2. Nonetheless, this document provided no quantitative details regarding potential wetland impacts.
- As of 2009, Step 3 has been completed for most of the RDUs within the ARWWS OU, although the final accounting of FEWA equivalent acres in this OU awaits the release of delineation and monitoring data for at least five additional sites. In addition, the State of Montana's Restoration Plan for the Anaconda Uplands (2008) discusses the likely impacts on wetlands but notes that a quantification of wetland acres is needed per the 4 Step protocols, but has not yet occurred in RDU 15, the Mount Haggin Uplands.
- According to the 2009 ARCO Step 3 summary, jurisdictional wetland totals within the ARWWS OU stand at 5,212.5 acres; FEWA equivalent acres stand at 3,682.0 acres. The 2009 jurisdictional wetland totals include 305 acres from the Warm Springs Creek lower reach and 2,311 acres from the Dutchman Creek Expansion Area. The 2009 FEWA equivalent wetland totals include 254 acres from the Warm Springs Creek lower reach and 1,772 acres from the Dutchman Creek Expansion Area. This represents 50 percent of the jurisdictional wetland acres and 55 percent of FEWA equivalent acres in the ARWWS OU through 2009.
- Step 4 was completed in 2004-2006 for RDUs 4, 11 and 12, none of which contain any jurisdictional wetlands.
- Major wetlands mitigation activities within the ARWWS OU are occurring at the Opportunity Ponds, which will involve the creation of 500-800 acres of jurisdictional wetlands. Construction of the wetlands is actively occurring in 2010, with seeding occurring in 2007, containerized wetland plant installation beginning in 2009. Planting will continue in 2010 and 2011.
- While ESG is awaiting pertinent maps and overlays, the 2007 Step 3 wetlands report by ARCO lists over 500 jurisdictional wetland acres and nearly 400 FEWA-scored wetland

equivalent acres within Assessment Areas (sub-areas of RDUs) that appear to be overlaid by the Opportunity Ponds mitigation wetlands project. This subject deserves close attention and ongoing review.

Butte Priority Soils Operable Unit (BPS OU)

- The BPS OU Step 1 survey report was released in 1993. The total area of jurisdictional wetlands equaled 100.5 acres; Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 110.3 acres. FEWA equivalent acres equaled 69.0 acres.
- The BPS OU Step 1 document notes that, "Residential and commercial development appears to have resulted in the filling of considerable wetland area previously present in the area (wetland areas filled prior to enactment of the Clean Water Act of 1993 are not regulated as jurisdictional wetlands). Thus, existing wetlands in the study area are the remnant of what was once a more extensive wetland area associated with both Blacktail and Silver Bow Creek."
- The BPS OU has not received Steps 2, 3, or 4 of the Four Step wetland assessment and mitigation process. A review of the 2006 Record of Decision (ROD) shows that this issue is directly placed before the EPA (ROD, Section 3. Responsiveness Summary, page 64): "A four-step wetlands evaluation protocol was developed for all Clark Fork River sites for no net loss of wetlands. Only Step 1 (Wetland Delineation and Functional Evaluation) has been completed at the BPSOU, but remedy-related impacts were not evaluated. ARCO needs to evaluate remedy-related impacts. Steps 2, 3, and 4 remain to be completed. The analysis of wetland impacts and a more refined wetland mapping effort should be conducted in a combined Step 2/3, during remedial design, prior to remedy implementation. Confirmation of impacts would be done after completion." This comment was followed up almost verbatim in a letter from the USFWS (page 212).
- In response, the EPA stated, "The Clark Fork River sites are all included in the program for achieving no net loss of wetlands except for the Streamside Tailings OU. Streamside Tailings is not included because the State is responsible for meeting the no net loss standard at that OU. The Wetland Delineation and Functional Evaluation step has been completed for BPS OU, as noted by the commenter. The remaining steps will be completed during remedial design. The other sites are in various stages of completion of the four-step process. EPA is committed to completing the four-step process for all applicable sites, and is confident that there will be no net loss of wetlands."

Clark Fork River Operable Unit (CFR OU)

- The CFR OU Step 1 survey report was released in 1994, with a follow-up in 1998. The total area of wetlands surveyed equaled 11,366 acres; FEWA equivalent acres equaled 7,159 acres.
- The 1994-1998 Step 1 surveys did not involve delineation of jurisdictional wetlands. Further, the 1994-1998 Step 1 surveys were limited to an assessment of FEWA only on those properties for which access permission was obtainable (63.1 percent of the OU in Reach A; much less in Reaches B and C).
- The CFR OU Step 2 report was released in 2002 as the Feasibility Study Report. In quantified the probable effects of the different Feasibility Study Alternatives to FEWA

equivalent acres in the areas of the CFR OU that would be impacted by remedial activities, i.e., most of Deerlodge Valley (Reach A) and part of Reach B (Garrison to Drummond). It also affirmed the applicability of the "No Net Loss" policy to the CFR OU.

- In 2006-2007, the EPA supported an initiative to apply the CFR Riparian Evaluation System (RipES) to define polygons for potential remedial action. Work included characterization of riparian soil patterns, investigation of the patterns of streambank instability, and mapping of riparian weed infestations, as well as the delineation of jurisdictional wetlands and FEWAs on over 42 miles of stream and 9,600 acres of property. This initiative was confined to Reach A and the upper portion of Reach B (e.g., Garrison area) of the CFR OU that will receive remedial action. Access was obtained to over 99 percent of the potentially affected properties in these reaches. The results of the jurisdictional wetland delineations and FEWA scores are currently being tabulated.
- It is anticipated that a formal Step 3 for the CFR OU will accompany the final design process.

Lower Area One Operable Unit (LAO OU)

- The LAO OU Step 1 survey report was released in 1993. The total area of jurisdictional wetlands equaled 38.4 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 42.1 acres. FEWA equivalent acres equaled 15.7 acres.
- Steps 2, 3 or 4 have not been completed for the LAO OU. The 1999 Wetland Summary Document by ARCO, however, stipulates that, "Phase I construction at the LAO OU and reconstruction of the Silver Bow Creek floodplain has been completed. Final remedial actions at LAO will be implemented following issuance of the BPS OU ROD. Step 2 for the LAO OU will be included in the BPS OU Feasibility Study to be delivered in 1999-2000, and therefore Steps 2 and 3 will be performed for LAO in combination with BPS OU. Generally, the Silver Bow Creek floodplain amounts to approximately 15 acres of riparian wetland and the reconstructed floodplain was designed to have a 2.3 to 2.7 overall rating for functional value (11.5 to 13.5 FEWA equivalent acres). In other areas of LAO (Colorado Tailings, BRW), there is likely to be some additional wetlands reconstruction. For example, several alternatives are being considered on a preliminary basis for Colorado Tailings, including natural wetlands, treatment wetlands, and upland setting. Wetlands fed by groundwater in BRW are likely to remain as wetlands."
- The ARCO 1999 summary goes on to say that "Step 3 for LAO OU will be conducted in the design phase of the remedy selected in the BPS OU ROD, which will include LAO Phase II remedial design. This is projected to be completed in 2001-2003."
- As previously discussed in the Butte Priority Soils section of this Memorandum, the BPS OU ROD acknowledges the "No Net Loss" policy applies to that OU, but makes no mention of the LAO OU.
- The State of Montana's Restoration Planning Process and Draft Conceptual Restoration Plan (2007) notes that 29.5 acres of the Lower Area One site, at least part of which contained wetlands, had been reclaimed with 1998-developed Butte Hill Reclamation Standards. As far as can be determined, this occurred without a Step 3 inventory being

undertaken. The same 2007 document states that 8.5 acres of wetlands, with waste materials present in the water, were recognized but un-reclaimed as of April 2005.

- The FEWA status of the LAO OU is actively slipping through the cracks.

Milltown Reservoir Operable Unit (Milltown OU)

- The Milltown OU Step 1 survey report was released in 2001 (ARCO). The total area of jurisdictional wetlands equaled 297.1 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 421.7 acres. FEWA equivalent acres equaled 379.5 acres.
- FEWA scores for the two areas of the Milltown OU were 2.64 and 2.73, respectively, for the Reservoir Pool Administrative Area and Braided River Administrative Area.
- The same wetland acres and FEWA equivalent acres were referenced in Step 2, the Feasibility Study (ARCO 2001), which also affirmed the applicability of the "No Net Loss" policy to the Milltown OU.
- Step 3 (Walsh 2004), however, resulted in delineation of 400.5 acres of jurisdictional wetlands. FEWA scores for the Reservoir Pool Administrative Area changed to 2.59. The FEWA score for the Braided River Administrative Area stayed at 2.73. The resulting FEWA equivalent acres are 358.6.
- The Step 3 also indicates that the remedial construction will affect 256.9 jurisdictional wetland acres and 227.9 FEWA equivalent acres. This report acknowledges the need for a Milltown OU Wetland Mitigation Plan.
- Further, the 2005 Consent Decree for the Milltown Site states that "The Settling Defendants' (ARCO's) obligation for mitigation of any loss of jurisdictional wetlands as a result of remedial actions, including any change in surface water and groundwater levels that follow remedial actions, within:
  - The Milltown Site;
  - All areas of the Clark Fork River and its riparian area upstream of the Milltown Site to the Turah gaging station; and
  - The Blackfoot River and its riparian area upstream of the Milltown Site to the Bonner gaging station, is the lesser of:
    1. 75.4 FEWA acres; or
    2. the difference between the actual FEWA acres created by the State in the Project during Restoration and 108.4 FEWA equivalent acres."
- In May, 2009, Envirocon developed and submitted to the State of Montana a Wetlands Plan in response to the requirements of the Consent Decree for the Milltown Site (Envirocon 2005), which stipulated that the Wetlands Plan must be prepared and include:
  - Measures to be undertaken to achieve the creation, restoration or enhancement of the mitigated wetlands within the Project Area including achievement of the FEWA units described in Attachment 4 of the Consent Decree;

- Design Plans and schedule for the mitigated wetlands within the Project Area (e.g., planting, grading/excavation, water supply and controls); and
- Provisions to make amendments or revisions to the Wetland Mitigation Plan within the Project Area, as necessary.

- The Milltown Wetlands Plan that was Drafted by Envirocon in 2009 generally fulfills the above requirements. The Milltown Wetlands Plan:
  - quantifies that 33 FEWA equivalent wetland acres will be created by the State during Remedial Actions.
  - contains designs for the mitigated wetlands, and indicates that revegetation and restoration activities will be completed by the end of 2011, although no further details regarding the schedule are provided.
  - indicates that the planned wetland mitigation is based upon the latest version of the Grading Plan provided by the State of Montana, and that if the Grading Plan is modified, an addendum will be prepared providing an updated estimate of predicted wetland mitigation in the project area.
- The FEWA weighting proposed by the State of Montana in the Milltown Wetlands Plan (Envirocon 2009) is different than that utilized in prior studies, for instance the 2004 Wetlands Mitigation Process: Step 3 – Detailed Analysis of Impacts (Walsh 2005). The importance of Floodflow Alteration in FEWA scoring would be increased, while Aquatic Diversity/Abundance, Wildlife Diversity/Abundance: Breeding, and Wildlife Diversity/Abundance: Migration are deemphasized. The result is that the proposed new methodology upweights a scoring area of likely project success and downweights areas of less certain project success.
- The Milltown Wetlands Plan (Envirocon 2009) states that remedial actions for the Milltown OU are anticipated to be complete in 2011, while revegetation and restoration activities are scheduled for completion by the end of 2011.. The Step 4 field inventory and analysis tasks to determine the post-response FEWA for comparison to pre-response FEWA will follow completion of the State of Montana's restoration work in the floodplain. The State will complete the Step 4 tasks.

Montana Pole and Treating Plant National Priorities List Site (Montana Pole NPL)

- As of 2009, none of the Four Steps have been formally completed specifically for the Montana Pole NPL site. Nonetheless, several actions have been taken that partially, but, in most cases, do not formally and completely address several of the steps.
- In 1990, Keystone Environmental Resources conducted a wetlands delineation exercise at the Montana Pole NPL site. While four jurisdictional wetlands were found, partially fulfilling the Step 1 requirements, no acreage tabulations of these sites were made. The wetlands delineation report does state, however, that two wetlands sites were found along the edge of Silver Bow Creek, where they provide some wildlife habitat and streambank erosion protection. The other two wetlands are small, inland from Silver Bow Creek and possibly human-induced.

- The Montana Pole NPL Feasibility Study (1993) and Montana Pole NPL Record of Decision (1993) both affirmed the applicability of the "No Net Loss" policy to the Montana Pole NPL site as well as other wetland-related ARARs, partially fulfilling the Step 2 requirements.
- The Montana Pole Feasibility Study (1993) also discusses the potential impacts on wetlands in each of five different remedial alternatives as well as the selected "No Action" alternative, partially fulfilling the Step 3 requirements.
- The Montana Pole Record of Decision (1993) also notes that, "These wetland areas [of the Montana Pole NPL site] are also within the Lower Area One Operable (LAO) Unit of the Butte-Silver Bow Creek NPL site and are being addressed under removal actions taking place within LAO." Thus, it seems the intention of the EPA to have wetlands protection covered under the auspices of the Four Step process as applied to LAO. Indeed, the LAO OU Step 1 survey report was released in 1993, which covers the streambank areas of Silver Bow Creek that fall within the Montana Pole NPL site. Nonetheless, Steps 2, 3 or 4 have not been completed for the LAO OU. Further, as Steps 2 and 3 are supposed be performed for LAO in combination with Butte Priority Soils OU, whose status is uncertain, it seems likely that the wetland status of the Montana Pole NPL site also may be in danger of slipping through the cracks.

Old Works/East Anaconda Development Area Operable Unit (OW/EADA OU)

- The OW/EADA OU Step 1 survey was released in 1999 as part of the Anaconda Regional Water Waste and Soils Step 1 report. The total area of jurisdictional wetlands equaled 68.8 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 78.9 acres. FEWA equivalent acres equaled 53.3 acres.
- The Step 2 document (1997) affirmed the applicability of the "No Net Loss" policy to the ARWWS OU (and thus to the OW/EADA), but provided no quantitative details regarding potential wetland impacts.
- Likewise, the Step 3 documents (1994-1997) affirmed the applicability of the "No Net Loss" policy to the ARWWS OU (and thus to the OW/EADA), but provided no quantitative details regarding potential wetland impacts.
- Preliminary Step 4 documents (1999), however, quantified the area of jurisdictional wetlands at 69 acres, an increase of 0.2 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 84.3 acres, an increase of 5.6 acres. FEWA equivalent acres equaled 60.2 acres, an increase of 6.9 FEWA equivalent acres.
- The review and final sign-off of wetland status in the OW/EADA is scheduled for 2009, 10 years following completion of remedial action construction at the site.

Rocker Operable Unit (Rocker OU)

- The Rocker OU Step 1 survey was released in 1993. The total area of jurisdictional wetlands equaled 5.8 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 6.7 acres. FEWA equivalent acres equaled 3.2 acres.

- The Step 2 document (1995) affirmed the applicability of the "No Net Loss" policy to the Rocker OU, but provided no quantitative details regarding potential wetland impacts.
- Likewise, the Step 3 document (1997) affirmed the applicability of the "No Net Loss" policy to the Rocker OU, but provided no quantitative details regarding potential wetland impacts.
- Between Steps 3 and the initial Step 4 assessment, 5.79 wetland acres and 2.74 FEWA equivalent acres were transferred from the Rocker OU to the Streamside Tailings OU. This left 0.91 wetland acres and 0.46 FEWA equivalent acres in the Rocker OU.
- An initial Step 4 (1999) report indicated that remedial activities left 0.51 acres of wetlands and 0.26 FEWA equivalent acres in the Rocker OU, a net loss of 0.4 acres of wetlands and 0.2 FEWA equivalent acres.
- The review and sign-off of wetland status in the Rocker OU is scheduled for 2009, 10 years following completion of remedial action construction at the site.

Streamside Tailings Operable Unit (SST OU)

- The SST OU Step 1 survey was released in 1994. The total area of jurisdictional wetlands equaled 1,501.9 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 1,595.3 acres. FEWA equivalent acres equaled 926.9 acres.
- The Step 2 document (1995) affirmed the applicability of the "No Net Loss" policy to the Rocker OU, but provided no quantitative details regarding potential wetland impacts.
- Between 2004 and 2006, Step 3 surveys were completed for Subarea 1, 2, and 4 in the SST OU. A Step 3 report has not yet been prepared for Subarea 3 (Durant Canyon), as the remedial designs have not yet been finalized for that section.
- As shown below in Table 3, there was a significant decline in wetland and FEWA acres from Step 1 to Step 3. According the USFWS, this is due to three factors:
  - A concentration during the Step 3 process on wetlands that might be impacted by remedial activities, instead of all wetlands within the SST OU;
  - An increase in the precision and an improvement in methodologies of the Step 3 process over the Step 1 process; and,
  - An ongoing drought, which has decreased wetland acres in the region.
- The final review and sign-off of wetland status in the SST OU will occur 10 years after the completion of remedial activities. However, in 2008 Bighorn Environmental conducted an assessment of wetland condition in Subarea I of the Streamside Tailings Operable Unit (SSTOU), Montana. The results, shown in Table 3, show an improvement in Jurisdictional Wetland Acres and FEWA acres in Subarea 1.
- While the conclusions reached and trends reported in the Bighorn Environmental report are probably correct, as shown by the following examples, the study was quirky in its methodologies, and incomplete in its reporting.

- Given the alteration of soils and vegetation that occurred during remediation, and as permitted under USACE guidelines, Bighorn Environmental relied upon hydrologic indicators for making its jurisdictional wetland calls. Nonetheless, while the wetland calls seems justifiable based upon the photos, the photo captions and the depths to groundwater reported, the report does not consistently and clearly provide the data required by the 1987 USACE guidelines that would link individual site conditions to the wetland calls that were made. As this data is probably included in the Form 1's referenced in the Bighorn Environmental report, this issue should be simple to ameliorate. More worrisome, however, is that fact there is no data reported for soil pits where the wetlands areas transitioned into and then became uplands, which the 1987 USACE guidelines require. Thus, while the wetland areas defined by Bighorn Environmental are probably reasonable and correct, it is possible that wetland acreages are being under-reported.

- Per Cowardin and others (1997), Bighorn Environmental designates three wetland types (riverine, lacustrine and palustrine wetlands) as the major assessment areas in which wetland function is evaluated. These classes seem reasonable and appropriate for evaluating the system. Nonetheless, the 2008 Bighorn Environmental report does not provide background information that would validate the application of these classes to the areas defined. It is likely that this information and validations have been made in other, prior reports. Their absence, however, makes this report incomplete and non-self supporting.

- Per the 1992 "Four Step" agreement, Bighorn Environmental evaluated wetland function using the Wetland Evaluation Form developed by EA Engineering 1992, and subsequently modified by ARCO, Dr. Chapin of EA Engineering, Science, and Technology, and the Riparian and Wetland Research Program (RWRP) of the University of Montana's School of Forestry. Bighorn Environmental, however, utilized a different FEWA weighting than those utilized in other wetland evaluations in the Clark Fork Basin. In particular, Bighorn Environmental doubled the weight given floodflow alteration from 0.5 to 1.0. While it is debatable whether such modifying the weighting of FEWA is ecologically unreasonable, the functional effect of this change is that scoring for the Subarea 1 will be different than those in some other reports for the site, as well as different from all other Operable Units in the Clark Fork Basin.

TABLE 3
Summary of Wetland Mitigation Status, Streamside Tailings Operable Unit.

Subarea	Step 1 Wetlands Acres	Step 1 FEWA equivalent acres	Step 3 Wetlands Acres	Step 3 FEWA equivalent acres	Step 4 Wetlands Acres	Step 4 FEWA equivalent acres
Subarea 1	68.9	43.8	30.27	15.58	44.7	42.5
Subarea 2	440.3	235.5	26.72	12.46		

Subarea 4	913.3	593.1	73.5	32.01		
Totals	**1,422.5**	**872.4**	**130.49**	**60.05**	**44.7**	**42.5**

Warm Springs Ponds Operable Unit (WSP OU)

- The WSP OU Steps 1, 2, and 3 were combined into a single document, which was released in 1993.
- The Step 1 total area of jurisdictional wetlands equaled 1,548.0 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 1,969.5 acres. FEWA equivalent acres equaled 1,493.0 acres.
- Step 2 compared multiple alternatives for both the Inactive and Active Operable Units that comprise the WSP OU. All alternatives considered would result in a loss of jurisdictional wetland acres in both the Inactive and Active OUs, although many alternatives would result in an increase in aquatic habitat less than 6.6 feet in depth. The analysis anticipated that the preferred alternative for the Inactive OU would result in a loss of 23 FEWA equivalent acres, while the preferred alternative for the Active OU would result in an increase in 72 FEWA equivalent acres.
- Step 3, which combined the analysis of the Active OU and the selected alternative (Alternative 5) for the Inactive OU, estimated that there would be a 286 acre decrease in jurisdictional wetlands and a 275 acre increase in aquatic areas < 6.6 feet depth (< 2 m) resulting in little net change in total wetland plus aquatic area. Step 3 also took the FEWA of the Active and Inactive operable units together under post-response action conditions (using FEWA for Alternative 5). Under this scenario, wetland area over the entire WSP OU was anticipated to be very similar under the two sets of conditions (1,493 acres under pre-response and 1,542 acres under post-response conditions). Due to a general increase in predicted functional value, the amount of FEWA would be about 50 acres higher after response actions are completed and wetland plant communities re-establish. The increase in functional rating was the result of eliminating tailings surfaces, which have Low functional value, and the creation of aquatic areas in administrative areas that previously had very little open water area.
- It should be noted that the USFWS took some exception to the findings of the Step 3 report, writing:
  - We agree that the response actions should, in the long term, improve the Warm Springs Ponds operable units wetlands functional values. However, we are concerned that (1) estimates of post-response jurisdictional and functionally effective wetland area, especially in the Mill-Willow Bypass, may be overestimated, and (2) that the proposed response actions do not adequately address mitigation of interim injury to the pre-response wetlands.
  - The pre- and post-response analysis assumes that since removal of sediment in the Mill-Willow Bypass lowered the surface down to the approximate level of the water table, most of the bypass has been altered from non-wetland to wetland. Since the post-response Mill-Willow Bypass Assessment Area (AA II) is predicted to show a 109 acre FEWA (functionally effective wetland area) increase (accounting for over twice the predicted combined operable unit FEWA increase of 50 acres), it is important to validate the assumed Bypass conversion to wetlands. Based on visual observations, portions of the Bypass do not presently appear to meet the wetland hydrology criterion (or the vegetation and soils criteria). However, the eventual flow of Mill and Willow Creeks through the Bypass may substantially alter the

hydrology. We recommend that the Bypass be monitored on a regular basis to validate the report's assumption of wetland conversion. If substantial areas of the Bypass are shown not to be wetlands, i.e., the report's assumption is invalid, additional wetland mitigation should be required.

- Mitigation for interim (short-term) injury to wetlands caused by the response actions in the combined WSP operable units has not been addressed. For example, the FEWA for AA II can be estimated to have been 0.0 immediately after the Mill Willow Bypass removal and a minimum of seven years after response completion is likely to be required for AA II to reach the predicted FEWA of 175.6. During that recovery period, the AA II wetland will not provide full wetland services. Using a discount rate of 7 percent and a linear recovery over seven years, a minimum of 35 functionally effective wetland acres would be required to compensate for those include analysis of and mitigation for interim loss of wetland services.
- Page 23, paragraph 6, line 2, further states that "response actions should ... result in effective mitigation of jurisdictional wetland losses." The report's analysis does not support this conclusion. In fact, both acres and FEWA of jurisdictional wetlands will decrease due to the response actions. As shown in Table 8 (page 26), the pre-response jurisdictional wetland area is 1,170.7 and pre-response FEWA is 838.0, while the post-response values are 884.7 and 717.2, respectively. This represents a loss of 286 jurisdictional wetland acres or a loss of 120.8 jurisdictional FEWA. The increase in FEWA as a result of the response action is attributed to the increase in aquatic areas > 6.6 feet in depth (> 2 m), which were not delineated as jurisdictional wetlands (presumably due to the lack of hydrophytic vegetation). We agree that this increase in shallow aquatic habitat will be beneficial and would increase functional values of pre-response conditions. The increase in overall 'wetland' FEWA and simultaneous loss of jurisdictional wetland FEWA should be more fully explained in the Long-Term Impacts (3.3.1) section."

- No response to these comments by ARCO has been discovered during the document collection process, however in 1998 the wetlands in the WSP OUs were examined following remedial actions, i.e., as a preliminary Step 4 assessment.
  - The preliminary Step 4 total area of jurisdictional wetlands equaled 722.0 acres. Total wetlands (jurisdictional wetlands plus shallow water habitat) equaled 1,750.3 acres. FEWA equivalent acres equaled 1,474.8 acres.
  - As a result, wetland areas delineated in Step 4 was 219.2 acres less than that found for pre-remedial conditions in Step 1. As predicted, this decrease was due primarily to a conversion of shallow water areas to deepwater habitat and secondarily of delineated wetland to upland in dry-closure areas. There was a general increase in functional rating of wetlands in the WSP OUs resulting from replacement of non-vegetated mudflats, which have little wetland functional value, by shallow water habitat in wet-closure areas, which have considerably more functional value. A few areas in the WSP OU, however, showed a decrease in functional value primarily due to the loss of vegetation diversity under higher water levels. Combining the changes in wetland area and functional value, there was a loss of 18.2 FEWA equivalent acres from pre-remedial (Step 1) to post-remedial conditions (Step 4).

- The review and sign-off of wetland status in the WSP OU should have occurred in 2005, 10 years after the completion of remedial action construction at the site. In its preliminary Step 4 assessment, however, ARCO proposed that the final assessment of wetland areas at the WSP OU would follow substantial completion of upstream actions, i.e., along Silver Bow Creek and within the ARWWS OU. ARCO is seeking to delay assessment, as it is anticipated that treatment system operation and pool levels at the WSP OU will be modified to handle lower inlet concentrations of metals. In short, the status and future of wetlands within the WSP OU remains up in the air.

Yankee Doodle tailings impoundment

- The Yankee Doodle tailings impoundment (also Yankee Doodle Pond) lies below Butte's Moulton Reservoir and above the Berkeley Pit/Continental Pit area. The dam holding back the impoundment is constructed from waste rock mined out of the Berkeley Pit and stands over 650 feet (200 meters) tall, the tenth highest dam in the United States. As part of active mining operations, Montana Resources pumps tailings and water from the Horseshoe Bend water treatment plant to the Yankee Doodle Pond. Lime rock is also added, settling out metals and tailings particles on the south portion of the ponds. Snowmelt runoff from upper drainages also mixes with the water at the north end of the pond. These factors result in water that is relatively clean, and birds and other wildlife often use the area.

- When mining operations were suspended from 2000 through 2003, water was no longer pumped to the Yankee Doodle site, and the tailings deposited there began to dry out. In response to dust clouds that began blowing off the tailings pond, Montana Resources spread about 1.5 million tons of rock, approximately 18 inches deep, over about 506 aces at the site. Since the mine reopened, the tailings deposit has remained wet, resulting in no further billows of tailings-dust.

- The Yankee Doodle tailings impoundment lies within the Active Mining and Milling OU of the Silver Bow Creek/Butte Area NPL site. Under the Record of Decision for the Butte Mine Flooding OU (1994), and the accompanying Consent Decree (2002) and Explanation of Significant Differences (2002), the Montana Department of Environmental Quality holds primary responsibility for the active mine area and the Yankee Doodle Tailings Pond. The EPA, however, continues to hold responsibility for the associated sludge repositories.

- No step of the Four Step process has been conducted at the Yankee Doodle tailings impoundment, or in the Active Mining and Milling OU.

Assorted Other Findings

- For the purpose of wetland accounting, at least 10 of the previously named OUs near Anaconda, such as the Flue Dust OU, the Mill Creek OU and the Arbiter/Beryllium Wastes OU, have been absorbed into the ARWWS OU.

- Several OUs listed on the EPA website for the Clark Fork Basin have not yet had their wetlands quantified: the Butte Mine Flooding/Berkeley Pit OU, the West Side Soils (formerly Non-priority Soils) OU, and the Active Mining and Milling Area OU, which contains the artificially created wetlands of the Yankee Doodle Tailings. Given that these areas have received no wetlands attention to this point, it is unclear whether they will.

- In most cases, the wetlands delineation and evaluation processes within the CFB preceded under common assumptions, but in almost all cases, unique circumstances or modifications to the field work or analyses occurred, making a side-by-side comparison of results an imperfect exercise. For instance, in many cases the FEWA functional assessments for Flood Flow alteration was down-weighted 50 percent, except in the case of the Step 3 analyses performed for the Streamside Tailings, where this characteristic was given full weight.
- In 4 of the 10 OUs discussed in detail in this report, acreages by Cowardin Dominance Types have been collected in one of the Four Steps. This information is available only at a broad-brush stroke level for the other five OUs (i.e., as jurisdictional wetlands, water < 6.6 ft [2 m] in depth, and water > 6.6 ft [2 m] in depth).

NAME	WITH
Tim Hilmo	Pioneer
Steve [illegible]	[illegible]
Roy Thun	Atlantic Richfield Co.
Tony Wesche	Pioneer Technical
Kris Edwards	EPA
[illegible]	ESG
Paul Hansen	ESG
Karen Nelson	USFWS
Dana Jacobsen	Via Phone
John Sithens	Via Phone

APPENDIX C

DUTCHMAN POND (NORTH) TRAILHEAD
PUBLIC ACCESS INFORMATION

Appendix C1	**Dutchman Property QuitClaim Deed and Public Access Easement**
Appendix C2	**Dutchman Dike Access Road Easement**

Appendix C1

Dutchman Property QuitClaim Deed and Public Access Easement

QUITCLAIM DEED

THIS QUITCLAIM DEED is made effective as of this 7th day of October, 2004 between ARCO Environmental Remediation, L.L.C., a Delaware limited liability company ("Grantor"), whose address is 377 Anaconda Road, Butte, Montana 59701 and Ueland Ranches, Inc., a Montana corporation ("Grantee"), whose address is Silver Bow, Montana 59750.

I. CONVEYANCE

1.1 Real Property. For and in consideration of Ten Dollars ($10.00) and other good and valuable consideration paid by Grantee to Grantor, the receipt and sufficiency of which are hereby acknowledged, Grantor grants, sells, and conveys unto the Grantee and its successors and assigns forever, all of Grantor's right, title and interest in and to the real property described in Exhibit A, attached hereto and incorporated herein by this reference, together with any and all right, title and interest of Grantor in and to the following: (a) all improvements and fixtures on the real property as of the date hereof (including, without limitation, existing barns, corrals, fences and related improvements and fixtures), (b) all veins, lodes or mineral deposits (including, without limitation, hardrock minerals, coal, oil, gas, sand, gravel or other similar substances) underneath, extending into, or contained in the real property, and the right to mine such interest in the same, (c) all rights-of-way or easements of every kind and character appurtenant to, or for the benefit of the real property, or any part thereof, or owned or used in connection therewith, and the right to use the same, (d) any adjoining or adjacent streets, roads, or rights-of-way and vacated alleys appurtenant to the real property, and (e) all and singular the tenements, hereditaments, privileges, appurtenances and appropriations of every kind and nature (the "Property"), reserving to Grantor, and its successors and assigns, all water, water supplies, and water rights of every kind and character used on or connection with any of the Property, together with all ditches, canals, ditch easements, and all measurement, diversion, and control facilities used in connection therewith.

1.2 Covenants. The grants, sales and conveyances set forth in Sections 1.1 of this Deed are made subject to the Covenants contained in Article II of this Deed and the Public Access Agreement contained in Article III of this Deed.

II. COVENANTS

2.1 The Covenants. The following covenants (the "Covenants") shall burden the Property and are intended to be and shall be construed as covenants of Grantee, and its successors and assigns, which run with the Property:

2.1.1 Except as otherwise provided in the Water Right Lease Agreement, attached hereto as Exhibit B and incorporated herein by this reference ("Water Right Lease Agreement") Grantee, and its successors and assigns with respect to all or any portion of the Property, shall take no acts, or suffer any acts to be taken, that would otherwise diminish the flows of Warm Springs Creek or any of its tributaries thereto whenever there is insufficient water available to use any of the Water Rights.

2.1.2 Except as otherwise provided in the Water Right Lease Agreement, Grantee, and its successors and assigns with respect to all or any portion of the Property, shall not oppose or contest any applications in any judicial or administrative proceedings brought by Grantor, or its successors or assigns, seeking the authority to use the Water Rights for a new use or uses at a different location or locations and/or through a different point or points of diversion, and in all respects Grantee, and its successors and assigns with respect to all or any portion of the Property, acknowledge that Grantor, and its successors and assigns, may fully consume or otherwise use all of the water and water supply available by and through the maximum diversion rates of the Water Rights, and Grantee acknowledges that Grantor's use of all of the water and water supply available by and through the maximum diversion rates of the Water Rights will not adversely affect the Property or any other property rights of Grantee, or its successors and assigns, wherever located.

2.1.3 Grantee, and its successors and assigns with respect to all or any portion of the Property, shall not take, authorize or allow any direct or indirect action which interferes with, is inconsistent with, hinders, delays, diminishes or frustrates the implementation, effectiveness, purposes or integrity of any Remedial Action required under Applicable Laws or by any federal, state or local Governmental Authority on, at, under near or associated with the Property.

2.1.4 Grantee, and its successors and assigns with respect to all or any portion of the Property, shall provide access to the Property to Grantor, Atlantic Richfield Company, the United States Environmental Protection Agency, and the State of Montana and their respective agents, employees, representatives and contractors for the following purposes:

2.1.4.1 Verifying any data or information submitted to any of the above-listed persons;

2.1.4.2 Obtaining samples;

2.1.4.3 Verifying compliance with the Covenants set forth in this Deed; and

2.1.4.4 Verifying compliance with the Reclamation Plan and the Vegetation Management Plan.

2.1.5 The Property may only be used for Agricultural Purposes or Open Space/Recreational (as defined in the Anaconda-Deer Lodge County Development Permit System), except that residential or commercial/industrial development shall be permitted under the following conditions:

2.1.5.1 Grantee, and/or its successors and assigns with respect to all or any portion of the Property proposed for residential or commercial/industrial development, shall notify Grantor in writing of its or their intent to commence residential or commercial/industrial development of all or any part of the Property. In addition, Grantee, and its successors and assigns with respect to all or any portion of the Property proposed for residential or commercial/industrial development, shall provide copies of any applications, plans or other submissions made to Anaconda-Deer Lodge County in connection with any proposed residential or commercial/industrial development. Such copies shall be provided on a timely basis so as to allow Grantor, or its successors or assigns, to (a) provide input to the current property owner and/or the appropriate public officials prior to making any decision on the development, and (b) participate in any public proceedings concerning the proposed development.

2.1.5.2 Grantee, and/or its successors and assigns with respect to all or any portion of the Property proposed for residential or commercial/industrial development, shall be solely responsible for all Remedial Actions and Operation and Maintenance Activities related to or necessitated by the development. All Remedial Actions and Operation and Maintenance Activities shall be undertaken and performed in accordance with and in a manner consistent with all Applicable Laws. In addition, Grantee, and/or its successors and assigns with respect to all or any portion of the Property proposed for residential or commercial/industrial development, shall be solely responsible for any and all claims, liabilities or obligations of any nature based upon any Environmental Condition of the Property which arises directly or indirectly from the development.

2.1.6 Grantee, and its successors and assigns with respect to all or any portion of the Property, shall be permitted to continue to use the existing farm houses and associated structures for farming, ranching and residential purposes. Such use shall include repairs, replacements, modifications, improvements and additions to existing facilities. Construction of new structures or buildings intended for residential use shall be subject to the provisions of Sections 2.1.5.1 and 2.1.5.2 hereof. Further, any existing wells may be used in conjunction with the farm houses and associated property. However, no new wells may be constructed unless such wells are in replacement of existing wells and are constructed in accord with the requirements of 2.1.7 hereof.

2.1.7 The use, construction and/or drilling of water wells and development of groundwater supplies on the Property shall conform and be consistent with the requirements of all Applicable Laws. This covenant shall include compliance with any limitation or prohibition upon use of groundwater for domestic or potable supply. Grantee, and its successors and assigns with respect to all or any portion of the Property, shall be solely responsible for all costs for any treatment or other Remedial Actions that may be required to allow development and use of groundwater beneath the Property under Applicable Laws. All well construction standards and rules under Applicable Laws for permitting of new wells and use of groundwater for water supply (for potable or non-potable water) shall apply to any new wells constructed on the Property.

2.1.8 Grantee, and its successors and assigns with respect to all or any portion of the Property, at their expense, shall control noxious weeds and maintain any vegetation and drainage control structures in good condition.

2.1.9 No new unlined pond systems shall be permitted on the Property.

2.1.10 .Grantee, and its successors and assigns with respect to all or any portion of the Property, may remove Borrow Materials from the Property only if the Borrow Materials will be used for (i) any purpose within the exterior boundaries of the Property or (ii) the purpose of performing Remedial Actions and/or Operation and Maintenance Activities within the Anaconda Smelter Site or the Upper Clark Fork River Basin

2.1.11 Grantee, and its successors and assigns with respect to all or any portion of the Property, at their expense, shall maintain the Property in good condition using Best Available Grazing Management Practices.

2.1.12 Grantee, and its successors and assigns with respect to all or any portion of the Property, at their expense, shall take such actions as may be necessary to use and maintain the Property in accordance with and in a manner consistent with the requirements of Applicable Laws.

2.2 Benefited Persons/Properties. The Covenants set forth herein shall be for the benefit of Grantor, and its successors and assigns and any subsequent owner of all or any part of the real property described in Exhibit C, attached hereto and incorporated herein by this reference ("Benefited Property") and any subsequent owner of all or any part of the Water Rights.

2.3 Modification of Covenants. Any proposed modification of the Covenants that would serve to increase or add to the burden upon the Property must be approved in writing by (i) Grantor, (ii) the current owner of all or any part of the Benefited Property and/or the Water Rights benefited by the Covenant to be modified, and (iii) the current owner of those portions of the Property affected by the modification (currently Grantee). Any proposed modification of the Covenants that would serve to terminate all or any portion of a Covenant or decrease the burden upon the Property must be approved in writing by (i) Grantor and (ii) the current owner of all or any part of the Benefited Property and/or the Water Rights benefited by the Covenant to be modified. In order to be effective, any modification of the Covenants must be dated after the date of this Deed and duly recorded in the Anaconda-Deer Lodge County real property records. Any modification that complies with the foregoing requirements shall be deemed duly created and enforceable from and after the effective date thereof.

2.4 Designation of Rights. Grantor may designate any person or entity to exercise the approval rights granted under Section 2.3. Any such designation shall be in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

III. RESERVED EASEMENT

3.1 Public Access Easement. Within two years from the date of this Quitclaim Deed, Grantee shall construct a roadway for purposes of public ingress and egress in the location designated on

Certificate of Survey No. 361-B as the "Access Easement" in Section 16, Township 5 North, Range 10 West, P.M.M., Deer Lodge County, Montana. The roadway for public ingress and egress shall be of equal or better quality as the existing roadway currently located in the west half (W½) of Section 15, Township 5 North, Range 10 West, P.M.M., Deer Lodge County, Montana (the "Public Access Roadway"). Grantor hereby reserves and Grantee hereby grants to Grantor, and its successors and assigns, an easement (the "Public Access Easment") for purposes of public ingress and egress over, across, through and in the location of the Public Access Roadway. The Public Access Easement is intended to be a burden upon the portion of the Property described herein for the benefit of Grantor, and its successors and assigns. The repair, maintenance and/or reconstruction of the Public Access Roadway shall be the sole responsibility of Grantor and its successors and assigns. Nothing contained in this Section 3.1 shall preclude Grantor or its successors and assigns from limiting or precluding the use of the Public Access Easement herein granted.

IV. ENFORCEMENT RIGHTS AND REMEDIES

4.1 Enforcement of Covenants. Grantor, its successors and assigns and the current owner of all or any of the Property and/or the Water Rights benefited by the Covenants shall have the right to enforce the Covenants (the "Enforcing Party"). Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law.

4.2 Remedies:

4.2.1 Remedies. All remedies available at law, in equity or specifically provided in this Deed shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the Enforcing Party.

4.2.2 Specific Performance. Grantor and Grantee hereby specifically agree that in addition to all other remedies available under this Deed, at law or in equity, the remedy of "specific performance" shall be available to the Enforcing Party. Grantee hereby waives, to the fullest extent permitted by Montana law, any rights it may have to argue that specific performance is an inappropriate remedy.

4.2.3 Other Remedies. In the event that Grantee, or its successors or assigns with respect to all or any portion of the Property, fail to comply with any of the Covenants, the Enforcing Party may, but shall not be obligated to, notify Grantee, or its successors or assigns, in writing of the failure, which notice shall specify the item(s) of non-compliance. Grantee, or its successors or assigns with respect to all or any portion of the Property, shall have 3 days following delivery of the notice to correct the items of non-compliance to the written satisfaction of the Enforcing Party that gave the notice. If Grantee, or its successors or assigns with respect to all or any portion of the Property, do not cure the failure within 3 days following delivery of the notice, the Enforcing Party shall have the right, but not the obligation, to take such actions as may be necessary to cure the failure and to charge to Grantee, or its successors or assigns with respect to all or any portion of the Property, the costs incurred by the Enforcing Party in taking any such actions. Grantee, or its successors or assigns with respect to all or any portion of the Property, shall promptly reimburse the Enforcing Party for all such costs incurred. Further, Grantor, and its successors and assigns with respect to all or any portion of the Property, shall indemnify, defend and hold harmless, the Enforcing Party, its agents, employees or contractors from and against all claims against the Enforcing Party, or liabilities incurred by the Enforcing Party, in taking such actions. Nothing in this Section 4.2.3 shall limit, qualify or abrogate the Enforcing Party's right to specific performance under Section 4.2.2.

4.2.4 Attorneys Fees. If the Enforcing Party is the prevailing party in any action brought by it, the Enforcing Party shall be entitled to reasonable attorneys' fees and costs incurred in bringing such action.

4.3 No Waiver. A delay or failure to enforce in any specific instance any Covenant or any violation of any Covenant shall not preclude or waive the right of any Enforcing Party to enforce such Covenant or the violation thereof in that or in any other instance.

4.4 Waiver. An Enforcing Party may waive, in a writing executed by the Enforcing Party, a violation of the Covenants. Such waiver shall relate only to the specific violation described in the waiver and shall not be effective to waive any other Covenants or any prior or subsequent violation, whether of the same or different nature. A waiver by one Enforcing Party shall not be effective against or constitute a waiver by any other Enforcing Party.

4.5 Designation of Rights. Grantor may designate any person or entity to exercise the enforcement and waiver rights granted under this Article IV. Any such designation shall be in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

V. CONVEYANCE/SUBSEQUENT OWNERS

5.1 Provisions of Subsequent Conveyance Instruments. Grantee hereby agrees that in any subsequent conveyance of all or any part of the Property, or any interest in the Property (including without limitation any grant of an easement burdening all or any part of the Property or any grant of a lease of all or any part of the Property), the Grantor shall include the following provisions in the deed or other conveyance instrument (completed appropriately to refer to this Deed and modified only so as to fit appropriately in the context of the conveyance instrument):

> Grantee hereby agrees to: (i) accept the Property subject to the covenants set forth in that certain Quitclaim Deed dated _________, and recorded on _________ in Book _____, at Page _____ of the Anaconda-Deer Lodge County real property records (the "Covenant Deed"), and (ii) abide by the covenants as owner of the Property.
>
> Grantee hereby also agrees that in any subsequent deed or other conveyance instrument, it shall require the grantee in such deed or conveyance instrument to either (a) execute the deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph, or (b) execute a separate acknowledgment attached to the deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph.

5.2 Binding Effect. Notwithstanding the foregoing, any person or entity who acquires any right, title or interest in all or any part of the Retained Property shall be conclusively deemed to have consented and agreed to the provisions of Section 5.1, whether or not any reference to this Deed or these provisions is contained in the deed or other conveyance instruments by which such person or entity acquires an interest in the Property.

VI. ASSUMPTION OF OBLIGATIONS UNDER LAND LEASE

6.1 Land Lease. A portion of the Property is subject to that certain Land Lease and Easement for Sewage Effluent Storage and Rapid Infiltration Ponds and Mixing Zone at Anaconda-Deer Lodge County, Montana (the "Land Lease"), with Anaconda-Deer Lodge County, Montana. The Land Lease is recorded in the public records of Deer Lodge County, Montana, at Book 81, pages 610-618. In addition to a portion of the Property being subject to the Land Lease, Grantor currently owns property that is subject to the Land Lease.

6.2 Assumption of Obligations Under Land Lease. Grantee, for itself and its successors and assigns, hereby assumes and accepts all obligations of the "Property Owner" and "Grantor" under the

Land Lease, which obligations shall remain solely the obligations of Grantee and not the obligations of any owner of other property which is subject to the Land Lease not currently owned by Grantee, including the property owned by Grantor and its successors and assigns, including the Montana Department of Fish, Wildlife and Parks.

6.3 Indemnification by Grantee. Grantee shall indemnify, defend and hold harmless Grantor and its successors and assigns, from and against any and all claims, liabilities, obligations, demands, actions, arbitrations, proceedings, losses, costs, expenses, fines, penalties, and fees (including attorney's fees, expert fees and other professional fees) that Grantor or its successors and assigns may incur or become subject to, directly or indirectly, as a result of the performance or non-performance of the obligations assumed by Grantee under the Land Lease as described herein.

VII. DEFINITIONS

For purposes of this Deed, the following terms shall have the meaning:

7.1 Anaconda Smelter Site shall mean the area designated by the United States Environmental Protection Agency and placed on the National Priority List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 31, 1983, 48 Fed. Reg. 30658 and any modifications or changes thereto made by the United States Environmental Protection Agency.

7.2 Applicable Laws shall mean and include, without limitation, all Environmental Laws, and all other applicable statutes, regulations, ordinances, decrees, orders, judgments, rules or agreements of any Governmental Authority, as the same may change from time to time. The term shall also include, without limitation, all applicable requirements and standards described or set forth in the Record of Decision for the Anaconda Regional Water, Waste and Soils Operable Unit of the Anaconda Smelter Site and all other applicable decision documents for the Anaconda Smelter Site prepared by the United States Environmental Protection Agency, the State of Montana, Grantee and/or Atlantic Richfield Company, or otherwise imposed by the United States Environmental Protection Agency, the State of Montana, Anaconda-Deer Lodge County or any other Governmental Authority having jurisdiction over the subject matter and any and all amendments to such documents required by any Governmental Authority having jurisdiction over the same from and after the date of this Deed. The term shall also include the Reclamation Plan and the Vegetation Management Plan. The term shall also include, without limitation, all applicable requirements of the Anaconda-Deer Lodge County Development Permit System, as the same may change from time to time.

7.3 Benefited Property shall have the meaning assigned to it in Section 2.2 of this Deed.

7.4 Best Available Grazing Management Practices shall mean the use of rotational grazing or other practices approved by the United States Soil Conservation Service for the Retained Property to maintain and improve range condition.

7.5 Borrow Material shall mean cover and fill materials consisting of surface and subsurface soils, topsoil, dirt, fill, sand, gravel, clay, rocks and like materials.

7.6 CECRA shall mean the Montana Comprehensive Environmental Cleanup and Responsibility Act, M.C.A. §§ 75-10-701, et seq.

7.7 CERCLA shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9601, et seq., as amended.

7.8 Covenants shall have the meaning assigned to it in Section 2.1 of this Deed.

7.9 Environmental Conditions shall mean and include, without limitation, any condition, circumstance, quality, quantity or other state of the land, subsurface, strata, air, surface water, groundwater, fish, wildlife, or biota arising out of, related to or resulting from the Release or threatened Release, generation, transport, handling, treatment, storage, disposal, management, presence of or exposure to any Hazardous Materials or Mine Waste.

7.10 Environmental Laws shall mean any past, present or future federal, state or local laws, regulations, ordinances, permits, approvals or authorizations pertaining to natural resources, Environmental Conditions, protection of human health, welfare or the environment or historic, archeological or cultural preservation, including without limitation CERCLA; the Clean Air Act (42 U.S.C. §§ 7401 et seq.); the Federal Water Pollution Control Act (33 U.S.C. §§ 1251 et seq.); the Resource Conservation and Recovery Act (42 U.S.C. §§ 6901 et seq.); the Safe Drinking Water Act (42 U.S.C. §§ 300(f) et seq.); the National Historic Preservation Act (16 U.S.C. § 470); CECRA; the Montana Hardrock Mining Act; the Montana Water Quality Act (M.C.A. §§ 75-5-101 et seq.); the Clean Air Act of Montana (M.C.A. §§ 75-2-101 et seq.); the Natural Streambed and Land Preservation Act (M.C.A. §§ 75-7-101 et seq.); and the Montana Floodplain and Floodway Management Act (M.C.A. §§ 76-5-101 et seq.); all as amended and as may change from time to time; and all applicable ARARs and ERCLs; and any provisions or theories of common law providing for any cause of action remedy or right of recovery with respect to, arising from or related to Environmental Conditions, as any such provisions or theories may change from time to time.

7.11 Governmental Authority shall mean any federal, state or local government administrative agency or commission, or other governmental authority or instrumentality having jurisdiction over the subject matter.

7.12 Hazardous Material shall mean any substance (i) the presence of which requires investigation of or remediation under any federal, state or local statute, regulation, ordinance, order, action, policy or common law; or (ii) which is defined or listed as a "hazardous waste," "hazardous substance," "extremely hazardous substance," "hazardous or deleterious substance," or "pollutant or contaminant" under any Environmental Laws; or (iii) which is toxic, explosive, corrosive, flammable, infectious, radioactive, carcinogenic, mutagenic, or hazardous; or (iv) the presence of which causes or threatens to cause a nuisance or poses or threatens to pose a threat to human health, safety or the environment; or (v) which contains, without limitation, gasoline, diesel fuel or other petroleum hydrocarbons; or (vi) which contains polychlorinated biphenyls (PCBs), asbestos or urea formaldehyde foam insulation.

7.13 Mine Waste shall mean solid, liquid or gaseous waste materials and their constituents resulting from or related to mining, milling, smelting, processing, or refining operations, and any structures and debris associated with such operations, including, without limitation, the following waste materials and their constituents resulting from or related to the extraction, beneficiation, or processing of ores and minerals: waste rock, overburden, tailings, slag, flue dust and other waste materials.

7.14 Operation and Maintenance Activities shall mean all activities of any kind or nature whatsoever which are required under Applicable Laws: (i) to monitor Environmental Conditions and/or Remedial Actions; or (ii) to maintain, repair and/or replace any component of any Remedial Action. The term shall include, without limitation, any and all related sampling, inspection and reporting requirements of any kind or nature whatsoever. The term shall also include, without limitation, all activities necessary to maintain an effective vegetative cover and all activities necessary to control noxious weeds, erosion and unauthorized entries. The term shall also include, without limitation, the removal of garbage and debris.

7.15 Property shall have the meaning assigned to it in Section 1.1 of this Deed.

7.16 Public Access Easement shall have the meaning assigned to it in Section 3.1 of this Deed.

7.17 Reclamation Plan shall mean (i) that certain draft document entitled "Anaconda Smelter NPL Site, Anaconda Regional Water, Waste & Soils Operable Unit, West Galen Expansion Area, Final Design Report, February 2004", and (ii) that certain draft document entitled "Anaconda Smelter NPL Site, Anaconda Regional Water, Waste & Soils Operable Unit, West Galen Expansion Area, Remedial Action Work Plan, February 2004", and (iii) any and all amendments to such documents or other reclamation requirements required by any Governmental Authority having jurisdiction over the same from and after the date of this Deed including, without limitation, any and all such amendments or requirements which relate to or concern the soil amendments (e.g. lime, fertilizer and organic matter) to be applied.

7.18 Release shall mean any spilling, leaking, pumping, pouring, emitting, leaching, emptying, discharging, injecting, escaping, dumping, burying, disposal or emanation whatsoever.

7.19 Remedial Action shall mean any response, removal, or remedial action, within the meaning of those terms under CERCLA and CECRA, regardless of whether such actions are undertaken pursuant to CERCLA or CECRA authority and any reclamation, restoration, or rehabilitation actions or any other actions of any kind or nature whatsoever required under any Applicable Laws to address Environmental Conditions.

7.20 Vegetation Management Plan shall mean that certain draft document entitled "Anaconda Smelter NPL Site, Anaconda Regional Water, Waste and Soils Operable Unit, Vegetation Management Plan, 2004" and any and all amendments to such document or other vegetation management requirements required by any Governmental Authority having jurisdiction over the same from and after the date of this Deed.

7.21 Water Rights shall mean all waters, water supplies and water rights, together with all ditches, canals, ditch easements, and all measurement, diversion, and control facilities used in connection with (i) all the water, water supplies and water rights arising out of or reflected by the water rights described in Exhibit D, attached hereto and incorporated herein by this reference and (ii) any other water, water supply or water right used on or in connection with the Property and/or Benefited Property, together with any and all right, title and interest of Grantor in and to all and singular the tenements, hereditaments, privileges, appurtenances and appropriations of every kind and nature of each.

7.22 Water Right Lease Agreement shall mean the Water Right Lease Agreement attached as Exhibit B to this Deed and incorporated herein by this reference.

The Grantor has executed this Deed effective as of the date first written above.

GRANTOR:

ARCO ENVIRONMENTAL REMEDIATION, L.L.C.

By: ____________________
Robin J. Bullock

GRANTEE:

UELAND RANCHES, INC.

By: ____________________
Its President

STATE OF MONTANA)
: ss.
COUNTY OF SILVER BOW)

On this 7th day of October, 2004, before me, a Notary Public for the State of Montana, personally appeared Robin J. Bullock, known to me to be the Vice-President of ARCO Environmental Remediation, L.L.C. and acknowledged to me that he/she executed the foregoing instrument on behalf of ARCO Environmental Remediation, L.L.C.

IN WITNESS WHEREOF, I have set my hand and affixed my official seal the day and year first above written.

J. RICHARD ORIZOTTI NOTARIAL SEAL STATE OF MONTANA (SEAL)

J Richard Orizotti
(signature)

J. Richard Orizotti
(print name)
Notary Public for the State of Montana
Residing at: Butte
My commission expires: 11/10/05

STATE OF MONTANA)
: ss.
COUNTY OF SILVER BOW)

On this 7th day of October, 2004, before me, a Notary Public for the State of Montana, personally appeared Dan Ueland, known to me to be the President of Ueland Ranches, Inc. and acknowledged to me that he/she executed the foregoing instrument on behalf of Ueland Ranches, Inc.

IN WITNESS WHEREOF, I have set my hand and affixed my official seal the day and year first above written.

J. RICHARD ORIZOTTI NOTARIAL SEAL STATE OF MONTANA (SEAL)

J Richard Orizotti
(signature)

J. Richard Orizotti
(print name)
Notary Public for the State of Montana
Residing at: Butte
My commission expires: 11/10/05

W/7760/DOC/041007.G/OPR52

EXHIBIT A TO QUITCLAIM DEED

Legal Description of the Property

Tract C of Certificate of Survey No. 361-A, a tract of land located in the following Section:

Section 1, Township 5 North, Range 10 West, Deer Lodge County.

Tract B of Certificate of Survey No. 361-A, a tract of land located in the following Sections:

Section 2, Section 3, Section 4, Section 8, Section 9, Section 10, Section 11, Section 15, Section 16, Section 17, Section 20, Section 21, Township 5 North, Range 10 West, Deer Lodge County.

Section 29, Township 5 North, Range 10 West, Deer Lodge County.

All, lying North and West of the Northerly boundary of the Montana State Highway as described in the Deed Book 70 page 572, records of Deer Lodge County, and Excepting the Montana State Highway as described in the Deed Book 70 page 572, records of Deer Lodge County, and Excepting the area deeded by the Anaconda Company to Edmund P. Harrison as recorded in Book 102 page 238 of Deed records of Deer Lodge County, and Excepting that area deeded by Mt. Haggin Livestock, Inc. to the City of Anaconda and recorded in Book 106 of Deeds at page 444, records of Deer Lodge County, and Excepting that area deeded to the City of Anaconda, a Municipal corporation, and recorded in Book 113 of Deeds at page 27, records of Deer Lodge County, and Subject to the "Clear Zone" Easements recorded in Book 106 of Deeds at pages 446 and 450, records of Deer Lodge County.

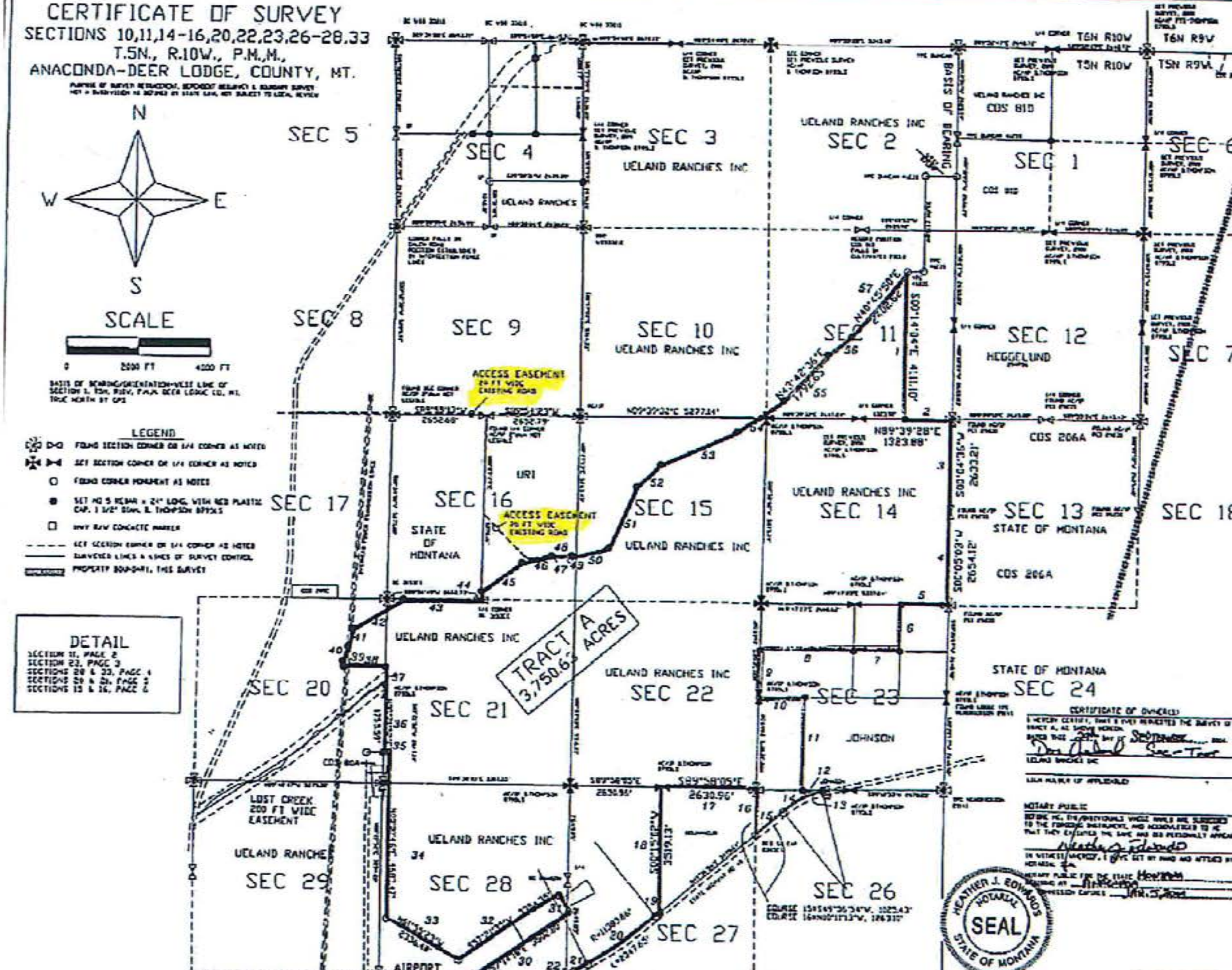
Excepting from the E1/2E1/2 of Section 29, that area deeded from Mount Haggin Ranch to Anaconda-Deer Lodge County, a political subdivision of the State of Montana by Deed in Book 81 page 152 of Deed records of Deer Lodge County, Montana.

Deed Reference: Microfilm Book 110 page 311 (12/31/1996)

Tax Parcel ID No. 489260

CERTIFICATE OF SURVEY

SECTIONS 10,11,14-16,20,22,23,26-28,33
T.5N., R.10W., P.M.,M.,
ANACONDA-DEER LODGE, COUNTY, MT.



LEGAL DESCRIPTION TRACT A

A TRACT OF LAND LOCATED IN SECTIONS 10, 11, 14, 15, 16, 20, 21, 22, 23, 26, 27, 28, AND 33, T.5N., R.10W., P.M.M., DESCRIBED AS FOLLOWS:

COMMENCING AT THE NE1/16 CORNER OF SAID SECTION 11, WHICH IS THE TRUE POINT OF BEGINNING OF TRACT A; THEN PROCEEDING ALONG THE FOLLOWING 57 COURSES; (1)THENCE S00°14'04"E., 4111.10 FT.; (2)THENCE N89°39'28"E., 1323.88 FT., TO THE SE CORNER OF SAID SECTION 11; (3)THENCE S00°04'36"W., 2632.21 FT., TO THE E1/4 CORNER OF SAID SECTION 14; (4)THENCE S00°05'03"W., 2654.12 FT., TO THE SE CORNER OF SAID SECTION 14; (5)THENCE S89°47'38"W., 1334.31 FT.; (6)THENCE S00°[illegible]"W., 1324.03 FT.; (7)THENCE S89°39'17"W., 1335.53 FT.; (8)THENCE S89°38'14"W., 2671.03 FT.; (9)THENCE S00°32'02"W., 1334.79 FT., TO THE W1/4 OF SAID SECTION 23; (10)THENCE N89°[illegible]"E., 1336.71 FT.; (11)THENCE S00°29'06"W., 2068.44 FT., TO THE NORTH LINE OF SAID SECTION 26; (12)THENCE N89°10'53"E., 565.61 FT.; (13)THENCE S10°00'00"E., 48.63 FT., TO THE NORTH SIDELINE OF STATE HIGHWAY NO. 48, AND POINT OF NON TANGENT CURVE, SAID CURVE HAVING A RADIUS OF 2048.48 FT., A CENTRAL ANGLE OF 25°48'36", AND RADIAL BEARING OF S14°34'30"E.; (14)THENCE SOUTHWESTERLY, TO THE LEFT, ALONG SAID CURVE, AND SIDELINE, 1026.43 FT.; (15)THENCE S49°26'34"W., ALONG SAID SIDELINE, 1025.43 FT., TO THE WEST LINE OF SAID SECTION 26; (16)THENCE N00°11'13"W., 1262.50 FT., TO THE NE CORNER OF SAID SECTION 27; (17)THENCE N89°58'05"W., 2630.96 FT., TO THE N1/4 CORNER OF SAID SECTION 27; (18)THENCE S00°15'02"W., 3519.13 FT., TO THE NORTH SIDELINE OF SAID HIGHWAY 48; (19)THENCE S49°26'34"W., ALONG SAID SIDELINE, 154.83 FT., TO POINT OF CURVE, SAID CURVE HAVING A RADIUS OF 11303.66 FT., A CENTRAL ANGLE OF 11°49'50", AND RADIAL BEARING OF N40°23'06"W.; (20)THENCE SOUTHWESTERLY ALONG SAID CURVE AND SIDELINE, TO THE RIGHT, 2347.65 FT.; (21)THENCE S61°23'48"W., ALONG SAID SIDELINE, 683.52 FT., TO THE EAST LINE OF SAID SECTION 28; (22)THENCE S61°23'48"W., ALONG SAID SIDELINE, 35.05 FT., TO THE NORTH LINE OF SAID SECTION 33; (23)THENCE S61°23'48"W., ALONG SAID SIDELINE, 373.17 FT., TO POINT OF CURVE, SAID CURVE HAVING A RADIUS OF 2902.10 FT., CENTRAL ANGLE OF 9°27'58", AND RADIAL BEARING OF S28°36'12"E.; (24)THENCE SOUTHWESTERLY ALONG SAID CURVE AND SIDELINE, TO THE LEFT, 480.30 FT.; (25)THENCE N25°29'20"W., 157.50 FT.; (26)THENCE N87°59'46"W., 179.20 FT.; (27)THENCE N00°08'48"E., 390.22 FT.; (28)THENCE N57°15'39"E., 1559.61 FT.; (29)THENCE N32°39'10"W., 398.76 FT.; (30)THENCE N57°14'18"E., 3502.80 FT.; (31)THENCE N32°43'00"W., 342.78 FT.; (32)THENCE S57°21'25"W., 3354.35 FT.; (33)THENCE N61°52'22"W., 2336.45 FT.; (34)THENCE N00°00'48"E., 4680.47 FT.; (35)THENCE WEST, 140.35 FT., TO THE EAST LINE OF SAID SECTION 20; (36)THENCE N00°21'52"E., 1755.59 FT., TO THE E1/4 CORNER OF SAID SECTION 20; (37)THENCE N00°21'52"E., 711.79 FT.; (38)THENCE WEST, 1106.40 FT.; (39)THENCE N10°05'07"W., 154.52 FT.; (40)THENCE N21°05'55"E., 456.00 FT.; (41)THENCE N13°22'44"E., 502.26 FT.; (42)THENCE N58°44'56"E., 1636.82 FT., TO THE SOUTH LINE OF SAID SECTION 16; (43)THENCE N89°56'49"E., 2294.30 FT., TO THE S1/4 CORNER OF SAID SECTION 16; (44)THENCE N00°27'27"E., ALONG THE N/S MIDSECTION LINE OF SAID SECTION 16, 242.22 FT.; (45)THENCE N53°39'43"E., 1419.64 FT.; (46)THENCE N76°44'58"E., 885.30 FT.; (47)THENCE N59°40'00"E., 38.87 FT.; (48)THENCE N87°48'30"E., 556.01 FT.; (49)THENCE S48°33'53"E., 54.25 FT.; (50)THENCE N70°14'42"E., 1026.74 FT.; (51)THENCE N23°49'20"E., 1927.22 FT.; (52)THENCE N47°28'53"E., 918.69 FT.; (53)THENCE N53°10'33"E., 2328.57 FT.; (54)THENCE N54°29'38"E., 1606.06 FT.; (55)THENCE N43°42'36"E., 1792.65 FT.; (56)THENCE N32°09'35"E., 829.42 FT.; (57)THENCE N40°45'56"E., 2462.62 FT., TO THE POINT OF BEGINNING, CONTAINING 3750.63 ACRES OF LAND, ALL ACCORDING TO THIS CERTIFICATE OF SURVEY.

SUBJECT TO ANY EASEMENT OF RECORD.

CERTIFICATE OF COUNTY SANITARIAN

I HEREBY CERTIFY THAT THIS SURVEY HAS BEEN EXAMINED TO DETERMINE COMPLIANCE WITH THE SANITATION IN SUBDIVISION ACT, AND [illegible] SUBDIVISION.

DATED THIS 29th DAY OF Sept 2004.

ANACONDA-DEER LODGE COUNTY SANITARIAN

CERTIFICATE OF OWNER(S)

I HEREBY CERTIFY, THAT I (WE) REQUESTED THE SURVEY OF TRACT A, AS SHOWN HEREON.

DATED THIS 29th DAY OF September 2004.

Sec-Treas

UELAND RANCHES INC

LIEN HOLDER (IF APPLICABLE)

NOTARY PUBLIC

BEFORE ME, THE PERSON(S) WHOSE NAMES ARE SUBSCRIBED TO THE FOREGOING INSTRUMENT, AND ACKNOWLEDGED TO ME THAT THEY EXECUTED THE SAME AND DID PERSONALLY APPEAR.

Heather J. Edwards

IN WITNESS WHEREOF, I HAVE SET MY HAND AND AFFIXED MY NOTARIAL [illegible]

NOTARY PUBLIC FOR THE STATE Montana

RESIDING AT Anaconda

COMMISSION EXPIRES Jan. 5, 2006

HEATHER J. EDWARDS NOTARIAL SEAL STATE OF MONTANA

CERTIFICATE OF COUNTY TREASURER

I HEREBY CERTIFY, PURSUANT TO 76-3-[illegible], THAT ALL REAL PROPERTY TAXES AND SPECIAL ASSESSMENTS ASSESSED AND LEVIED ON THE LAND TO BE DIVIDED HAVE BEEN PAID.

DATED THIS 29th DAY OF Sept. 2004.

Jan Thomas [illegible] 504250, 507900, 507930

TREASURER, ANACONDA-DEER LODGE COUNTY

489260

William T. [illegible]

REVIEWING LAND SURVEYOR

MONT REG No. 3733-S

REVIEWED UNDER SECTION 76-3-[illegible], MCA

DATE: Sept. 29, 2004

CERTIFICATE OF LAND SURVEYOR

I HEREBY CERTIFY THAT THIS CERTIFICATE OF SURVEY IS A TRUE AND CORRECT REPRESENTATION OF A SURVEY PERFORMED UNDER MY DIRECT SUPERVISION DURING THE MONTH OF JUNE, 2003.

9/28/04

BRIAN D. THOMPSON
MONTANA REGISTRATION NO. 6795LS

MONTANA BRIAN D. THOMPSON 6796 LS

THOMPSON & ASSOCIATES
BRIAN THOMPSON, PLS
406-533-0526
Butte, Montana

FOR: UELAND RANCHES, INC

FISH, WILDLIFE & PARKS BOUNDARY SURVEY

CERTIFICATE OF CLERK & RECORDER

STATE OF MONTANA
COUNTY OF ANACONDA-DEER LODGE

FILED ON THE 29TH DAY OF SEPTEMBER 2004 AT 3:19 O'CLOCK P.M.

MARIE HATCHER By [illegible] Deputy

COUNTY CLERK & RECORDER

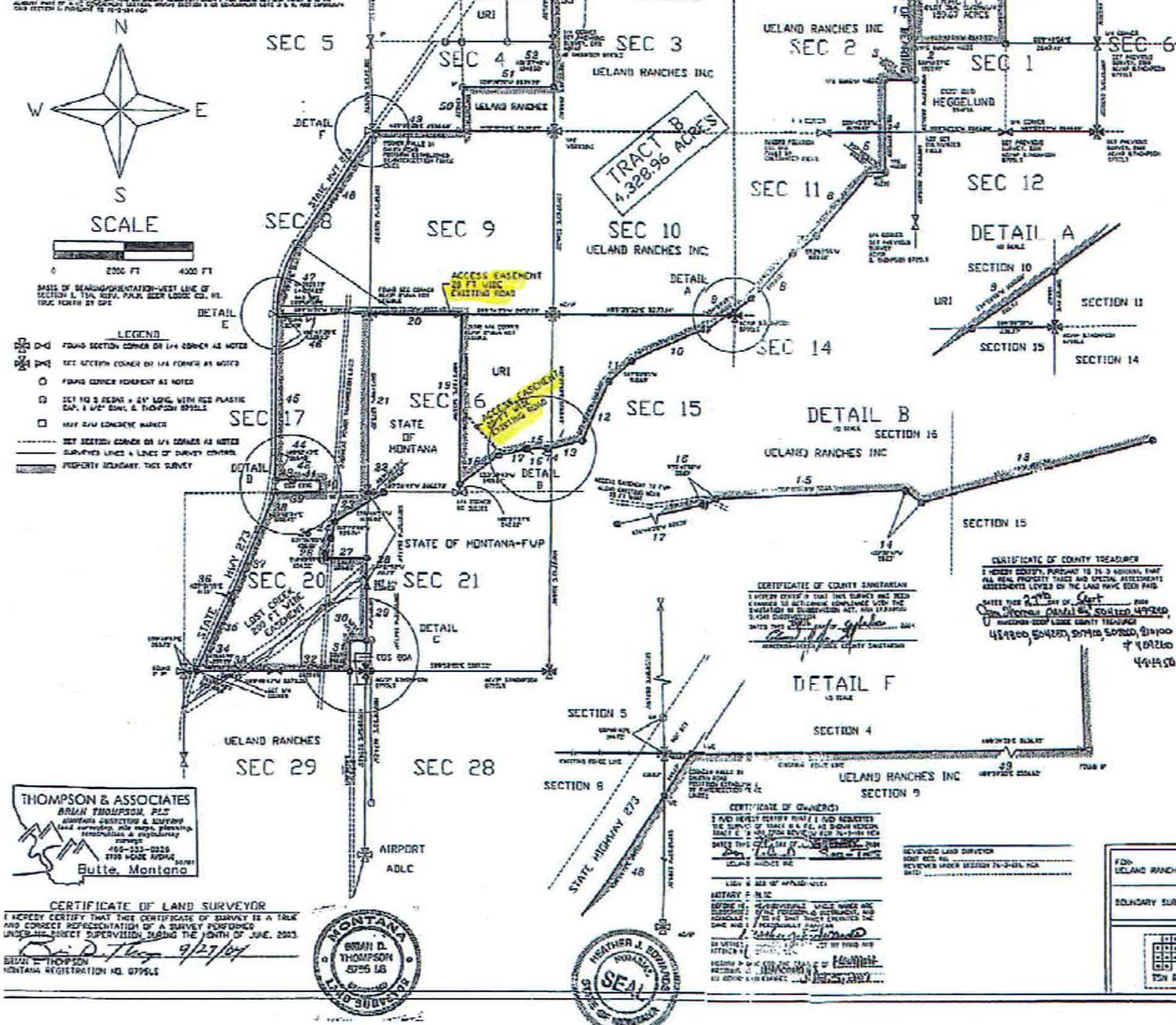
BOOK .... PAGE ....
INSTRUMENT NO. 171642

CERTIFICATE OF SURVEY No. 361-B

SHEET 1 of 6

CERTIFICATE OF SURVEY

SECTIONS 1-4, 8-11, 15-17, 20,21
T.5N., R.10W., P.M.M.,
ANACONDA-DEER LODGE, COUNTY, MT.



LEGAL DESCRIPTION TRACT B

A TRACT OF LAND LOCATED IN SECTIONS 2, 3, 4, 8, 9, 10, 11, 15, 16, 17, 20, 21, T.5N., R.10W., P.M.M. DESCRIBED AS FOLLOWS;

COMMENCING AT THE NE CORNER OF SAID SECTION 2, WHICH IS THE TRUE POINT OF BEGINNING OF TRACT B; THEN PROCEEDING ALONG THE FOLLOWING 61 COURSES; [illegible] TO THE POINT OF BEGINNING, CONTAINING 4,328.96 ACRES OF LAND. ALL ACCORDING TO THIS CERTIFICATE OF SURVEY.

SUBJECT TO ANY EASEMENT OF RECORD.

LEGAL DESCRIPTION TRACT C

A TRACT OF LAND LOCATED IN SECTION 1, T.5N., R10W., P.M.M., BEING GOVERNMENT LOTS 3 AND 4 AND THE S1/2NW1/4, SECTION 1, T.5N., R.10W., P.M.M. DESCRIBED BY A CERTAIN DEED BOOK 97, PAGE 417, DESCRIBED AS FOLLOWS;

COMMENCING AT THE NW CORNER OF SAID SECTION 1, WHICH IS THE TRUE POINT OF BEGINNING OF TRACT C; THENCE S.89°38'47"E., 2648.72 FT., TO THE N1/4 CORNER OF SAID SECTION 1; THENCE S.00°09'54"E., 2623.45 FT., TO THE CENTER 1/4 CORNER OF SAID SECTION 1; THENCE N89°40'56"W., 2647.25 FT., TO THE WEST 1/4 CORNER OF SAID SECTION 1; THENCE N.00°10'35"W., 2629.74 FT., TO THE POINT OF BEGINNING. CONTAINING 159.67 ACRES OF LAND. ALL ACCORDING TO THIS CERTIFICATE OF SURVEY.

SUBJECT TO ANY EASEMENT OF RECORD.

FOR: UELAND RANCHES, INC

BOUNDARY SURVEY

CERTIFICATE OF CLERK & RECORDER

STATE OF MONTANA
COUNTY OF ANACONDA-DEER LODGE
FILED ON THE 29th DAY OF September, 2004.
MARIE HATCHER
COUNTY CLERK & RECORDER
Deputy
INSTRUMENT NO. 171641

CERTIFICATE OF SURVEY No. 361-A
SHEET 1 of 2

CERTIFICATE OF LAND SURVEYOR

I HEREBY CERTIFY THAT THIS CERTIFICATE OF SURVEY IS A TRUE AND CORRECT REPRESENTATION OF A SURVEY PERFORMED UNDER MY DIRECT SUPERVISION DURING THE MONTH OF JUNE, 2003.

9/27/04

BRIAN D. THOMPSON
MONTANA REGISTRATION NO. 6795LS

Appendix C2

Dutchman Dike Access Road Easement

Road Easement Dutchman

183892

BOOK 218 PAGE 48 6/26/09 9:09 A

State of Montana, County of Deer Lodge } SS

I hereby certify that the within instrument was filed for record in my office on the 16th day of July A.D. 2009 at 25 min. past 3 o'clock p m. and recorded on page ____ of Book ____ of ____ Records of Deer Lodge County Montana, fee $ 42.00

Marie Hatcher County Recorder

By ____ Deputy

After recording return to
Land Section
Montana Fish, Wildlife & Parks
P O Box 200701
Helena, Montana 59620-0701

ROAD EASEMENT

288200-A

THIS GRANT OF EASEMENT made this 23RD day of June, 2009, by and between **UELAND RANCHES, INC.** , a Montana corporation whose address is P.O.Box 127, 100 Cattle Drive Road, Ramsay, MT 59748 (hereinafter called "Grantor"), and the **Montana Department of Fish, Wildlife & Parks**, whose address is P.O. Box 200701, Helena, MT 59620 (hereinafter called "Grantee" or the "Department").

Grantor, for and in consideration of the sum of One Dollar and other good and valuable consideration, the receipt of which is hereby acknowledged, does hereby grant and convey unto Grantee, its successors and assigns, subject to existing easements and valid rights, a perpetual easement for a road (hereinafter termed the "Road Easement") along and across a strip of land located on the Grantor's property in Anaconda-Deer Lodge County, Montana more particularly shown as "ACCESS EASEMENT 20 FT WIDE EXISTING ROAD" on Sheet 1 of 6 of Certificate of Survey No. 361-B, records of Anaconda-Deer Lodge County, and generally located in Sections 8, 9, 16, and 17 of Township 5 North, Range 10 West.

Grantor and the Department agree that the purpose of the road easement is to provide state administrative and public recreational access across Grantor's land to reach the adjoining land described as Tract A of Certificate of Survey 361-B, records of Anaconda-Deer Lodge County.

Grantor and the Department further agree that it is not a purpose of the road easement to provide public access or public parking on Grantor's land outside the easement area for recreation or any other purpose.

This Road Easement provides Grantee with a perpetual right to maintain at its discretion, a road for use by the public to cross Grantor's land. The Road Easement also provides Grantee with the rights appurtenant thereto, including: the right to enter upon and occupy the Road Easement in order to maintain the road in the future; and the right to manage public use of the road as may be necessary to enforce seasonal closures, prevent damage to natural resources and private property and to provide for public safety.

The Road Easement is twenty (20) feet in width with such additional width as required for accommodation and protection of cuts and fills. If the road is located substantially as shown on Certificate of Survey 361-B, the road as constructed is hereby deemed accepted by the Grantor and Grantee as the true location of the Road Easement granted. If any subsequent survey of the road shows that any portion of the road, although located substantially as described, crosses lands of the Grantor not described herein, the Road Easement is deemed to include the additional lands traversed and to exclude any lands outside of the width of the surveyed Road Easement that are not traversed by the road as constructed.

This Road Easement is made subject to the following terms, provisions, and conditions applicable to Grantor and Grantee, and to their permittees, contractors, guests, successors and assigns:

A. Grantee has the right to allow public use of the Road Easement, free of any charge by Grantor or Grantee, for the purpose of public recreational access to reach Tract A of Certificate of Survey 361-B. This public recreational travel may be by motor vehicle, nonmotorized vehicle, foot, or horseback; subject, however, to any regulations that may be imposed by Grantee. Grantor shall have no liability for any injury or damage suffered by members of the public related to public use of the road under this Road Easement, unless due to the negligence or willful misconduct of the Grantor or its agents, employees, contractors, or guests. Grantee agrees to indemnify and hold harmless Grantor for any claims, suits or actions for damages or injury to property or persons brought by or alleged by third persons utilizing the road easement for the sole purpose contemplated by this Road Easement, unless the claims, suits or actions are caused by the negligence or willful misconduct of the Grantor or its agents, employees, contractors, or guests.

B. Grantee itself may use the Road Easement and administer the public recreational access on the road. Grantee may impose reasonable traffic-control regulations on public users of the road, including designation of the type of vehicles, season of use, conditions of use and related considerations for public safety and natural resource protection. Grantee may restrict public use of the road, including temporary or long-term road closure, as necessary for resource protection, including wildlife security, and public safety purposes.

C. Grantee shall have the right to manage vegetation upon the Road Easement to the extent necessary for maintaining the road. Grantee and Grantor may develop a cooperative weed management agreement to develop a weed control plan specific to public recreational use of the road.

D. In the event that an action or use by Grantor, or by a party authorized by Grantor, creates a barrier that blocks the road or results in damage to the road in any way that impairs the ability of the public to make recreational use of the road, Grantor shall take appropriate action to restore the road and/or the associated site conditions so that the road will be accessible to and adequately accommodate the public recreational use provided for in this Road Easement.

This Road Easement is granted subject to the following reservations by the Grantor, its successors and assigns:

The right to use the road and to cross the Road Easement described herein for all purposes deemed necessary or desirable by Grantor in connection with the protection, administration, management, and utilization of Grantor's lands and resources now or hereafter owned or controlled, in a manner that does not unreasonably interfere with its use by Grantee or the public.

Grantor and Grantee agree and understand that ranch operations may occasionally require the use of unlocked gates to control livestock rather than cattleguards on the access road, for example, during periods of heavy snow or during road/cattleguard maintenance.

This grant of easement shall run with the land and shall be binding upon and inure to the benefit of the parties to this easement, and to each of their successors and assigns.

IN WITNESS WHEREOF, the undersigned hereby grants, conveys, and agrees to this Road Easement on the day and year first above written.

UELAND RANCHES, INC. Grantor

By: [signature]

Title: Sec/Tres.

AGREEMENT AND ACCEPTANCE BY DEPARTMENT

The Department hereby agrees to accept the Road Easement subject to the terms and conditions set forth above and further subject to the covenants set forth in that certain Quitclaim Deed dated October 7, 2004, and recorded on December 29, 2004, in Book 173, Page 406, of the Anaconda Deer Lodge County real property records (the "Covenant Deed") and agrees to abide by the covenants as the holder of the Road Easement.

The Department further agrees that in any subsequent easement conveyance instrument, it shall require the grantee in such conveyance instrument to either (a) execute the conveyance instrument which contains the agreements set forth in the immediately preceding paragraph, or (b) to execute a separate acknowledgment attached to the conveyance instrument which contains the agreements set forth in the immediately preceding paragraph.

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS, Grantee

By: Joe Maurier

Title: Director

ACKNOWLEDGMENTS

UELAND RANCHES, INC.

State of Montana }
ss.
County of ~~Deer Lodge~~ Silver Bow }

Signed and acknowledged before me on the 9th day of June, 2009 by Don Ueland, representing UELAND RANCHES, INC.

STATE OF MONTANA
SEAL
NOTARIAL
BOBBIE J. MULCAHY

Printed Name: Bobbie J Mulcahy

Notary Public for the State of Montana

Residing at Butte, MT

My Commission Expires 5-11-2009

MONTANA DEPARTMENT OF FISH, WILDLIFE AND PARKS:

State of Montana }
ss.
County of LEWIS & CLARK}

Signed and acknowledged before me on the 23 day of June, 2009, by Joe Maurier, as Director (title) of the Montana Department of Fish, Wildlife and Parks.

Betty L Warren

Printed Name: BETTY L WARREN

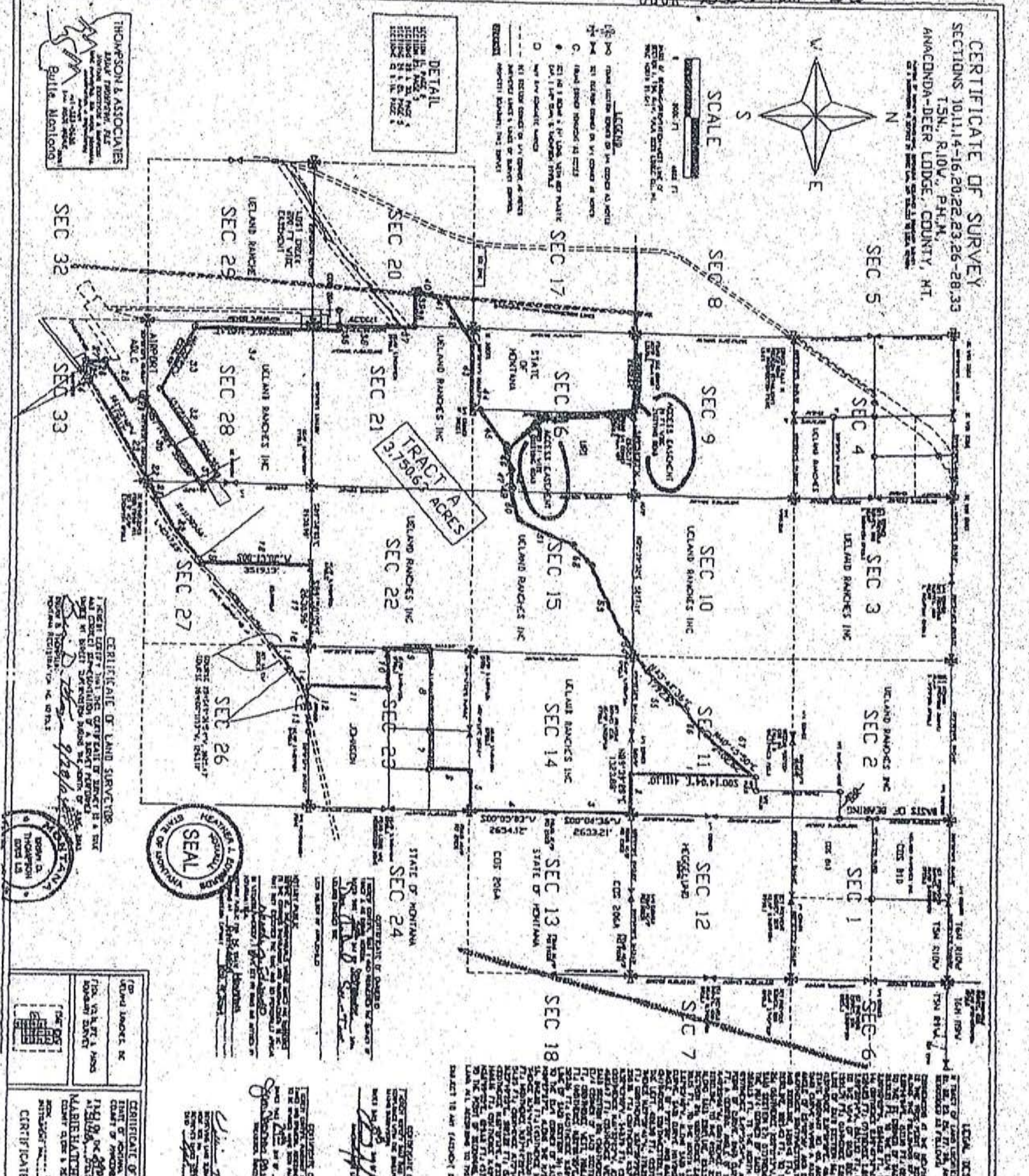
Notary Public for the State of Montana

Residing at Helena

My Commission Expires 11-12-2010

BETTY L. WA...
NOTARIAL
SEAL
STATE OF MONTANA

BOOK 218 PAGE 53



183892

<< 0011-0275 >>

APPENDIX D

STATE OF MONTANA/ADLC COUNTY
NOXIOUS WEED LIST

Montana Noxious Weed List*

Effective: September 2010

Priority 1A	These weeds are not present in Montana. Management criteria will require eradication if detected; education; and prevention. - Yellow starthistle (*Centaurea solstitialis*)
Priority 1B	These weeds have limited presence in Montana. Management criteria will require eradication or containment and education. - Dyer's woad (*Isatis tinctoria*) - Flowering rush (*Butomus umbellatus*) - Japanese knotweed complex (*Polygonum spp.*) - Purple loosestrife (*Lythrum spp.*) - Rush skeletonweed (*Chondrilla juncea*) - Eurasian watermilfoil (*Myriophyllum spicatum*) - Scotch broom (*Cytisus scoparius*) - Curlyleaf pondweed (*Potamogeton crispus*)
Priority 2A	These weeds are common in isolated areas of Montana. Management criteria will require eradication or containment where less abundant. **Management shall be prioritized by local weed districts.** - Tansy ragwort (*Senecio jacobaea*) - Meadow hawkweed complex (*Hieracium spp.*) - Orange hawkweed (*Hieracium aurantiacum*) - Tall buttercup (*Ranunculus acris*) - Perennial pepperweed (*Lepidium latifolium*) - Yellowflag iris (*Iris pseudacorus*) - Blueweed (*Echium vulgare*) - Hoary alyssum (*Berteroa incana*)
Priority 2B	These weeds are abundant in Montana and widespread in many counties. Management criteria will require eradication or containment where less abundant. **Management shall be prioritized by local weed districts.** - Canada thistle (*Cirsium arvense*) - Field bindweed (*Convolvulus arvensis*) - Leafy spurge (*Euphorbia esula*) - Whitetop (*Cardaria draba*) - Russian knapweed (*Centaurea repens*) - Spotted knapweed (*Centaurea stoebe* or *maculosa*) - Diffuse knapweed (*Centaurea diffusa*) - Dalmatian toadflax (*Linaria dalmatica*) - St. Johnswort (*Hypericum perforatum*) - Sulfur cinquefoil (*Potentilla recta*) - Common tansy (*Tanacetum vulgare*) - Oxeye daisy (*Chrysanthemum leucanthemum or Leucanthemum vulgare*) - Houndstongue (*Cynoglossum officinale*) - Yellow toadflax (*Linaria vulgaris*) - Saltcedar (*Tamarix spp.*)
Priority 3	Regulated Plants: (NOT MONTANA LISTED NOXIOUS WEEDS) These regulated plants have the potential to have significant negative impacts. The plant may not be intentionally spread or sold other than as a contaminant in agricultural products. The state recommends research, education and prevention to minimize the spread of the regulated plant. - Cheatgrass (*Bromus tectorum*) - Hydrilla (*Hydrilla verticillata*) - Russian olive (*Elaeagnus angustifolia*)

* State of Montana Department of Agriculture

DEER LODGE COUNTY

LISTED NOXIOUS WEEDS*

1. Babysbreath
2. Common mullein
3. Curley dock
4. Kochia
5. Musk thistle
6. Sowthistle

*Deer Lodge County Weed District.

APPENDIX E

MONITORING INSPECTION FORMS

FENCE LINE INSPECTION

1. **Inspector(s) – Name and Affiliation:**

2. **Date:**

3. **Beginning and Ending Points.**

4. **Fence Condition - wire, gates, locks**

5. **Type of Disturbance Present** (Cattle, Vehicle, Foot Traffic)

6. Actions Taken During Inspection

7. **Actions Required to Repair Fence Line**

8. **Actions Required to Prevent Redisturbance**

9. **Identify approximate location of problem areas on Inspection Site Map provided.**

10. **Recommendations:**

i. No action required. Site in good condition and no actions necessary in the near future.
ii. Minor action required (e.g., weed spraying, fence repair, etc.). Site is relatively stable and only minor actions required in the near future.
iii. Some action required. Site requires some evaluation in order to make best management decisions for corrective action(s) of identified problems. Site maintenance activities may be necessary.
iv. Significant action required. Corrective actions have been ineffective and site maintenance activities are necessary.

11. **Comments:**

______________________________ Date:__________________

Evaluator Signature

NOXIOUS WEEDS INSPECTION FORM

1. **Inspector(s) – Name and Affiliation:**

2. **Date:**

3. **Species Identified and % Cover:**

______________________	______________________
______________________	______________________
______________________	______________________
______________________	______________________

4. **Location**
   Description -

   Coordinates -

   Also identify approximate location of problem areas on Site Map.

5. **Comments** (observations, concerns, need for maintenance):

   ____
   ____
   ____
   ____
   ____

6. **Recommendations:**

   [ ] 0. No Action, Site completed

   [ ] 1. Minor action, site stable

   [ ] 2. Small areas on site require some action

   [ ] 3. Significant action required

7. **Site Sketch – Use back page for field map.**

______________________________ Date:______________

STREAMBANK STABILIZATION INSPECTION

1. **Inspector(s) – Name and Affiliation:**

2. **Date:**

3. **Locations inspected:**

4. **Is There Evidence of Erosion?** ___ Yes ___ No
   If yes describe below.

5. **Is There Evidence of Erosion or sediment buildup?**
   If yes describe below. ___ Yes ___ No

6. **Description of visual observations** (erosion, sediment buildup, other physical damage, etc.).

7. **Based on Inspection, Describe maintenance or repairs that may be required.**
   (For any repair or "watch areas" provide GPS coordinates and photographs.)

8. **Comments:**

9. **Recommendations:**

   [ ] 0. No Action, Site completed

   [ ] 1. Minor action, site stable

   [ ] 2. Small areas on site require some action

   [ ] 3. Significant action required

_______________________ Date:_______________

Inspector

ACESS POINT INSPECTION

1. **Inspector(s) – Name and Affiliation:**

2. **Date:**

3. **Location(s) Inspected.**

4. **Fences / Locks / Gates**

5. **Signage**

6. **Vehicle Barriers**

7. **Type of Disturbance Present** (check all that apply)
   - [ ] No significant disturbance observed
   - [ ] Vehicle tracks on site surface
   - [ ] Foot/bike paths
   - [ ] Other____________________
   - [ ] Evidence of domestic livestock grazing
   - [ ] Evidence of wildlife usage
   - [ ] Apparent vandalism at site

8. **Actions Required to Repair Disturbance**

9. **Actions Required to Prevent Redisturbance**
   - [ ] No actions required
   - [ ] Fencing
   - [ ] Other____________________
   - [ ] Post signs
   - [ ] Fencing and signs

10. **Debris/Garbage On Site**
    - [ ] No material present
    - [ ] Small amount of easily removed material
    - [ ] Significant amount of material to be removed
    - [ ] Material requiring immediate removal (detailed below)

11. **Comments** (materials to be removed, action required, etc.):

    ____

    ____

12. **Recommendations:**

[ ]	0.	No Action, Site completed
[ ]	1.	Minor action, site stable
[ ]	2.	Small areas on site require some action
[ ]	3.	Significant action required

______________________________ Date:____________________

Evaluator Signature

APPENDIX F

SUPPLEMENTAL VEGETATION 2011 REPORT FOR THE DUTCHMAN RIPARIAN LANDS, DEER LODGE COUNTY, MONTANA (ELECTRONIC COPY)

Supplementary Vegetation 2011 Report for the Dutchman Riparian Lands Deer Lodge County, Montana

June 15, 2012

Prepared by

Applied Ecological Services, Inc.
17921 Smith Road
P.O. Box 256
Brodhead, Wisconsin 53520-0256
608/897-8641 Phone
608/897-8486 Fax

Submitted to
Pioneer Technical Services
P.O. Box 3445
Butte, Montana 59702

November, 2011
Revised Jan-June 15, 2012

TABLE OF CONTENTS

Figures

Appendices

Index to Abbreviations and Acronyms

AC	Absolute Cover
AF	Absolute Frequency
ANOVA	Analysis of Variance
AR	Atlantic Richfield
ARCO	Atlantic Richfield Company
CD	Consent Decree
cm	Centimeter
CUM	Cumulative
DBH	Diameter at Breast Height
F	Fahrenheit
FEWA	Functional Equivalent Wetland Area
g	Gram
Ha	Hectare; 2.47 acres equal 1 hectare
in	Inch
IV	Importance Value; the summation of relative cover and relative frequency. Value can range from 0-200
m	Meter
m^2	Meter square
MIN	Minute
RC	Relative Cover
REL	Relative
RF	Relative Frequency
Sp.	Species (singular)
Spp.	Species (plural)
STAND DEV	Standard Deviation
STD	Standard Deviation
TMS	Timed Meander Search
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

Supplementary Vegetation 2011 Report for the Dutchman

Riparian Lands, Deer Lodge County, Montana

1.0 INTRODUCTION

Atlantic Richfield (AR) purchased and has made commitments to convey in fee, the approximately 3,700 acres of land hereafter called "The Dutchman Property". This land has been recognized in its pre-purchase condition to have high conservation values, of interest to federal, state and local conservation and regulatory agencies. AR agreed with the regulatory agencies that are party to the *Streamside Tailings Operable Unit Consent Decree* (CD) and used a wetland functional evaluation process in the ARCO (1992) report that was developed locally and with United States Environmental Protection Agency (USEPA). At that time, field crews mapped and determined the wetland acreages and Functional Equivalent Wetland Area (FEWA) wetland credits present in 2005 in The Dutchman Property. The acreage was evaluated using the aforementioned wetland evaluation systems and all wetlands were delineated using the 1987 Corps of Engineers Wetland Delineation Manual.

A re-evaluation was started in 2008 and was halted when it was discovered cattle from a neighboring ranch had entered The Dutchman Property through a fence breach. Cattle exclusion was the primary improvement sought to increase the value of wetlands on The Dutchman Property. Once cattle were removed, not only would browsed native wetland and upland vegetation spread and become more abundant, but native vegetation would also be identifiable and would provide other conservation values once the cover of this native vegetation increased. The exclusion of neighboring cattle was the action plan to increase the value of existing wetlands and allow the re-evaluation process to begin.

This report documents the qualitative actions taken by AR to document, as best as possible, the conditions in The Dutchman Property. This reports documents the 2011 conditions in The Dutchman Property, so if future evaluations are completed, a qualitative set of data is available for comparison. The supplementary vegetation data was collected in June 6-9, and July 25-26 of 2011. This data set was collected in the field with the oversight of the United States Fish and Wildlife Service (USFWS) and was completed as stipulated in the *2011 Dutchman Riparian Lands Work Plan* (AR, 2011).

1.1 The Dutchman Property Wetland

The Dutchman Property Wetland is located approximately one mile west of Warm Springs, Deer Lodge County, Montana (Figure 1, p. 64). The property is legally described as Tract A of recorded Certificate of Survey 361B and includes portions of Sections 10, 11, 14, 15, 16, 20, 21, 22, 23, 26, 27, 28, and 33 Township 5 North, Range 10 West, lying north of Montana State Highway 48, about one mile east of Highway 273. This property lies directly west of the 4,700-acre Warm Springs Wildlife Management Area. The landscape of the site is open grassland, wetland and riparian habitats located along Warm Springs, Dutchman, and Lost Creeks. Much of the area is covered with shallow surface water in the spring, and provides valuable habitat for wildlife and shorebirds. The wetland has several spring-fed creeks, which flow year-round and provide water and habitat for large mammals, birds, fish, and plants. The Dutchman Property Wetland is considered the best large contiguous wetland/riparian habitat in the Upper Clark Fork River Basin.

The Deer Lodge County area is in the upper reaches of the Clark Fork River Valley (also known as Deer Lodge Valley) in the northern part of the Big Hole Valley with adjoining mountain ranges. The Deer Lodge County area lies in the Northern Rocky Mountain physiographic province, within the structural province of the Rocky Mountain Fold-Thrust Belt. The Continental Divide forms the southwestern portion of the county border, then trends eastward through the center of the County. North of the Continental Divide, the Clark Fork River system drains Deer Lodge County. The headwaters of the Clark Fork River are located in the northeastern corner of the county, at the confluence of Warm Springs Creek and Silver Bow Creek near Anaconda. Major Clark Fork tributaries that drain the Flint Creek Range include Flint, Warm Springs, Lost and Modesty Creeks. The principle sources of ground water in Deer Lodge County are the Quaternary alluvium and Tertiary basin-fill sediments which are unconsolidated to partially consolidated. The average annual precipitation in Anaconda is 14 inches, including 6 inches of snowfall; the average growing season is 114 days; and the average annual temperature is 43° F (USDA, 2001). Rainfall in 2011 was above normal, creating flooding conditions while vegetation surveys were conducted.

1.2 The Supplementary Vegetation Data Collection Goal

The goal of the supplementary vegetation data collection was to prepare an evaluation of The Dutchman Property by analyzing vegetation quality and the condition of wetlands in The Dutchman Property. In 2011, ecological measurements of ecosystem health were collected, using quantitative measures to better relate the Dutchman riparian land to traditional field ecological/ecosystem measurements.

2.0 METHODS

The Dutchman Property was mapped using high resolution imagery. Results from the imagery provided quantitative and qualitative samples to provide A) objective data to evaluate plant community responses to cattle removal, B) documentation of native volunteer wetland and invasive species responses and presence, and C) a record of the conditions on the land to aid future land managers in management methods. The following quantitative sampling methods were reviewed for use in each of the aforementioned monitoring requirements (Table 1). See Bibliography for technical literature citations.

Table 1. Sampling Methods Summary for Data Collection at The Dutchman Property in 2011.

Monitoring Requirement	Sampling Method[1]
Plant Cover as Percent Cover	• Total % cover • Total % bare soil • Measured June - July • Compared with aerial photography • Sampled in representative areas of ecological units • Line transect nested 1m² quadrats
Plant Biomass	• Total above-ground standing crop dry weight biomass in 7 random 1m² quadrats in grassland and herbaceous wetlands
Plant Diversity	• Line transect nested 1m² quadrats • Timed Meander Search technique
Nested Belt Transects/Cover & DBH	• % canopy intercept • Diameter and/or DBH • Number of stems (≤ 10cm DBH) • Line transects with 1-meter parallel belts on each side • DBH of woody plants ≥ 1m in height & > 10cm in diameter • Woody plants ≤ 1m counted
Wildlife Habitat	• Evaluation of grassland, woodland, and wetland communities

[1] See Pertinent Bibliography.

2.1 Measurement Methods and Techniques

This section provides a description of each measurement method or technique proposed in Table 1.

2.1.1 Line Transects and Nested 1 Square Meter Sample Quadrats

An alpha-numeric grid was superimposed over the 2-dimensional Dutchman Property map for randomly choosing grid intersection points. Within The Dutchman Property, 26 Transect Groups were selected for sampling. Because of high water levels in June 2011, only 23 Transect Groups were sampled. Within each Transect Group, a series of perpendicular 100m transects were established. A total of 139-100m transects were sampled in the 23 Transect Groups (one was 60m in length). Each Transect Group was installed on-site using randomly chosen intersection points, of the geo-referenced grid as the end points of the linear monitoring transects. Transect direction was established with compass bearings and was perpendicular to and centered at the mid-point of the Transect Group base line. Starting from each randomly chosen grid point, a 100m tape was pulled taut along the randomly chosen compass bearing.

Sample quadrats were placed at 10m increments along each transect that had been marked with a numbered pink flag. At each 10m increment along the 100m tape, a circular 1-meter square quadrat was centered over the tape with the pink flag centered in the middle of the quadrat, and the plant percent cover (a measure of the vertical projection of photosynthetic leaf area) of each species was measured in each quadrat. A total of 1,386 quadrats were sampled in 2011.

The recorded data at each quadrat included:

- Percent cover by species including all woody plants of less than 1m height;
- Percent canopy cover by substrate type (fine litter, 1-hour combustible fuels), coarse litter (>1 hour combustible fuels), rock, bare soil, and bryophytes (mosses, lichens, liverworts).

The following information and results were derived from the data collected from each quadrat:

- Frequency of occurrence (percent of the total number of sample quadrats in which each species occurs in each transect);
- Richness (number of plant species);
- Absolute cover (the actual percent of the ground surface covered by a vertical projection of foliage) and relative cover (the cover of a species as a percentage of total plant cover);
- Erosion control effectiveness (average +/- standard deviation for percent bare soil and percent total plant and substrate cover/quadrat);
- Importance Value (IV) as the summation of relative cover and relative frequency (frequency of a species as a percentage of total plant frequency). For a given species, the importance value can range from 0-200; and
- IV, percent cover, and frequency of occurrence data calculated for each plant species, for each transect, community type, and overall site performance level (processed transect data is available in Appendix 1).

In addition, a Timed Meander Search (TMS) of representative areas was used to help determine plant species richness and diversity in The Dutchman Property (described below).

2.1.2 Timed Meander Search Technique

Plant species richness and species diversity in selected representative community types were sampled using the TMS technique (Goff et al., 1982). The TMS technique involves slowly walking though each plant community type and listing new plant species while dividing the search into increments of time. The TMS sampling technique documents representative areas of the site regardless of whether regular or random transects exist at a given location. The TMS method develops time-equated plant species lists. The data contribute to the development of total plant species lists and help quantify diversity for each plant community. The data contribute not only to species lists and diversity measurements, but statistics can be used to help characterize community development and compare different areas within the same community type. Results of the TMS searches are located in Appendix 4 (Tables 142-148).

Seven areas were sampled using the TMS method. These included two areas outside The Dutchman Property. The first area outside of The Dutchman Property was a pasture on the Eulands property grazed in the spring by cattle (Area A)(Appendix 4, Table 142) and the second area was the Warm Springs Wildlife Unit owned by the State of Montana east of The Dutchman Property (Area G) (Appendix 4, Table 148). Five areas within The Dutchman Property were investigated (Areas B-F). Area B comprised the northwest area of The Dutchman Property (Appendix 4, Table 143); Area C (Appendix 4, Table 144) and Area D (Appendix 4, Table 145) were near the Deer Lodge County Airport; and Area E (Appendix 4, Table 146) and Area F (Appendix 4, Table 147) were located within the central area of The Dutchman Property that had been previously grazed, a portion of which had likely been dry land farmed.

2.1.3 Nested Belt Transects-Cover Intercept and DBH

Woody vegetation equal to or greater than 1m height was sampled along the identical 100m linear study transects laid out for vegetation percent cover as described above. Parallel belts, 1m wide were laid out on both sides of a study transect tape. Woody plants greater than 1m in height and less than 10cm (4 inches) in diameter, encountered within each 1m wide by 100m long belt transect were identified and counted. Woody species greater than 1m in height and greater than 10cm Diameter at Breast Height (DBH) along a 1m wide belt transect on each side of the tape were measured for size (DBH) and species. In addition, woody species greater than 1 m in height that had a vertical projection directly over the transect tape were measured by centimeters of intercept. Data generated by these techniques were used to measure:

- Percent canopy intercept (vertical projection of photosynthetic leaf area over measured lineal distance of transect tape);
- Survivorship (measured as live or dead canopy intercept);
- Diameter at Breast Height (DBH- 4.5 feet above ground); and
- Number of stems for each woody plant species.

2.1.4 Biomass

Herbaceous plant biomass was measured in 70 quadrats of $0.25m^2$ in wetland and grassland communities. Seven areas selected for biomass sampling were in the same areas as the seven TMS sampling locations. In each of the seven areas, 10 biomass samples were collected in the $0.25m^2$ quadrats. The circular quadrat was placed on the ground and all vegetation in the quadrat was included in the sample for biomass using the following method:

- Vegetation was clipped with hand clippers to within 2.5cm (1 inch) of the ground surface;
- Green clipped materials were placed in sealable "grocery style" paper bags (pre-labeled with transect #, quadrat # and date);
- Samples were air dried until consistent weight was measured; and
- Air-dried weight was the recorded biomass measurement.

2.1.5 Wildlife Habitat Evaluation Process

The above collected data and mapping of ecological units were used to characterize and evaluate wildlife habitat improvements occurring in The Dutchman Property, as follows:

- Vegetation diversity;
- Vegetation community structure;
- Vegetation function in terms of productivity; and
- Potential for use by approved animal species.

Herbaceous plant cover, frequency of occurrence, importance value, richness, biomass, and woody plant structural measurements were used to generate habitat structural, functional, and spatial analyses. This involved data summary, mapping plant communities, and characterization of these communities.

The wildlife habitat evaluation procedure can further characterize and document the development of habitat and correlated responses of the key wildlife and a general model for the key wildlife groups that use the habitat(s).

2.1.6 Threatened, Endangered and Special Concern Species

Observed federal or state sensitive, rare, threatened, or endangered plant and animal species were noted during field work.

2.2 Data Analysis

Data usefulness is directly related to statistical design and quality of data collected. This process is focused on creating basic data that can be useful to inform and remind evaluators and land managers about what is present in the land. For this reason, and because this data is not being collected as a part of detailed and exhaustive statistical analysis, AR will prepare simple summary statistics such as percent cover, frequency and importance values. For biomass data, a one way ANOVA (Analysis of Variance) was calculated to determine if there was a significant difference in the biomass mean weight. For the TMS data, simple linear regression was used to determine the regression line and slope of the number of new species observed per minute.

- For all sample plots, standardized and reproducible primary methods of data summary and analysis were employed
- Plots were laid out to provide other future land managers (should this be desired) measures of trend analysis if they conduct repeated sampling of plots.

All plant identifications follow Dorn (1984) as taxonomic authority for this monitoring program. Additional plant nomenclature sources were also consulted and citations of such are included in the Pertinent Bibliography Section (Section 5.0). All processed data has been tabulated and referenced in Results (Section 3.0). Tables referenced in Sections 3.0 and 4.0 are found in Appendices 1-4. Appendix 5 contains lists of plant species names, both by scientific and by common name.

3.0 RESULTS

3.1 Quadrats

Quadrat data was collected in 23 of the 26 selected transect locations in 2012. Quadrat data was not collected in three transects (15, 17, & 18) in 2012 due to high water levels in the Creeks.

Photograph 1. Transect Group 1 in The Dutchman Property.

Transect Group 1

Transect Group 1 was located near the Deer Lodge County Airport east-west runway (Figure 2, p. 67). Group 1 included drained, hydric soils and existing jurisdictional wetlands (Photograph 1). Transects 1A and 1B were dominated by creeping bentgrass (*Agrostis stolonifera*). Baltic rush (*Juncus balticus littoralis*) was the second most important species in Transect 1A and 1C and the third most important species in Transect 1B (Table 2). Slender wheatgrass (*Agropyron trachycaulum*) was the second most important species in Transect 1B.

As the transect locations approached wetland habitat (T1C), the dominant species changed to Slimstem reed grass (*Calamagrostis stricta*) and Baltic rush followed by redtop grass (Table 2). In 1D, Baltic rush was dominant with slimstem reed grass less dominant. Transect 1E was located within jurisdictional wetlands and had the dominant plant species comprised of Baltic rush and Nebraska sedge (*Carex nebrascensis*). Willows (*Salix* spp.) and other sedges (*Carex spp.*) were more prominent in Transect 1E than in other Transects (Appendix 1, Tables 1-5).

The overall species richness was low with a range of 7 to 11 species (average = 9) observed in upland areas T1A and T1B (Table 2). Plant species richness on average (14) was higher and ranged from 12 to 16 species in the three transects near or within wetlands (Transects 1C-1E) compared to 1A & 1B.

Table 2. Importance Value of the Top Three Species in Each Transect of Transect Group (1) at The Dutchman Property in 2011*

SPECIES		1A	1B	1C	1D	1E
Agrostis stolonifera	Creeping bentgrass	80.90	71.88	33.03	17.65	
Juncus balticus littoralis	Baltic rush	63.99	31.23	40.41	97.39	82.13
Calamagrostis stricta	Slimstem reed grass	25.66		43.73	22.17	
Agropyron trachycaulum	Slender wheatgrass		36.07			
Carex nebrascensis	Nebraska sedge					44.20
Salix boothii	Booth's willow					15.60
Number of Species Observed		7	11	14	12	16

*(Complete Transect Data Group 1 A-E, Appendix 1, Tables 1-5)

Transect Group 2

Transect Group 2 was located in the large central upland area (Figure 2) and was comprised of 6 transects that began in a wetland setting (T2A), with the Group's other end point in an upland setting (~2D-2F). The upland area was previously grazed and had most likely been dry farmed (Photograph 2).

Photograph 2. Central upland of Transect Group 2 in The Dutchman Property.

Baltic rush was generally the dominant species in wetland areas (in Transects 2A, 2B & 2C, respectively) (Table 3), followed by Creeping bentgrass (Tables 3, and Table 6, Appendix 1). The presence of non-native aggressive disturbance species, Canada thistle *(Cirsium arvense)* and common dandelion (*Taraxacum officinale*), along with relatively high frequencies of native Baltic rush suggest a past history of disturbance in these wetland areas, most likely from grazing. As data were analyzed from transects in upland areas, a shift occurred from the Baltic rush/creeping bentgrass community in wetter areas (represented by T2A-T2C), to an upland community that can be described as an Idaho fescue (*Festuca idahoensis*), saline plantain (*Plantago eriopoda*) and slender wheatgrass community (Transects 2D-2F) (Table 3).

Species richness ranged from a low of 13 species to a high of 21 species, with an average of 16 species in (Transects 2A-2C) (Table 3). Species richness ranged from 14 to 18 species, with an average of 15 species in (Transects 2D-2F).

Table 3. Importance Value of the Top Three Species in Each Transect of Transect Group (2) at The Dutchman Property in 2011*

SPECIES		2A	2B	2C	2D	2E	2F
Juncus balticus littoralis	Baltic rush	99.80	69.55	37.47		31.18	
Cirsium arvense	Canada thistle	17.34					
Helianthella uniflora	One flower helianthella	17.32					
Agrostis stolonifera	Creeping bentgrass		30.16	87.47		60.70	
Potentilla anserina	Silverweed		19.23				
Taraxacum officinale	Common dandelion			16.55			
Festuca idahoensis	Idaho fescue				53.65	21.77	55.14
Plantago eriopoda	Saline plantain				34.41		35.89
Spartina gracilis	Alkali cordgrass				20.44		
Agropyron trachycaulum	Slender wheatgrass						16.04
Number of Species Observed		15	21	13	14	14	18

*(Complete Transect Data Group 2 A-F, Appendix 1, Tables 6-11)

Transect Group 3.

Transect Group 3 was also located in the central interior area dominated by uplands (Figure 2) and is comprised of 6 transects (3A-3G). This area is a mix of uplands and wetlands which were previously grazed and dry farmed. Creeping bentgrass is the dominant species in 3A, 3B & 3C while Idaho fescue is the dominant species in 3D, 3F and 3G as well as the second most dominant in 3C (Table 4). Baltic rush is second in importance in 3A, while saline plantain is second in importance in 3B, 3D, 3F & 3G.

Photograph 3. Central upland Transect Group 3 in The Dutchman Property.

Species richness ranged from 10 to 17 species in Transect Group 3 (Table 4). The average number of species per transect was 13 species.

Table 4. Importance Value of the Top Three Species in Each Transect of Transect Group (3) at The Dutchman Property in 2011*

SPECIES		3A	3B	3C	3D	3F	3G
Agrostis stolonifera	Creeping bentgrass	59.81	87.93	80.38			
Juncus balticus littoralis	Baltic rush	49.33					
Agropyron trachycaulum	Slender wheatgrass	12.84	24.76		25.75		
Plantago eriopoda	Saline plantain		29.14	27.91	44.09	37.05	38.15
Festuca idahoensis	Idaho fescue			33.17			
Festuca occidentalis	Western fescue				69.30	67.10	57.40
Phlox kelseyi	Kelsey's phlox					26.44	
Aster falcatus	White prairie aster						21.73
Number of Species Observed		17	10	13	13	12	12

*(Complete Transect Data Group 3 A-G, Appendix 1, Tables 12-17)

Photograph 4. Transect Group 4 in The Dutchman Property.

Transect Group 4

Transect Group 4 consisted of 4 transects and was located near the Deer Lodge County Airport north-south runway (Figure 2). Transects began in wetlands (4A) and ended in an upland edge (4D). Baltic rush was generally the dominant species in the wetland transects 4A, 4B, 4C.Creeping bentgrass was the dominant species in the upland transect 4D and was the third most dominant species in 4A and 4C (Table 5). Other species located in wetland transects 4A, 4B & 4C were Nebraska sedge and common beaked sedge (*Carex utriculata,* in 4B), which were of secondary importance.

Species richness ranged from 9 to 14 species in Transect Group 4 (Table 5) and averaged approximately 12 species per transect.

Table 5. Importance Value of the Top Three Species in Each Transect of Transect Group (4) at The Dutchman Property in 2011*

SPECIES		4A	4B	4C	4D
Juncus balticus littoralis	Baltic rush	71.68	43.51	101.13	
Carex nebrascensis	Nebraska sedge	33.02	39.57	22.61	
Agrostis stolonifera	Creeping bentgrass	20.72		30.21	90.82
Carex utriculata	Common beaked sedge		45.70		
Plantago aristata	Poor Joe				30.61
Spartina gracilis	Alkali cordgrass				29.02
Number of Species Observed		13	14	10	9

*(Complete Transect Data Group 4 A-D, Appendix 1, Tables 18-21)

Transect Group 5

Transect Group 5 was also located near the north-south runway of the Deer Lodge County Airport (Figure 2) and comprised 6 transects that included both wetland and upland areas. The transect group began in wetlands and ended in uplands. Within wetland transects 5A, 5B and 5C, Baltic rush was the dominant species in all three transects. Booth's willow (*Salix boothii,* in Transect 5A), Nebraska sedge (in Transect 5B) and slimstem reed grass (in Transect 5C) were secondary dominants (Table 6).

In the remaining transects, 5D, 5E and 5F wetland species continued to be the dominant species. Baltic rush continued to be an important species in Transects 5D, 5E and 5F, followed by slimstem reed grass and creeping bentgrass (Table 6).

Species richness ranged from 10 to 13 species in Transects 5A, 5B and 5C (Table 6), with an average of 11 species per transect. Species richness ranged from 6 to 12 species in Transects 5D, 5E and 5F, with an average 9 species per transect.

Table 6. Importance Value of the Top Three species in Each Transect of Transect Group (5) at The Dutchman Property in 2011*

SPECIES		5A	5B	5C	5D	5E	5F
Juncus balticus littoralis	Baltic rush	65.59	95.78	88.58	51.43	50.28	82.09
Salix boothii	Booth's willow	44.95	22.49				
Carex nebrascensis	Nebraska sedge	32.65	33.10	30.51			
Calamagrostis stricta	Slimstem reed grass			34.47	46.24	43.20	27.62
Agrostis stolonifera	Creeping bentgrass				43.13	57.16	64.94
Number of Species Observed		11	13	10	10	12	6

*(Complete Transect Data Group 5 A-F, Appendix 1, Tables 22-27)

Transect Group 6

Transect Group 6 is comprised of 6 transects (6AA-6E) and is located within a wetland/upland complex in the northwest portion of The Dutchman Property (Figure 2). Because these transect locations most likely encompass jurisdictional wetlands, non-jurisdictional wetlands and uplands, some transects in Group 6 contain a higher diversity of plant species than some other areas. Baltic rush and creeping bentgrass dominated in 6AA (Table 7), while Baltic rush and Bebb's willow dominated in Transect 6A. Creeping bentgrass and Baltic rush were the two dominants in Transect 6B. Baltic rush and shrubby cinquefoil (*Potentilla fruticosa*) dominated in 6C; Idaho fescue and saline plantain dominated in 6D; and Torrey's rush (*Juncus torreyi*) and slender wheatgrass dominated in 6E.

Species richness ranged from 13 to 28 species in Transect Group 6 (Table 7). There were almost 20 species, on average, in each transect.

Table 7. Importance Value of the Top Three Species in Each Transect of Transect Group (6) at The Dutchman Property in 2011*

SPECIES		6AA	6A	6B	6C	6D	6E
Juncus balticus littoralis	Baltic rush	58.26	77.99	31.36	79.16		
Agrostis stolonifera	Creeping bentgrass	28.10		52.73			
Salix lutea	Yellow willow	25.24					
Salix bebbiana	Bebb's willow		17.78				
Potentilla anserina	Silverweed cinquefoil		14.59				
Phlox kelseyi	Kelsey's phlox			21.74		24.54	
Potentilla fruticosa	Shrubby cinquefoil				30.90		
Deschampsia caespitosa	Tufted hairgrass				13.38		
Festuca occidentalis	Western fescue					40.46	
Plantago eriopoda	Saline plantain					29.27	
Juncus torreyi	Torrey's rush						31.06
Agropyron trachycaulum	Slender wheatgrass						19.24
Aster sp.	Unidentified aster						17.81
Number of Species Observed		16	28	22	19	13	19

*(Complete Transect Data Group 6 AA-E, Appendix 1, Tables 28-33)

Transect Group 7

Transect Group 7 was located within the central upland (Figure 2) and is comprised of 6 transects (7A-7E) that were mostly confined to disturbed uplands with a few transects located in wetland habitat (Photograph 5). Creeping bentgrass and Baltic rush were the two dominants in Transects 7A, 7B, 7C, 7E & 7F (Table 8). Saline plantain and creeping bentgrass were the dominants in the remaining Transect (7D).

Species richness ranged from 10 to 20 species in Transect Group 7 (Table 8), with an average of 15 species per transect.

Photograph 5. Transect Group 7 in The Dutchman Property.

Table 8. Importance Value of the Top Three Species in Each Transect of Transect Group (7) at The Dutchman Property in 2011*

SPECIES		7A	7B	7C	7D	7E	7F
Juncus balticus littoralis	Baltic rush	47.90	28.52	40.56		31.63	36.73
Agrostis stolonifera	Creeping bentgrass	40.51	37.71	63.51	45.08	75.50	77.20
Potentilla anserina	Silverweed	20.22					
Agropyron trachycaulum	Slender wheatgrass		24.30				
Plantago eriopoda	Saline plantain			39.15	47.31	16.23	
Festuca idahoensis	Idaho fescue				40.28		
Helianthella uniflora	One flower helianthella						18.96
Number of Species Observed		16	20	10	10	19	15

*(Complete Transect Data Group 7 A-F, Appendix 1, Tables 34-39)

Photograph 6. Transect Group 8 in The Dutchman Property.

Transect Group 8

Transect Group 8 was located in an adjacent Warm Springs Wildlife Management Unit (Figure 2) and was comprised of 5 transects (8A-8E) (Photograph 6). Baltic rush and/or creeping bentgrass were the top dominants in all five transects (Table 9). Quackgrass (*Agropyron repens*), a non-native species, was an additional species that was of secondary dominance in transects 8B and 8D.

Species richness ranged from 13 to 19 species in Transect Group 8 (Table 9), averaging 15 species per transect.

Table 9. Importance Value of the Top Three Species in Each Transect of Transect Group (8) at The Dutchman Property in 2011*

SPECIES		8A	8B	8C	8D	8E
Juncus balticus littoralis	Baltic rush	47.41	41.66	53.76	31.18	60.95
Agrostis stolonifera	Creeping bentgrass	42.85	44.51	39.40	38.99	49.54
Aster falcatus	White prairie aster	13.46				
Agropyron repens	Quackgrass		35.49		26.17	
Potentilla anserina	Silverweed			16.65		
Sonchus arvensis	Field sow thistle					18.28
Number of Species Observed		17	13	13	19	14

*(Complete Transect Data Group 8 A-E, Appendix 1, Tables 40-44)

Transect Group 9B

Transect Group 9B was located within north east area of The Dutchman Property (Figure 2). Transect Group 9B was planned to be sampled as 2 parallel groups 9A and 9B. However, only Transect Group 9B (Photograph 7) was sampled and was comprised of 5 transects (9BF-9BJ). Baltic rush and water sedge (*Carex aquatilis*) dominated vegetation cover in Transect 9BF (Table 10). Baltic rush and silverweed cinquefoil (*Potentilla anserina*) were the dominants in 9BG. Baltic rush and creeping bentgrass dominated in 9BH. An unidentified sedge (*Carex* sp.) and Booth's willow were the two dominants in 9BI. Baltic rush and yellow willow (*Salix lutea*) were the dominants in 9BJ.

Species richness ranged from 14 to 20 species in Transect Group 9 (Table 10), averaging 17 species per transect.

Photograph 7. Transect Group 9B in The Dutchman Property.

Table 10. Importance Value of the Top Three Species in Each Transect of Transect Group (9) at The Dutchman Property in 2011*

SPECIES		9BF	9BG	9BH	9BI	9BJ
Juncus balticus littoralis	Baltic rush	59.41	75.85	72.03		64.29
Carex aquatilis	Water sedge	32.82				
Carex nebrascensis	Nebraska sedge	16.61				
Potentilla anserina	Silverweed cinquefoil		30.60			
Aster falcatus	White prairie aster		16.83	19.25		
Agrostis stolonifera	Creeping bentgrass			25.18		
Carex sp. - dark	Unidentified sedge				53.69	
Salix boothii	Booth's willow				23.71	
Salix candida	Hoary willow				20.07	
Salix lutea	Yellow willow					24.20
Betula glandulosa	Swamp birch					16.05
Number of Species Observed		20	14	14	18	19

*(Complete Transect Data Group 9B BF-BJ, Appendix 1, Tables 45-49)

Transect Group 10A & 10B

Transect Group 10 was comprised of 2 parallel subgroups (10A and 10B) and was located in the southwest portion of the property (Figure 2). These 2 groups were separated by a water diversion ditch. Each parallel group was comprised of 4 transects (10AA-10AD and 10BE-10BH). Transect subgroup 10A was located on the west side of the diversion ditch. Baltic rush and Booth's willow were the dominant species in 10AA, 10AC & 10AD (Table 11). Creeping bentgrass and Baltic rush were dominants in Transect 10AB.

Transect Group 10B was located on the east side of the diversion ditch. Baltic rush and Booth's willow were the dominants in 10BE (Table 11). Baltic rush and Canada thistle were dominant in 10BF. Baltic rush and an unidentified goldenrod (*Solidago* sp.) were the dominants in 10BG. Baltic rush and slimstem reed grass were the dominants in 10BH.

Species richness ranged from 12 to 15 species in subgroup 10A, averaging 13 species while species richness ranged from 12 to 19 species in subgroup 10B, averaging almost 16 species per transect (Table 11).

Table 11. Importance Value of the Top Three Species in Each Transect of Transect Group (10) at The Dutchman Property in 2011*

SPECIES		10AA	10AB	10AC	10AD	10BE	10BF	10BG	10BH
Juncus balticus littoralis	Baltic rush	74.19	36.87	72.95	80.91	56.58	63.96	75.61	69.15
Salix boothii	Booth's willow	32.52		27.70	19.98	35.29			20.79
Carex nebrascensis	Nebraska sedge	21.59							
Agrostis stolonifera	Creeping bentgrass		63.13		19.83			17.11	
Cirsium arvense	Canada thistle		25.95				30.07		
Aster falcatus	White prairie aster			23.18					
Potentilla anserina	Silverweed					34.64	22.12		
Solidago sp.	Unidentified goldenrod							24.80	
Calamagrostis stricta	Slimstem reed grass								30.72
Number of Species Observed		14	15	12	12	12	14	19	18

*(Complete Transect Data Group 10A &10B AA-BH, Appendix 1, Tables 50-57)

Transect Group 11

Transect Group 11 consisted of 4 transects and was located within the central interior upland area of The Dutchman Property (Figure 2). Transect A was located near Dutchman Creek and transects continued easterly (Transects B-D). Baltic rush and white prairie aster (*Aster falcatus*) were the two dominant species in Transect (11A) closest to Dutchman Creek (Table 12). Creeping bentgrass and Baltic rush dominated the Transect 11B area while creeping bentgrass and saline plantain were dominants in Transect 11C and 11D.

Species richness ranged from 9 to 16 in Transect Group 11, averaging almost 13 species per transect (Table 12).

Table 12. Importance Value of the Top Three Species in Each Transect of Transect Group (11) at The Dutchman Property in 2011*

SPECIES		11A	11B	11C	11D
Juncus balticus littoralis	Baltic rush	86.04	44.11		
Aster falcatus	White prairie aster	22.80			
Cirsium arvense	Canada thistle	18.38			23.33
Agrostis stolonifera	Creeping bentgrass		66.91	67.54	91.00
Potentilla anserina	Silverweed cinquefoil		18.91		
Plantago eriopoda	Saline plantain			41.88	43.16
Haplopappus uniflorus	Plantain goldenweed			21.41	
Number of Species Observed		16	15	14	9

*(Complete Transect Data Group 11 A-D, Appendix 1, Tables 58-61)

Transect Group 12

Transect Group 12 consisted of 5 transects and was located east of Transect Group 11 (Figure 2). An unidentified sedge (*Carex* sp.) and Nebraska sedge were the two dominants in Transect 12A (Table 13). Baltic rush and slimstem reed grass were dominants in 12B while creeping bentgrass and saline plantain were the dominants in 12C. Baltic rush and creeping bentgrass were dominants in both Transects 12D and 12 E.

Species richness ranged from 10 to 23 species in Transect Group 12 (Table 13), averaging almost 19 species per transect.

Table 13. Importance Value of the Top Three Species in Each Transect of Transect Group (12) at The Dutchman Property in 2011*

SPECIES		12A	12B	12C	12D	12E
Carex sp.	Unidentified sedge	108.99				
Carex nebrascensis	Nebraska sedge	23.10				
Scirpus acutus	Hardstem bulrush	20.34				
Juncus balticus littoralis	Baltic rush		49.37		62.69	88.53
Calamagrostis stricta	Slimstem reed grass		35.46			
Salix boothii	Booth's willow		26.39			
Agrostis stolonifera	Redtop grass			56.88	25.42	15.66
Plantago eriopoda	Saline plantain			33.98		
Phlox kelseyi	Kelsey's phlox			21.60		
Potentilla anserina	Silverweed cinquefoil				16.93	14.93
Number of Species Observed		10	17	21	23	22

*(Complete Transect Data Group 12 A-E, Appendix 1, Tables 62-66)

Transect Group 13

Transect Group 13 was located to the south and east of Transect Group 2 (Figure 2) and consisted of 6 transects. Baltic rush and slimstem reed grass were the two dominants in Transect 13A & 13B (Table 14). Baltic rush and creeping bentgrass were the two dominants in Transect 13C. Saline plantain, Idaho fescue grass and shrubby cinquefoil were dominants in Transect 13D. Baltic rush and shrubby cinquefoil were the dominants in 13E while creeping bentgrass and slender wheatgrass were the dominants in 13F.

Species richness ranged from 15 to 22 species in Transect Group 13 (Table 14), averaging 18 species per transect.

Table 14. Importance Value of the Top Three Species in Each Transect of Transect Group (13) at The Dutchman Property in 2011*

SPECIES		13A	13B	13C	13D	13E	13F
Juncus balticus littoralis	Baltic rush	82.44	74.84	57.37		104.53	
Calamagrostis stricta	Slimstem reed grass	18.97	22.59				
Alopecurus pratensis	Meadow foxtail	15.60					
Salix boothii	Booth's willow		16.21			13.33	
Agrostis stolonifera	Creeping bentgrass			38.70			27.36
Potentilla anserina	Silverweed cinquefoil			21.32			
Plantago eriopoda	Saline plantain				43.28		
Festuca idahoensis	Idaho fescue				26.79		40.52
Potentilla fruticosa	Shrubby cinquefoil				26.72	28.19	
Agropyron trachycaulum	Slender wheatgrass						29.89
Number of Species Observed		19	19	20	15	22	15

*(Complete Transect Data Group 13 A-F, Appendix 1, Tables 67-72)

Transect Group 14

Transect Group 14 consisted of 5 transects and was located west of a diversion ditch (Figure 2). Baltic rush and swamp birch (*Betula glandulosa*) were the dominants in Transect 14A (Table 15). Baltic rush and Booth's willow were dominants in Transect 14B & 14C. Saline plantain and creeping bentgrass were the dominant species in both Transect 14D and 14E.

Species richness ranged from 14 to 22 species in Transect Group 14 (Table 15), averaging almost 17 species per transect.

Table 15. Importance Value of the Top Three Species in Each Transect of Transect Group (14) at The Dutchman Property in 2011*

SPECIES		14A	14B	14C	14D	14E
Juncus balticus littoralis	Baltic rush	76.60	72.85	85.76		18.02
Betula glandulosa	Swamp birch	33.07				
Salix boothii	Booth's willow	15.56	26.19	19.97		
Potentilla anserina	Silverweed		17.70			
Deschampsia caespitosa	Tufted hairgrass			19.18		
Plantago eriopoda	Saline plantain				55.78	51.05
Agrostis stolonifera	Creeping bentgrass				46.98	47.12
Festuca ovina	Sheep fescue				25.43	
Number of Species Observed		17	22	17	14	14

*(Complete Transect Data Group 14 A-E, Appendix 1, Tables 73-77)

Transect Group 16

Transect Group 16 was comprised of 2 parallel subgroups (16A and 16B) with 5 transects in 16A (16AA-16AE) and 4 transects in 16B (16BF-16BI). Transect Groups 16A & 16B were located in the northeastern area of The Dutchman Property (Figure 2). Non-native Kentucky bluegrass (*Poa pratensis*), goldenrod (*Solidago* sp.) and non-native Canada thistle were the dominants in Transect 16AA (Table 16). Nebraska sedge and Baltic rush dominate in Transect 16AB and 16AC while non-native quackgrass and Kentucky bluegrass were the dominants in Transect 16AD (Table 16). Meadow foxtail (*Alopecurus pratensis*) and Baltic rush were the dominants in 16AE, 16BH & 16BI. Baltic rush and a wheatgrass (*Agropyron* sp.) species were dominants in Transects 16BF & 16BG.

Species richness in Transect subgroup 16A ranged from 6 to 20 species and from 7-20 species in Transect subgroup 16B, averaging almost 14 species in each subgroup.

Table 16. Importance Value of the Top Three Species in Each Transect of Transect Group (16) at The Dutchman Property in 2011*

SPECIES		16AA	16AB	16AC	16AD	16AE	16BF	16BG	16BH	16BI
Poa pratensis	Kentucky bluegrass	63.37			46.94					
Solidago sp.	Goldenrod	22.76								
Cirsium arvense	Canada thistle	22.06				16.68				24.33
Carex nebrascensis	Nebraska sedge		41.76	19.39					24.24	
Juncus balticus littoralis	Baltic rush		37.62	75.35	32.64	74.52	54.48	67.09	61.87	62.08
Smilacina stellata	Starry false Solomon's seal		21.15							
Alopecurus pratensis	Meadow foxtail			15.96		81.98			66.16	71.76
Agropyron repens	Quackgrass				84.03					
Agropyron sp.(1)	Wheatgrass						46.59			
Agropyron sp.(2)	Wheatgrass						24.04			
Agropyron sp.	Wheatgrass							40.67		
Potentilla anserina	Silverweed cinquefoil							15.52		
Number of Species Observed		14	20	20	9	6	20	19	9	7

*(Complete Transect Data Group 16 AA-BI, Appendix 1, Tables 78-86)

Transect Group 19

Transect Group 19 was comprised of 6 transects and was located in northeastern portion of The Dutchman Property (Figure 2). Baltic rush and creeping bentgrass were the dominants in Transect 19A (Table 17). Creeping bentgrass, starry false Solomon's seal (*Smilacina stellata*) and few flowering shooting star (*Dodecatheon pulchellum*, see Photograph 8) were the dominants in Transect 19B. Baltic rush and tea-leaved willow (*Salix planifolia*) were the dominants in Transect 19C (Table 17). Baltic rush and few flowering shooting star were the dominants in Transect 19D. Saline plantain and creeping bentgrass were the dominants in Transects 19E and 19F.

Photograph 8. Few flowering shooting star of Transect Group 19 in The Dutchman Property.

Species richness ranged from 14 to 28 species in Transect Group 19 (Table 17), averaging almost 20 species per transect.

Table 17. Importance Value of the Top Three Species in Each Transect of Transect Group (19) at The Dutchman Property in 2011*

SPECIES		19A	19B	19C	19D	19E	19F
Juncus balticus littoralis	Baltic rush	40.47		80.41	82.34		
Agrostis stolonifera	Creeping bentgrass	29.74	68.31			43.78	36.14
Poa pratensis	Kentucky blue grass	27.99					
Smilacina stellata	Starry false Solomon's seal		18.96				
Dodecatheon pulchellum	Few flowering shooting star		18.94	14.64	24.55		
Salix planifolia	Tea-leaved willow			26.41			
Potentilla anserina	Silverweed				14.39		
Plantago eriopoda	Saline plantain					53.76	33.36
Festuca occidentalis	Western fescue					36.95	
Phlox kelseyi	Kelsey's phlox						20.12
Number of Species Observed		17	19	20	19	14	28

*(Complete Transect Data Group 19 A-F, Appendix 1, Tables 87-92)

Transect Group 20

Transect Group 20 was comprised of 6 transects and was located in the eastern portion of The Dutchman Property (Figure 2). Baltic rush and Booth's willow were the two dominants in Transect 20A (Table 18). Baltic rush and water sedge were the two dominants found in Transect 20B. Baltic rush and Alpine meadow-rue (*Thalictrum alpinum*) were the dominants in Transect 20C. Slender wheatgrass and saline plantain were the dominants in Transect 20D. Baltic rush and meadow foxtail were the dominants in Transect 20E while non-native Pumpelly's brome (*Bromus inermis*), Baltic rush and meadow foxtail were the dominants in Transect 20F.

Species richness ranged from 14 to 33 species in Transect Group 20 (Table 18), averaging 24 species per transect.

Table 18. Importance Value of the Top Three Species in Each Transect of Transect Group (20) at The Dutchman Property in 2011*

SPECIES		20A	20B	20C	20D	20E	20F
Juncus balticus littoralis	Baltic rush	73.10	50.97	48.53		32.03	27.65
Salix boothii	Booth's willow	21.04					
Thalictrum alpinum	Alpine meadowrue	17.07	25.60	28.24			
Carex aquatilis altior	Water sedge		31.75				
Dodecatheon pulchellum	Few flowering shooting star			17.59			
Agropyron trachycaulum	Slender wheatgrass				24.65		
Plantago eriopoda	Saline plantain				22.40		
Agrostis stolonifera	Creeping bentgrass				18.28		
Alopecurus pratensis	Meadow foxtail					30.83	25.83
Potentilla anserina	Silverweed cinquefoil					16.53	
Bromus inermis	Pumpelly's brome						68.99
Number of Species Observed		24	23	25	26	33	14

*(Complete Transect Data Group 20 A-F, Appendix 1, Tables 93-98)

Transect Group 21

Transect Group 21 was comprised of six transects located in the southwest portion of The Dutchman Property near the Deer Lodge County Airport (Figure 2). Creeping bentgrass, Canada thistle and Baltic rush were the dominants in Transect 21A (Table 19). Baltic rush and slimstem reed grass were the dominants in Transect 21B. Baltic rush, creeping bentgrass and Booth's willow were dominant in Transect 21C. Slender wheatgrass and creeping bentgrass were the dominants in 21D. Baltic rush and creeping bentgrass were the dominants in Transect 21E while slimstem reed grass and Baltic rush were the dominants in 21F.

Species richness ranged from 7 to 16 species in Transect Group 21 (Table 19), averaging 13 species per transect.

Table 19. Importance Value of the Top Three Species in Each Transect of Transect Group (21) at The Dutchman Property in 2011*

SPECIES		21A	21B	21C	21D	21E	21F
Agrostis stolonifera	Creeping bentgrass	63.61		35.84	44.07	33.66	28.13
Cirsium arvense	Canada thistle	23.19					
Juncus balticus littoralis	Baltic rush	23.06	55.64	63.73	22.81	82.76	35.41
Calamagrostis stricta	Slimstem reed grass		38.85				85.28
Salix boothii	Booth's willow		32.59	35.15			
Agropyron trachycaulum	Slender wheatgrass				78.36	20.00	
Number of Species Observed		16	11	15	13	16	7

*(Complete Transect Data Group 21 A-F, Appendix 1, Tables 99-104).

Transect Group 22

Transect Group 22 was comprised of 2 separate subgroups (22A and 22B) each consisting of 4 transects (Figure 2). Transect Group 22 is located in the central area of The Dutchman Property (Photograph 9). Baltic rush and slimstem reed grass were the dominants in Transect 22AA (Table 20). Baltic rush, meadow-rue and yellow willow (*Salix lutea*) are the dominants in Transect 22AB and 22BF. Baltic rush and Alpine meadowrue are the dominants in Transect 22AC. Baltic rush and creeping bentgrass are the dominants in Transect 22AD, 22BG. Baltic rush and Booth's willow are the dominants in Transect 22BE. One flower helianthella (*Helianthella uniflora*) and silverweed cinquefoil (*Potentilla anserina*) were the dominants in Transect 22BH.

Species richness in subgroup 22A ranged from 19 to 27 species, averaging about 22 species per transect. Species richness ranged from 13 to 22 species in subgroup 22 with an average of about 18 species per transect (Table 22).

Table 20. Importance Value of the Top Three Species in Each Transect of Transect Group (22) at The Dutchman Property in 2011*

SPECIES		22AA	22AB	22AC	22AD	22BE	22BF	22BG	22BH
Juncus balticus littoralis	Baltic rush	74.44	76.92	42.95	44.17	74.67	79.20	56.56	17.78
Calamagrostis stricta	Slimstem reed grass	19.79							
Salix lutea	Yellow willow	16.23	29.88				28.96		
Potentilla anserina	Silverweed cinquefoil		22.47		18.20				26.17
Thalictrum alpinum	Alpine meadowrue			39.98					
Carex lanuginosa	Woolly sedge			15.07					
Agrostis stolonifera	Creeping bentgrass				30.35	27.90		26.80	
Salix boothii	Booth's willow					32.15		22.69	
Aster falcatus	White prairie aster						14.42		
Helianthella uniflora	One flower helianthella								70.70
Number of Species Observed		20	19	23	27	13	17	21	22

*(Complete Transect Data Group 22 AA-BH, Appendix 1, Tables 105-112)

Transect Group 23

Transect Group 23 consisted of 2 subgroups (23A & 23B) that contain 4 transects (23AA-23AD) and 3 transects 23BF-23BH (Figure 2). Tea-leaved willow and broadleaf cattail (*Typha latifolia*) were the dominants in Transect 23AA (Table 21). Water sedge (IV= 46.3 and hoary willow (*Salix candida*) were the dominants in Transect 23AB. Baltic rush and hoary willow were the dominants in Transect 23AC, 23AD, 23BF & 23BH. Sedge (*Carex* sp.) and Baltic rush were the dominants in Transect 23BG.

Photograph 9. Mealy primrose in Transect Group 23 at The Dutchman Property.

Species richness in Transect subgroup 23A ranged from 17 to 23, averaging about 19 species per transect (Table 21). Species richness ranged from 13 to 27 in Transect subgroup 23B, averaging about 19 species per transect. A state of Montana special concern species, mealy primrose (*Primula incana*; see Photograph 9) was located in some quadrats within this Transect Group (Appendix 1, Tables 113-119).

Table 21. Importance Value of the Top Three Species in Each Transect of Transect Group (23) at The Dutchman Property in 2011*

SPECIES		23AA	23AB	23AC	23AD	23BF	23BG	23BH
Salix planifolia	Tea-leaved willow	65.54						
Typha latifolia	Broadleaf cattail	40.82						
Salix candida	Hoary willow	17.85	25.06	16.04	25.46	20.69	35.50	39.95
Carex aquatilis altior	Water sedge		46.27					13.46
Schoenoplectus tabernaemontani	Softstem bulrush		22.68					
Juncus balticus littoralis	Baltic rush			66.15	75.87	62.67	44.74	67.57
Deschampsia caespitosa	Tufted hairgrass			15.43				
Carex sp.(1)	Unidentified sedge				17.09			
Poa pratensis	Kentucky blue grass					17.73		
Carex sp.	Unidentified sedge						64.83	
Number of Species Observed		17	20	23	17	26	13	17

*(Complete Transect Data Group 23 AA-BH, Appendix 1, Tables 113-119)

Transect Group 24

Transect Group 24 consisted of 2 subgroups (24A & 24B) that contained 4 transects each (24AA-24AD and 24BE-24BH) (Figure 2). Baltic rush and Slimstem reed grass were the dominants in Transects 24AA, 24AB, 24AC, 24BF (Table 22). Saline plantain and creeping bentgrass were the dominants in Transect 24AD. Baltic rush and Booth's willow were the dominants in Transect 24BE. Sedge (*Carex* sp.) and Baltic rush were the two dominants in Transect 24BG. Baltic rush and creeping bentgrass were the dominants in Transect 24BH.

Species richness in Transect subgroup 24A ranged from 11 to 15 species, averaging 13 species per transect (Table 22). Species richness ranged from 14 to 27 in Transect subgroup 24B, averaging almost 20 species per transect.

Table 22. Importance Value of the Top Three Species in Each Transect of Transect Group (24) at The Dutchman Property in 2011*

SPECIES		24AA	24AB	24AC	24AD	24BE	24BF	24BG	24BH
Juncus balticus littoralis	Baltic rush	78.23	66.39	106.48		97.25	87.42	28.26	41.60
Calamagrostis stricta	Slimstem reed grass	41.16	37.36	15.46		19.02	21.53	23.32	
Salix boothii	Booth's willow	19.95	33.06			25.02			
Salix sp.	Unidentified willow			14.77					
Plantago eriopoda	Saline plantain				56.41				
Festuca idahoensis	Idaho fescue				25.19				
Agrostis stolonifera	Creeping bentgrass				40.10				31.28
Dodecatheon pulchellum	Few flowering shooting star						19.24		
Carex sp. dark	Unidentified sedge							29.40	
Phlox kelseyi	Kelsey's phlox								15.37
Number of Species Observed		11	13	15	13	15	14	23	27

*(Complete Transect Data Group 24 AA-BH, Appendix 1, Tables 120-127).

Transect Group 25

Transect Group 25 was located to the west of the larger water diversion ditch/dike (Figure 2) and was comprised of 6 transects. An unidentified sedge (*Carex* sp.) and Baltic rush were the dominants in Transect 25A, 25B & 25F (Table 23). Baltic rush and swamp birch were the dominants in Transect 25C. The same unidentified sedge in Transect 25A was the dominant species in Transect 25D, followed by hardstem bulrush (*Scirpus acutus*). In Transect 25E, hardstem bulrush and Baltic rush were the dominants.

Species richness ranged from 13 to 21 species in Transect Group 25, averaging a little over 17 species per transect (Table 23).

Table 23. Importance Value of the Top Three Species in Each Transect of Transect Group (25) at The Dutchman Property in 2011*

SPECIES		25A	25B	25C	25D	25E	25F
Carex sp.	Unidentified sedge	44.63	79.50		72.77		39.96
Juncus balticus littoralis	Baltic rush	37.48	16.12	86.98		28.58	33.94
Typha latifolia	Broadleaf cattail	17.94					
Salix candida	Hoary willow		14.40		19.57		
Betula glandulosa	Swamp birch			14.97			
Viola sp.	Unidentified violet			11.07			
Scirpus acutus	Hardstem bulrush				20.73	60.90	24.88
Carex praegracilis	Clustered field sedge					23.09	
Number of Species Observed		17	13	20	16	16	21

*(Complete Transect Data Group 25 A-F, Appendix 1, Tables 128-133)

Transect Group 26

Transect Group 26 was located just east of the water diversion ditch/dike (Figure 2) and was comprised of 6 transects (Photograph 10). Baltic rush and clustered field sedge (*Carex praegracilis*) were the dominants in Transect 26A (Table 24). Baltic rush and yellow willow were the dominants in Transect 26B. Baltic rush and Booth's willow were the dominant in Transect 26C. Idaho fescue and saline plantain were the dominants in Transect 26D & 26F. Alkali cordgrass (*Spartina gracilis*) and saline plantain were the dominants in Transect 26E.

Photograph 10. Transect Group 26 in The Dutchman Property.

Species richness ranged from 9 to 25 species in Transect Group 26, averaging slightly more than 15 species per transect (Table 24).

Table 24. Importance Value of the Top Three Species in Each Transect of Transect Group (26) at The Dutchman Property in 2011*

SPECIES		26A	26B	26C	26D	26E	26F
Juncus balticus littoralis	Baltic rush	54.38	70.02	90.32		31.12	
Carex praegracilis	Clustered field sedge	41.87					
Salix boothii	Booth's willow	28.37		22.41			
Salix lutea	Yellow willow		16.93				
Potentilla anserina	Silverweed cinquefoil		15.36				
Carex nebraskensis	Nebraska sedge			19.73			
Festuca idahoensis	Idaho fescue				48.59		81.84
Plantago eriopoda	Saline plantain				44.26	47.33	44.27
Agrostis stolonifera	Creeping bentgrass				25.05		
Spartina gracilis	Alkali cordgrass					59.30	
Equisetum laevigatum	Smooth scouring rush						16.00
Number of Species Observed		17	25	16	9	13	12

*(Complete Transect Data Group 25 A-F, Appendix 1, Tables 134-139)

3.2 Woody Species

3.2.1 Shrub Density

Montana's riparian and wetland scrub vegetation typically occurs on terraces along floodplains of both low and high gradient streams and rivers. The scrub-shrub vegetation community can also be found around beaver ponds and on the fringes of fens and lakes. Common willow species are tea-leaved willow, wolf willow, Drummond's willow (*S. drummondiana*), Geyer's willow, Booth's willow, yellow willow and sandbar willow.

Photograph 11. Aspen clump in The Dutchman Property.

The density of shrubs greater than 1m in height and less than 2-inch diameter varied throughout The Dutchman Property. Thirty nine percent (39%) of the

139 transects had no shrubs greater than 1m in height. When shrubs greater than 1m in height were present, density ranged from a low of 100 stems/ha in Transects 7D, 10AB, 10BF, 14B, & 24BH to a high of 55,900 stems/ha in Transect 5A (Table 25). Willows (*Salix Boothii, S. exigua, S. geyeriana, S. lutea, S. wolfii, S. bebbiana, S. candida, Salix* sp.) comprised 84% of the stems in The Dutchman Property with birches (*Betula glandulosa, B. occidentalis*) at 9%, quaking aspen (*Populus tremuloides,* see photograph 11) at 3 % and shrubby cinquefoil at 2 % (Appendix 2, Table 140). Grazing by moose have no doubt kept the presence of some shrubs from attaining heights of 1m or greater in some areas.

Table 25. Shrub Density Data Summary for The Dutchman Property. Only transects with shrubs are included.

Transect ID	Total #Stems	Total Stems/ha
1D	292	29,200
1E	265	26,500
2A	10	1,000
3C	2	200
3G	12	1,200
4A	104	10,400
4B	33	3,300
4C	54	5,400
5A	559	55,900
5B	216	21,600
5C	187	18,700
5F	55	5,500
6AA	57	5,700
6A	59	5,900
6B	25	2,500
6C	6	600
6D	12	1,200
6E	3	300
7A	93	9,300
7D	1	100
8A	11	1,100
8B	5	500
8C	6	600
8D	12	1,200
8E	12	1,200
9BF	97	9,700
9BG	25	2,500
10AA	275	27,500
10AB	1	100
10AC	88	8,800
10AD	28	2,800
10BE	140	14,000
10BF	1	100
10BG	78	7,800
10BH	41	4,100
12B	51	5,100
12C	26	2,600
12D	295	29,500
12E	212	21,200
13A	42	4,200

Table 25. (continued)		
Transect ID	Total #Stems	Total Stems/ha
13B	100	10,000
13C	6	600
13D	17	1,700
13E	26	2,600
13F	10	1,000
14A	277	27,700
14B	1	100
16AB	70	7,000
20A	127	12,700
20B	105	10,500
20C	130	13,000
20D	6	600
20E	13	1,300
21A	137	13,700
21B	62	6,200
21C	218	21,800
21E	2	200
22AA	94	9,400
22AB	29	2,900
22BE	69	6,900
22BF	26	2,600
22BH	95	9,500
23AA	377	37,700
23AB	20	2,000
23AC	2	200
23AD	39	3,900
23BE	53	5,300
24AA	41	4,100
24AB	24	2,400
24AC	10	1,000
24AD	11	1,100
24BE	21	2,100
24BG	48	4,800
24BH	1	100
25A	45	4,500
25C	54	5,400
25F	4	400
26A	129	12,900
26B	86	8,600
26C	55	5,500
26D	14	1,400
26E	2	200
26F	9	900

3.2.2 Line Intercept

Most of The Dutchman Property consisted of open wetlands and uplands, as only 37 of the 139 transects had woody species line intercept (Appendix 3, Table 141). All of the woody species canopy line intercept was comprised of live (100% survivorship) stems. Of the 37 transects with woody intercept, 29 transects had total woody intercepts of less than 10% (10m along a 100m transect). Only 8 transects had woody intercept greater than 10 meters. The greatest canopy intercept along an individual transect was 93 meters out of 100 meters (93%). Willows comprised the majority of the line intercept (63% of total) followed by quaking aspen (30% of the total).

The higher line intercept percentage (30%) for aspen compared to its overall stem density (3%) is likely the result of the species growth form. Aspen typically had a wider canopy cover than most shrubs. Greater tree canopy crown width allowed aspen trees to be located outside the 1 meter belt used for measuring density, but still provided for greater crown intercept over the measuring tape. Most shrubs with their smaller crown widths had to be located within the 1m belt transect to be both counted as stems and provide a crown intercept over the tape.

3.2.3 Tree Diameters

Three transects (21A, 21B & 26A) contained woody species greater than 4 inches (10cm) diameter at breast height (Table 26). All 17 trees were quaking aspen and averaged from 10-15 cm in diameter.

Table 26. Tree Diameters at The Dutchman Property in 2011.

Transect	Species	Common Name	#Trees	Average DBH (cm)
T21A	Populus tremuloides	Quaking aspen	7	10.3
T21B	Populus tremuloides	Quaking aspen	7	12.3
T26A	Populus tremuloides	Quaking aspen	3	15.2

3.3 Timed Meander Search

Seven generalized areas were characterized for species richness within and adjacent to The Dutchman Property (Figure 2). Area A was sampled in July 2011 and was a pasture regularly grazed in the spring (Eulands) located outside the boundary of The Dutchman Property (Photograph 12). Twenty five (26) species were observed in a 26-minute search of the grazed pasture (Table 27).

Area B was located in the northwest portion of The Dutchman Property (Figure 2) and was located within a fen-type wetland (Photograph 13). Thirty nine different species were observed in a 27 minute search (Table 27).

Areas C & D were located near the Deer Lodge Airport (Figure 2, Photographs 14 & 15). In wetland Area C, 40 species were observed in a 28-minute search and in upland/wetland Area D, only 19 species were observed in a 19-minute search (Table 27).

Table 27. Timed Meander Search (TMS) results for areas in and around The Dutchman Property in 2011*

Area	Total # of Species Observed	Length of Search in Minutes	Slope of Depression Line (b)	Intercept Constant (a)
A. Eulands Previously Grazed Pasture	26	26	-0.111	2.46
B. Dutchman Property Fen Community	39	27	-0.126	3.21
C. Dutchman Property Wetlands Near Airport	40	28	-0.071	2.45
D. Dutchman Property Uplands Near Airport	19	19	-0.121	2.21
E. Dutchman Property Previously Grazed upland/wetland Interior	35	21	-0.182	3.76
F. Dutchman Property Previously Grazed shrub Interior	58	23	-0.176	4.55
G. Warm Springs Wildlife Management Unit	49	35	-0.041	2.13

*(Additional TMS data found in Appendix 4, Tables 142-148)

Areas E and F were located in the interior of The Dutchman Property where previous cattle grazing had occurred (Figure 2, Photographs 16 & 17). In the upland dominated Area E, 35 species were observed in a 21-minute search while 58 species in a 23-minute search were observed in wetland Area F (Table 27).

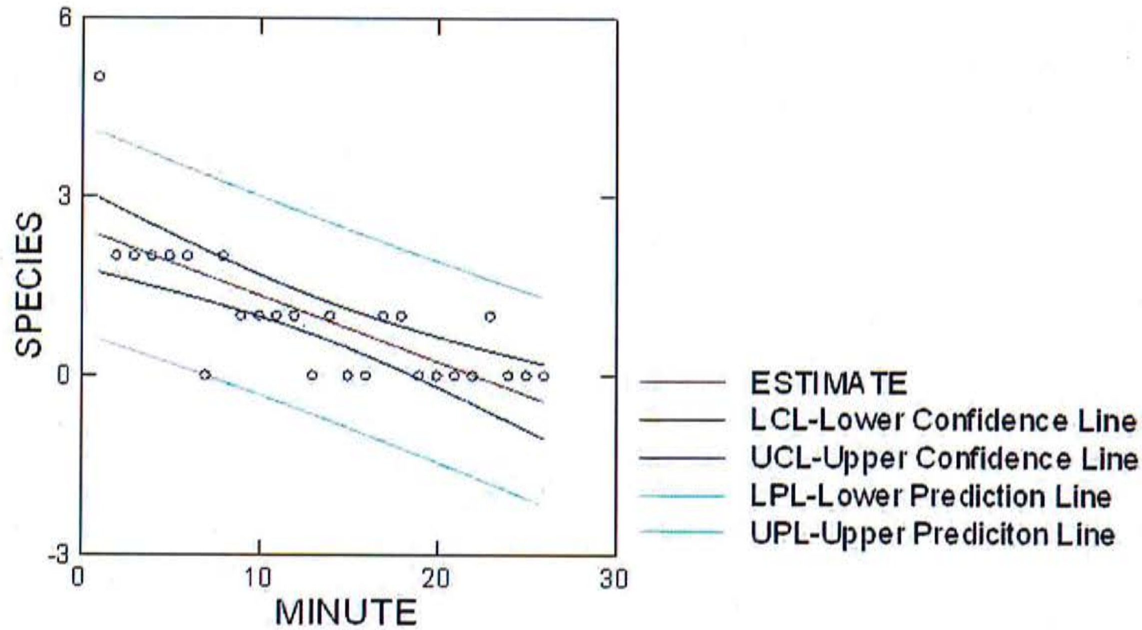
In the adjacent Warm Springs Wildlife Management Unit (Area G, Photograph 18), 49 species were observed in a 35-minute search (Table 27).

A linear regression was the statistical tool used to model the relationship between the number of new species observed (dependent variable on Y-axis) and time in minute units (X-axis). Like all forms of regression analysis, linear regression focuses on the probability of the Y value, given the X value.

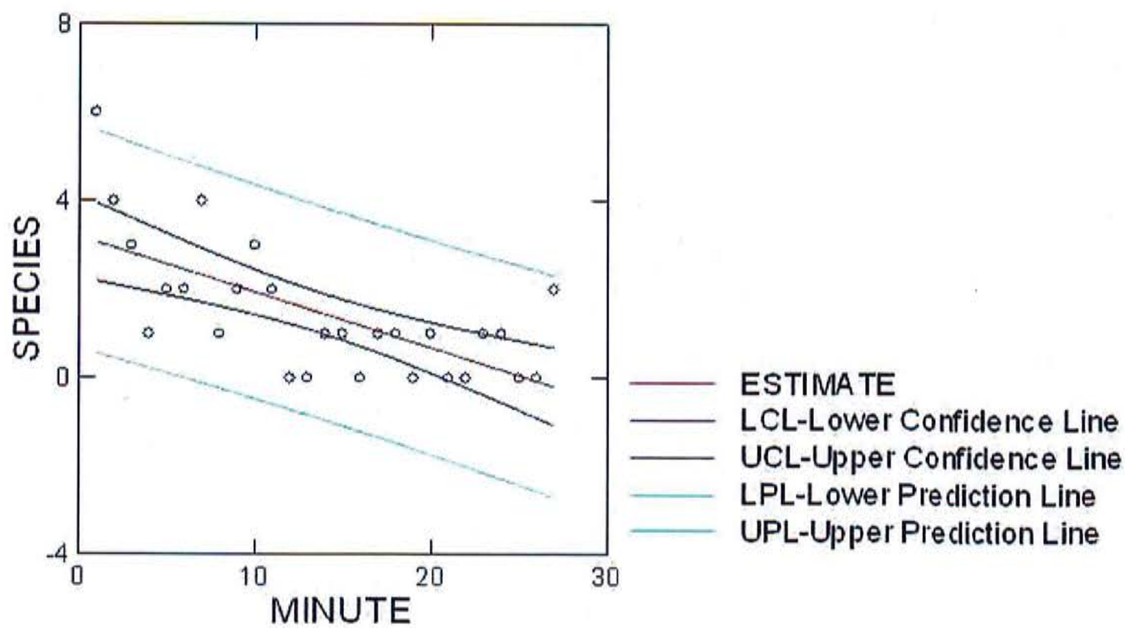
Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data. A linear regression line has an equation of the form $Y = a + bX$. In this study, X is minute of the search and Y is the number of new plant species. The slope of the line is b, and the intercept (the value of Y when $X = 0$) is **a** (Table 27). It is possible to look at the regression line of these species searches, based on the number of new species observed (along Y-axis) by minute increments (X-axis). For example, for each additional minute of search in Area D (The Ducthman Property previously grazed/farmed interior), 0.121 less species would be expected to be observed. Conversely, in the Warm springs Wildlife management Unit for each additional minute searched only 0.041 less species would be expected to be observed. Based on this the Warm Springs Management Unit could be thought of as more diverse. The graphic result of the linear regression statistical analysis is provided below in Diagrams A-G.

Diagrams A-G Confidence Interval & Prediction Interval for TMS Areas in and around The Dutchman Property

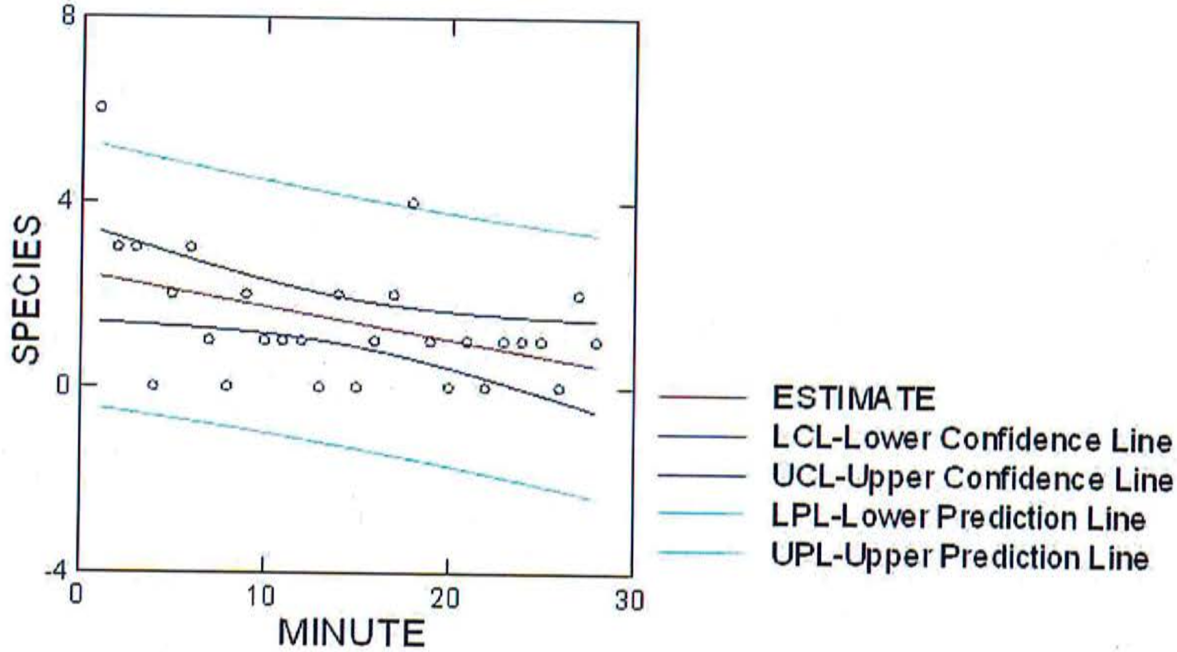
Confidence Interval and Prediction Interval
Area A. Outside of The Dutchman Property Spring-grazed Euland's Pasture



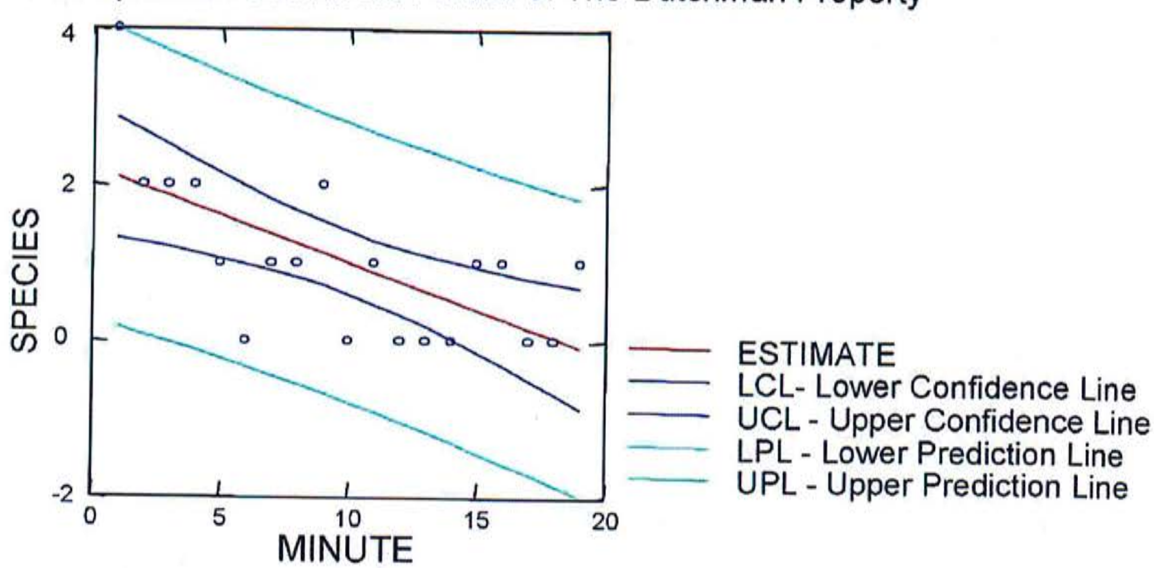
Confidence Interval and Prediction Interval
Area B. Fen-type Wetland in the Northwest Portion of The Dutchman Property



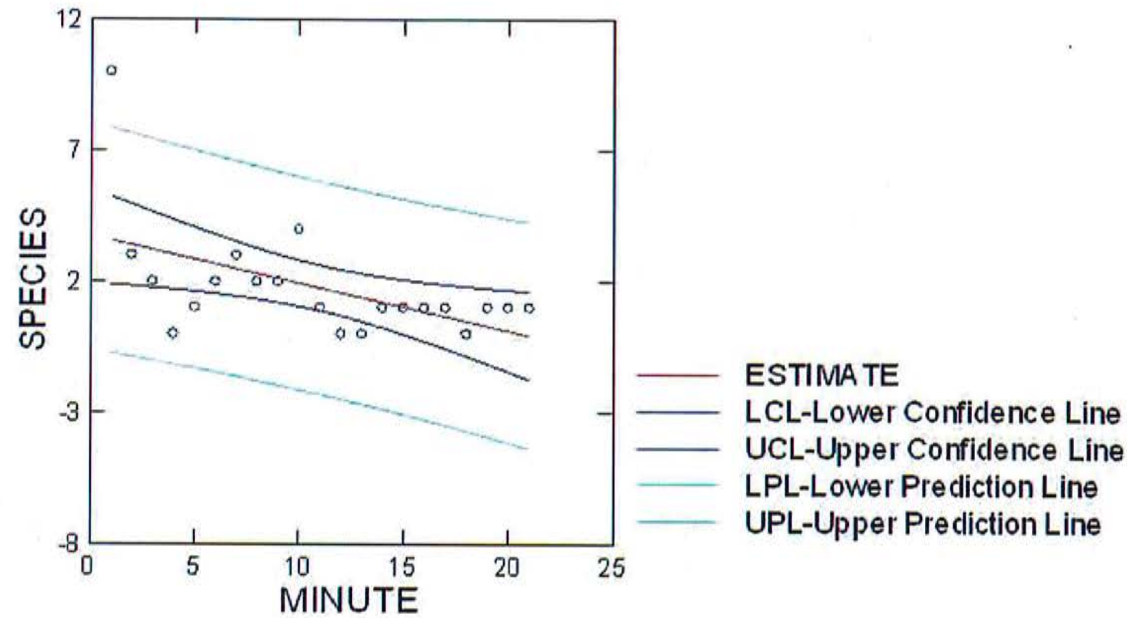
Confidence Interval and Prediction Interval
Area C. Wetland in Southwest Portion of The Dutchman Property



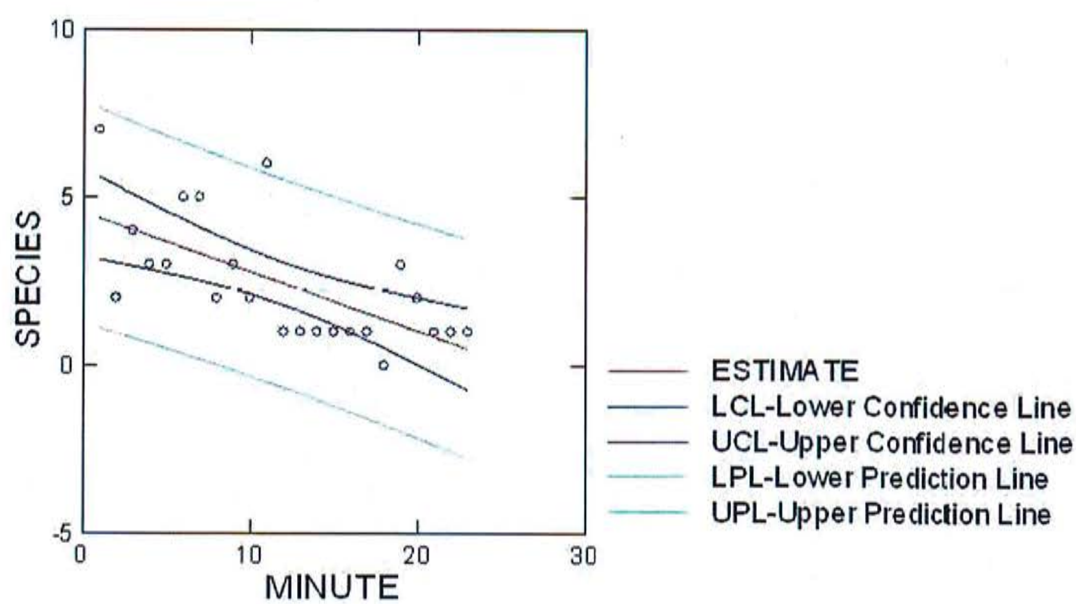
Confidence Interval and Prediction Interval
Area D. Upland in Southwest Portion of The Dutchman Property



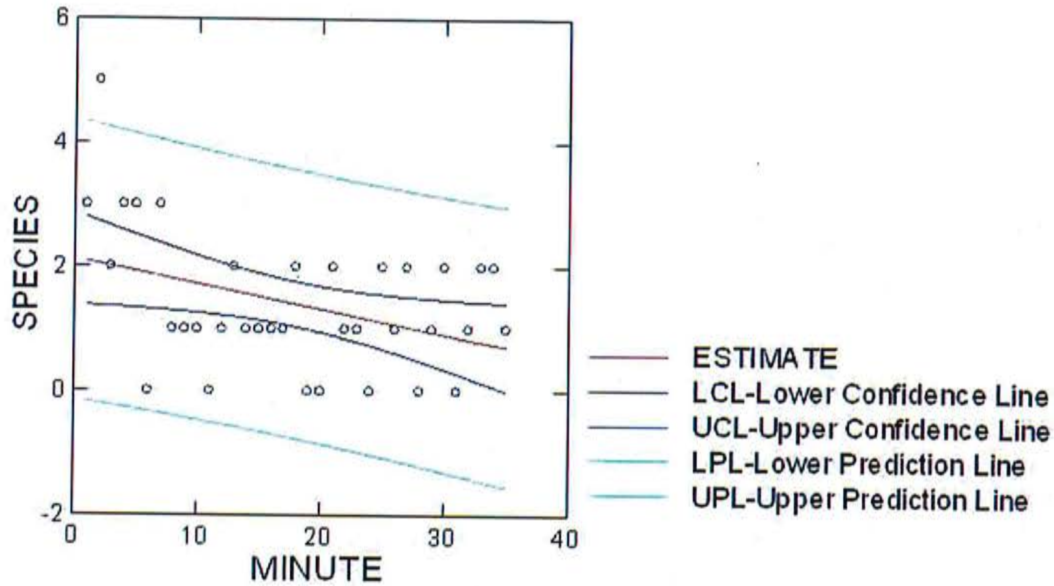
Confidence Interval and Prediction Interval
Area E. Interior Upland with Scattered Wetlands in The Dutchman Property



Confidence Interval and Prediction Interval
Area F. Shrub Dominated Wetland in the Interior Portion of The Dutchman Property



Confidence Interval and Prediction Interval
Area G. Adjacent Warm Springs Wildlife Management Unit off The Dutchman Property



3.4 Biomass Results

The same seven areas where TMS data were collected were sampled for live standing crop (biomass) (Figure 2). The spring-grazed Euland's pasture (Area A, photograph 12) averaged the greatest plant biomass (89 g/0.25 m^2) of the 7 areas sampled in July 2011, while an area in the interior of the Dutchman Property (Area F, Photograph 17) averaged the second greatest at 78 g/0.25m^2 (Table 28). The standard deviation (how much variation exists from the average of Area A and Area F) were 18.97 and 5.13 respectively.

A low standard deviation indicates that the data points tend to be very close to the mean (average) such as with Area F, whereas a high standard deviation, such as for Area B indicates that the data points are spread out over a large range of values. The large standard deviation for Area B indicates that the data points are far from the mean, and the smaller standard deviation for Area F indicates that the values in the 10 samples are clustered more closely around the mean.

Biomass production averaged 72 g/0.25m^2 in the fen community (Area B, Photograph 13). It averaged 65.1 and 46.5 g/0.25$m^{2,}$ respectively, in the areas near the airport (Areas C and D, Photographs 14 and 15) (Table 28). The variation between the 10 fen biomass samples was greatest (47.50 g/0.25m^2) of all areas sampled. The standard deviations of the two areas nearest the airport were similar (30.68 & 31.43 g/0.25m^2).

Area E (Photograph 16) had the lowest biomass production (30.4 g/0.25m^2), with a standard deviation of 13.13.Biomass production averaged the second lowest value (50.8 g/0.25m^2) in the Warm Springs Wildlife Management Unit, with a standard deviation of 30.66 for the ten samples (Area G, Photograph 18)(Table 28).

Table 28. Above-ground live standing crop (g/0.25 m^2) for 7 locales; 2 outside and 5 inside The Dutchman Property in 2011 (N=10 samples/site). See Figure 2 for locations of Areas A-G.

Site	Mean (g/0.25m²)	STD
A. Eulands Previously Grazed Pasture	89.0	18.97
B. Dutchman Property Fen Community	72.0	47.50
C. Dutchman Property Wetlands Near Airport	65.1	30.68
D. Dutchman Property Uplands Near Airport	46.5	31.43
E. Dutchman Property Previously Grazed Wetland/Upland II Interior	30.4	13.13
F. Dutchman PropertyPreviously Grazed Shrub Interior	78.0	5.13
G. Warm Springs Wildlife Management Unit	50.8	30.66

The standard deviation value of a mean serves as a measure of uncertainty. The larger the standard deviation, the larger is the uncertainty that the mean value actually represents the population/metric. The standard deviation of each of the 7 sites and of their 10 sample measurements (N=10) provides the precision of those measurements. When deciding whether measurements of several sites are different or the same, within a certain level of certainty, the standard deviation of those measurements is of crucial importance. If the mean of the measurements of one site is too far away from the means of other sites, then the means may be significantly different.

Analysis of Variance (ANOVA) was the statistical test used to detect whether or not the means of the 7 groups were equal or if some were significantly different. The results of the ANOVA test are shown in Table 29.

Photograph 12, Area A. Spring Grazed pasture off The Dutchman Property.

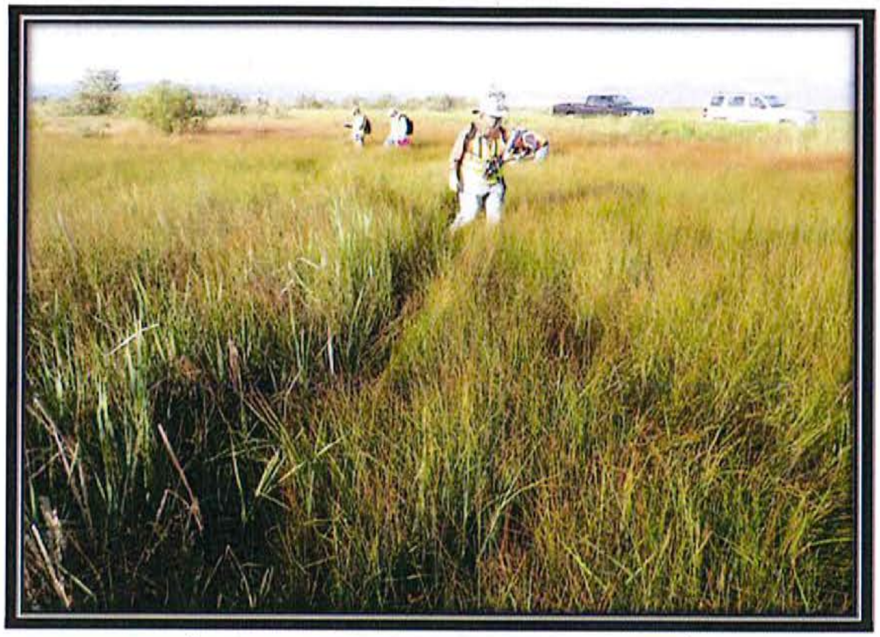
Photograph 13, Area B. Fen in The Dutchman Property.

Photograph 14, Area C. Wetland in southwest portion of Dutchman Property near airport.

Photograph 15, Area D. Upland in southwest portion of The Dutchman Property near airport.

Photograph 16, Area E. Interior upland with scattered wetlands in The Dutchman Property.

Photograph 17, Area F. Interior portion of The Dutchman Property in shrub dominated wetland.



Photograph 18. Area G. Adjacent Warm Springs Wildlife Management Unit off The Dutchman Property.

Table 29. ANOVA Results for the Seven Biomass Samples in and around The Dutchman Property in 2011 (Appendix 7 contains additional ANOVA calculations).

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Squares	F
Between	2.2614E+04	6	3769	3.309
Error	7.1767E+04	63	1139	
Total	9.438E+04	69		

The probability of this result, assuming the null hypothesis that all means are equal, is 0.007.

In order to determine if any of the means of the 7 samples were significantly different, the F distribution value taken from a published F-Distribution Statistic Table for a 95% confidence level for 6 and 63 degrees of freedom (F= 2.25) was compared to the F value obtained in Table 29. The F value in Table 29 (3.309) was greater than the value taken from the F-Distribution Table (2.25), indicating the null hypothesis (that all means are equal) was to be rejected and some of the means were indeed significantly different. ANOVA does not provide information on which means were significantly different from one another. It only indicates that there was a significant difference between some of the means. Additional statistical analysis beyond the scope of this report would be required to find out which means are significantly different from one another.

3.5 Fine & Coarse Litter, Rock, Bare Soil, Bryophytes (mosses, lichens, liverworts)

In a majority of quadrats sampled for the percentage of cover of herbaceous species and woody species less than 1 m in height, data was collected on the percentage cover of litter (i.e., dead stems of grasses and wildflowers), bryophytes, standing water and bare ground. This data provides information on potential fuel buildup (litter) and the erosion potential of an area (i.e., bryophytes can help to hold the soil in place).

Substrate cover mostly consisted of fine litter and/or bryophyte cover in most quadrats (Table 30). Fine litter was found in over 90% of transects and bryophytes were found in about 60% of transects. Both these, along with vegetative plant cover, are essential for precipitation absorption, for ameliorating the effects of precipitation splash and for assisting in the reduction of rain velocity. Plant vegetative cover, along with plant litter cover and especially bryophyte cover, acts as an effective "sponge" that can reduce the erosive potential of rain and assist in holding soil particles in place from periodic flood waters. Those factors, along with the general flatness of the entire Dutchman Property, suggest there is little soil erosion potential over the majority of the property. Even in areas of upwelling where vegetation and litter were sparse, there was often a cover of bryophytes. Thus little evidence of erosion was observed in the Dutchman property, except for a few localized areas along the creeks running through the property.

Table 30. Mean Cover of Litter, Rock, Bryophytes, Water and Bare Ground in Vegetation Quadrats in The Dutchman Property. See Appendix 5 for additional data.

Substrate	Transect	Mean	StdDev
	1A		
Fine Litter		99.8	0.6
Bryophytes		1.8	0.4
	1B		
Fine Litter		91.5	15.1
Bare Soil		7.0	2.7
Bryophytes		1.5	0.7
	1D		
Fine Litter		44.0	22.2
Bryophytes		66.7	30.4
	1E		
Fine Litter		62.5	34.7
Bare Soil		11.3	7.5
Bryophytes		32.1	25.5
	2A		
Fine Litter		76.5	11.6
Bare Soil		2.0	0
Water		10.0	0
	2B		
Fine Litter		98.0	4.2
Bare Soil		5.5	6.4
Bryophytes		13.6	32.7
Water		1.0	0
	2C		
Fine Litter		79.5	26.6
Bare Soil		8.5	9.2
Water		31.7	37.5
	2D		

Substrate	Transect	Mean	StdDev
	14B		
Fine Litter		100	0
Course Litter		95.0	15.8
Bryophytes		90.0	30.0
	14C		
Fine Litter		100	0
Course Litter		100	0
	14D		
Fine Litter		23.5	11.3
Bare Soil		50.9	24.5
Water		28.3	21.0
	14E		
Fine Litter		19.0	15.6
Bare Soil		43.0	23.2
	16AA		
Fine Litter		84.0	35.8
Bare Soil		80.0	0
	16AB		
Fine Litter		81.5	22.2
Bryophytes		5.0	0
Water		16.8	10.1
	16AC		
Fine Litter		99.5	1.6
Bare Soil		5.0	0
Bryophytes		10.0	5.0
	16AD		
Fine Litter		98.0	4.2
Bare Soil		6.0	5.7
	16AE		

Transect 2D continued			
Fine Litter		57.5	29.7
Bare Soil		26.0	22.2
	2E		
Fine Litter		42.5	29.7
Bare Soil		25.0	15.0
Water		55.0	35.2
	2F		
Fine Litter		32.0	14.8
Bare Soil		32.0	14.8
	3A		
Fine Litter		93.0	22.1
Bryophytes		90.0	0
	3B		
Fine Litter		98.0	4.8
Bare Soil		10.0	7.1
Bryophytes		1.1	0.4
	3C		
Fine Litter		75.0	23.2
Course Litter		7.0	4.2
Bare Soil		26.5	26.3
Water		1.3	0.6
	3D		
Fine Litter		17.0	20.8
Bare Soil		28.5	11.8
	3F		
Fine Litter		10.0	5.8
Bare Soil		36.5	16.8
	3G		
Fine Litter		10.5	6.9
Bare Soil		50.0	15.6
	4A		
Water		25.0	0
	4B		
Fine Litter		73.9	30
Bare Soil		27.7	29.3
Bryophytes		35.3	31
Water		11.5	12.9
	4C		
Fine Litter		95.0	9.4
Bryophytes		11.7	2.9

Transect 16AE continued			
Fine Litter		100	0
	16BF		
Fine Litter		96.9	7.5
Bare Soil		11.0	12.7
Bryophytes		1.8	0.5
	16BG		
Fine Litter		97.4	7.9
Bare Soil		13.0	17.0
Bryophytes		26.6	41.7
Water		9.3	13.6
	16BH		
Fine Litter		95.8	1.7
Bare Soil		1.0	0
Bryophytes		1.0	0
	16BI		
Fine Litter		91.5	4.7
	19A		
Fine Litter		98	3.5
Bryophytes		13.7	11.0
Water		4.0	1.7
	19B		
Fine Litter		79.5	29.9
Bare Soil		5.0	3.0
Bryophytes		50.0	0
Water		5.0	0
	19C		
Fine Litter		82.0	15.8
Bare Soil		2.0	1.4
Bryophytes		3.0	1.4
Water		10.4	11.1
	19D		
Fine Litter		94.9	7.4
Bryophytes		30.4	21.9
Water		18.2	16.5
	19E		
Fine Litter		37.5	26.4
Bare Soil		13.4	7.0
	19F		
Fine Litter		45.0	32.1
Bare Soil		31.7	16.9

Transect 4C continued			
	4D		
Bare Soil		20.0	0
	5A		
Bryophytes		44.5	36.8
	5B		
Fine Litter		74.5	21.1
Course Litter		15.0	0
Bare Soil		10.0	7.1
Bryophytes		23.8	21.3
	5C		
Fine Litter		82.0	16.2
Bare Soil		10.0	0
Bryophytes		49.8	31.2
	5F		
Fine Litter		92.5	14.8
Course Litter		20.0	0
Bare Soil		1.0	0
Bryophytes		4.0	1.7
	6A		
Fine Litter		90.5	16.4
Course Litter		5.0	0
Bare Soil		20.0	0
Bryophytes		55.9	34.7
Water		88.8	31.8
	6AA		
Fine Litter		98.5	3.4
Bryophytes		9.8	10.5
Water		41.1	43.2
	6B		
Fine Litter		71.0	33.2
Bare Soil		48.3	29.4
Bryophytes		5.0	0
Water		5.0	0
	6C		
Fine Litter		79.5	18.9
Bare Soil		3.0	0
Bryophytes		4.0	1.4
Water		8.9	13.1
	6D		

Transect 19F continued			
Water		6.0	5.7
	20A		
Fine Litter		96.0	12.6
Bryophytes		39.1	33.6
Water		31.7	37.9
	20B		
Fine Litter		78.0	25.8
Bryophytes		16.3	22.5
Water		31.2	34.4
	20C		
Fine Litter		64.0	30.0
Fine Litter		42.0	36.4
Course Litter		3.0	0
Bare Soil		36.7	24.1
	20E		
Fine Litter		87.2	14.4
Bare Soil		3.0	0
Bryophytes		5.0	0
Water		3.0	0
	20F		
Fine Litter		96.0	9.7
Bare Soil		14.0	8.5
	21A		
Fine Litter		63.0	25.5
Course Litter		3.5	2.1
	21B		
Fine Litter		99.0	3.2
Course Litter		10.0	0
Water		50.0	0
	21D		
Fine Litter		98.8	2.1
Bare Soil		2.7	0.6
	21E		
Fine Litter		92.0	6.3
Course Litter		2.0	0
Bryophytes		7.5	3.5
	22AA		
Fine Litter		95.5	8.3
Bare Soil		1.0	0

Transect 6D continued			
Fine Litter		8.5	4.7
Bare Soil		60.5	11.4
	6E		
Fine Litter		17.7	23.1
Bare Soil		58.1	22.2
Water		77.5	3.5
	7A		
Fine Litter		80.0	11.3
	7B		
Fine Litter		70.5	21.1
Bare Soil		10.0	7.1
	7C		
Fine Litter		86.1	16.0
Bare Soil		31.7	27.1
Bryophytes		7.5	3.5
	7D		
Fine Litter		43.0	37.9
Bare Soil		62.0	28.7
	7E		
Fine Litter		29.0	27.4
Bare Soil		23.3	24.1
Water		42.5	27.9
	7F		
Fine Litter		15.5	8.3
Bare Soil		27.6	18.2
Water		39.4	24.0
	8A		
Fine Litter		82.5	19.2
Bare Soil		29.3	20.1
Bryophytes		10.0	0
Water		40.0	0
Rock		5.0	0
	8B		
Fine Litter		84.0	15.1
Course Litter		50.0	0
Bare Soil		12.3	15.4
	8C		
Fine Litter		91.5	12.0
Deer Scat		10.0	0
Bare Soil		11.7	2.9

Transect 22AA continued			
Bryophytes		16.6	19.8
Water		15.5	12.2
	22AB		
Fine Litter		85	18.4
Bryophytes		6.3	10.6
Water		22.8	17.7
	22AC		
Fine Litter		42	21.4
Bare Soil		5	0
Water		14.3	10.2
	22BD		
Fine Litter		99.8	0.6
Bare Soil		1	0
Bryophytes		3.9	6.7
	22BE		
Fine Litter		78.5	14.9
Bryophytes		10.0	0
Water		18.7	17.3
	22BF		
Fine Litter		87.5	12.3
Bare Soil		2.0	0
Bryophytes		3.8	3.3
Water		11.6	11.9
	22BG		
Fine Litter		59.0	25.7
Bryophytes		5.0	0
Water		26.8	31.3
	22BH		
Fine Litter		71.0	24.8
Bryophytes		38.8	28.7
Water		8.4	5.0
	23AA		
Fine Litter		31.8	21.5
Bryophytes		9.2	7.0
Water		63.8	28.6
	23AB		
Fine Litter		58.2	37.6
Bryophytes		66.3	38.2
Water		49.0	39.6
	23AC		

Transect 8C continued			
Bryophytes		15.0	0
	8D		
Fine Litter		68.8	29.8
Bare Soil		38.5	28.3
Bryophytes		6.7	2.9
	8E		
Fine Litter		83.4	15.5
Bare Soil		20.0	0
	9BF1		
Fine Litter		89.2	6.6
Bare Soil		2.0	1.0
Bryophytes		23.8	29.2
Water		55.8	41.8
	9BG		
Fine Litter		100	0
	9BH		
Fine Litter		100	0
Bryophytes		16.3	11.1
Water		15.0	7.1
	9BI		
Fine Litter		61.0	28.5
Course Litter		2.0	1.4
Bryophytes		40.0	35.6
Water		30.3	32.9
	9BJ		
Fine Litter		66.0	15.1
Bryophytes		35.8	24.2
Water		3.9	3.2
	10AA		
Fine Litter		80.5	23.7
Bryophytes		11.0	10.6
	10AB		
Bare Soil		10.0	5.0
Bryophytes		2.0	0
Water		84.5	13.6
	10AC		
Fine Litter		79.0	21.3
Course Litter		4.0	1.4
Bare Soil		5.0	0
Bryophytes		75.0	0

Transect 23AC continued			
Fine Litter		97.5	6.3
Bryophytes		68.6	67
Water		46.3	26.2
	23AD		
Fine Litter		46.5	20.7
Course Litter		1.0	0
Bryophytes		8.0	0
Water		34.6	20
	23BF		
Fine Litter		93.3	11.2
Bare Soil		15.0	0
Water		17.3	14.2
	23BG		
Fine Litter		46.0	22.2
Bare Soil		5.0	0
Bryophytes		5.0	0
Water		53.5	35.6
	23BH		
Fine Litter		65.0	31.3
Bryophytes		5.0	0
Water		39.4	23.1
	24AA		
Fine Litter		100	0
Bryophytes		15.4	9
Water		70.0	32.7
	24AB		
Fine Litter		100	0
Bryophytes		24.5	9.6
Water		63.5	23.6
	24AC		
Fine Litter		99.0	3.2
Water		71.1	29.9
	24AD		
Fine Litter		23.5	18.0
Bare Soil		70.0	18.1
	24BE		
Fine Litter		100	0
Bryophytes		25.0	17.1
Water		33.3	28.0
	24BF		

Transect 10AC continued			
	10AD		
Fine Litter		88.0	14.9
Bare Soil		5.0	0
Bryophytes		15.1	20.6
	10BG		
Fine Litter		100	0
Bryophytes		2.1	1.4
	11A		
Fine Litter		97.0	2.1
Bare Soil		3.0	2.8
Bryophytes		1.0	0
Water		100	0
	11B		
Fine Litter		96.2	2.8
Bare Soil		1.8	1.0
Bryophytes		1.0	0
Water		2.3	2.3
	11C		
Fine Litter		50.0	28.2
Bare Soil		19.2	13.8
Water		5	0
	11D		
Fine Litter		81.3	21.4
Bare Soil		26.7	21.0
	12A		
Fine Litter		73.5	12.5
Bryophytes		8.3	2.9
Water		22.3	13.1
	12B		
Fine Litter		78.5	24.4
Bryophytes		2.0	0
Water		18.8	14.6
	12C		
Fine Litter		76.0	17.0
Bare Soil		27.8	14.6
Bryophytes		1.0	0
	12D		
Fine Litter		78.5	17.8
Water		15.0	13.4
	12E		
Fine Litter		88.8	15.6

Transect 24 BF continued			
Fine Litter		98.0	3.5
Bryophytes		3.2	3.0
Water		69.5	28.1
	24BG		
Fine Litter		87.5	27.0
Water		60.7	29.9
	24BH		
Fine Litter		42.5	46.4
Bare Soil		55	16.4
Bryophytes		5.0	0
Water		50.0	56.6
	25A		
Fine Litter		69.4	29.0
Bryophytes		39.2	22.5
Water		34.4	28.2
	25B		
Fine Litter		30.0	15.6
Bryophytes		25.7	20.9
Water		43.3	26.3
	25C		
Fine Litter		93.0	16.4
Course Litter		10.0	
Bryophytes		50.0	43.5
Water		32.5	20.6
	25D		
Fine Litter		18.0	22.2
Bryophytes		41.9	29.6
Water		60.0	29.7
	25E		
Fine Litter		88.5	27.5
Bryophytes		37.0	20.6
Water		42.5	35.7
Rock			
	25F		
Fine Litter		53.0	23.6
Bryophytes		27.0	16.7
Water		34.5	28.2
	26A		
Fine Litter		68.0	18.1
Course Litter		15.0	7.1
Bare Soil		10.0	

Transect 12E continued			
Course Litter		10.8	10.7
Bare Soil		1.5	0.7
Bryophytes		5.0	4.4
Water		4.9	8.3
	13A		
Fine Litter		86.7	13.7
Water		19.7	16.7
	13B		
Fine Litter		91.0	18.5
Water		10.0	8.7
	13C		
Fine Litter		95.0	12.5
Bare Soil		4.0	1.7
Bryophytes		8.0	10.4
Water		20.5	27.6
	13D		
Fine Litter		56.5	15.8
Bare Soil		42	14.6
Bryophytes		5.0	0
	13E		
Fine Litter		100	0
Bryophytes		1.7	0.06
Water		63.8	35.8
	13F		
Fine Litter		48.5	26.5
Bare Soil		23.3	15.6
	14A		
Fine Litter		38.0	23.1
Course Litter		10.0	0
Bare Soil		5.0	0
Bryophytes		2.5	0.7
Water		41.7	23.4

Transect 26A continued			
Bryophytes		22.0	16.4
Water		37.0	11.6
	26B		
Fine Litter		78.5	20.1
Bare Soil		4.0	1.4
Bryophytes		11.4	25.9
Water		21.4	24.9
	26C		
Fine Litter		60.0	18.9
Bryophytes		5	0
Water		66.9	26.6
	26D		
Fine Litter		22.0	24.3
Course Litter			
Bare Soil		49.5	25.5
Water		20.0	0
	26E		
Fine Litter		62.0	23.8
Bare Soil		32.0	16.7
Bryophytes		4.9	8.9
	26F		
Fine Litter		6.7	2.6
Bare Soil		46.5	30.4
Bryophytes		8.5	9.2

4.0 SUMMARY OF PLANT COMMUNITY CHARACTERIZATIONS

The Dutchman Property wetland is a diverse ecological setting because of the variety of habitats found within the 3,700+ acre property. Data collected suggest there are at least 11 plant communities present on the property (Figure 3 & Table 31) as described below. Plant communities are also described below along with photographs of some representative communities. The Dutchman Property wetland was found to contain a diversity of vegetation community types and may be one of the most diverse wetland systems remaining in the

Upper Clarks Fork Basin. Plant diversity, based on Timed Meander Searches of several areas within and around The Dutchman Property, suggest wetlands are quite diverse, even in pastures (Eulands) that are regularly grazed. An ungrazed offsite area (Warms Springs Wildlife Management Unit) had the most diversity of plants of the 7 areas.

In general, vegetation consists of a variety of wetland types in the western portions of the property. These include fens, bulrush flarks, seeps, sedge meadows and riparian shrub covered marshes. These plant communities are quite productive (72 grams and 65 grams/0.25m^2) and diverse (39 and 40 species). As one moves east, the interior portions of The Dutchman Property are dominated by fallow upland fields and fallow fields that have reverted to wetlands. Small tree covered areas are also occasionally observed. At the eastern end of the property upland areas are comprised of wetlands dominated by Idaho fescue and red top grass with an abundance of saline plantain and a large percentage of exposed bare soils. This upland upwelling area with interspersed drainageways was representitative of areas in the eastern portions of The Dutchman Property. The south portion of the east end of The Dutchman Property is comprised mostly of uplands dominated by forage grass fields. The central, forested south portion of The Dutchman Property contains tree covered areas. The area adjacent to the Deer Lodge County Airport is comprised of fallow uplands (some of which is underlain with hydric soils), which eventually transition into sedge meadow and shrub covered marshes.

Several State of Montana noxious weeds were found in The Dutchman Property (Montana DOT 2008). The most prevalent noxious weed in The Dutchman Property was Canada thistle (*Cirsium arvense*). This species was found in variety of habitats (Transects 1B, 1C, 1D, 2A, 2B, 3A, 3B, 4A, 4B, 5C, 6AA, 6A, 6B ,7A, 7B, 9BG, 10A, 10B, 11A, 11B, 11C, 11D, 12C, 12E, 13C, 16AA, 16AC, 16AD, 16AE, 16BF, 16BG, 16BI, 19B, 19D, 19E, 19F, 20D, 20E, 20F, 21A, 22AB, 22AD, 22BG, 26B) and had higher importance values in areas believed to be where past livestock grazing were the most intense. For instance, some areas near the interior of the Dutchman Property and the area near the Deer Lodge County Airport where livestock grazing was believed to have been prevalent had sizable populations of Canada thistle. Grazing livestock can create sufficient earth disturbance that would favor establishment of wind-blown weed species such as thistle. Livestock can also serve as a vector for dispersal as thistle heads stick to them from other fields and are dropped as they graze through the upland and wetland areas. The Warm Springs Wildlife Management unit also had some Canada thistle populations. Several vegetation types typically did not contain thistles or their population was reduced. These were in the fen community and areas where there was a dense cover of red top grass.

Two additional noxious weeds, knapweed (*Centaurea* spp.) and white top (*Cardaria draba*), were occasionally observed on the diversion dike and other created berms (personal observation).

Table 31. Plant Communities and Mapped Acreages in The Dutchman Property.

Number	Community	Acres	% Total Property
1	Fallow fields reverting to native wetland communities	272	7.9
2	Fallow upland field communities	694	20.1
3	Fens including bulrush flarks, seeps and springs	236	6.8
4	Wet sedge meadows	218	6.3
5	Sedge meadows	688	19.9
6	Riparian marsh	119	3.4
7	Riparian shrub covered areas including oxbow wetland areas	771	22.3
8	Small tree covered areas	92	2.7
9	Upwelling and drainage-ways	232	6.7
10	Open water ponds (artificial)	11	0.3
11	Fallowed uplands with introduced forage grasses	125	3.6

The major communities which have been characterized above using plant cover, frequency, intercept, Timed Meander Search, and biomass data (for a limited number) of the communities include the following:

1. Fallowed fields reverting to native wetland communities (Photograph 19).

   Some fallow fields located in interior portions of The Dutchman Property have reverted to jurisdictional wetlands following the removal of cattle (Photograph 19), based on the differences between the 2005 and 2011 wetland delineations. These areas were in lower depressional areas within the old pastured fields, as well as areas comprised of the transitional areas between the previously delineated wetlands (2005) and the grazed pastures. A number of transects were located in these fallow fields that have reverted to wetlands (Transects 2C, 7E, 7F, 11B, 11C, 14B, 14C, 21E, 21F). These fallow fields that have reverted to wetlands were typically dominated by either redtop grass or Baltic rush. A few other dominants were Booth's willow, slimstem reedgrass and a few other species (Appendix 1).

Photograph 19. Fallow fields reverting to wetlands in The Dutchman Property.

2. Fallowed upland field communities (Photograph 20)

Other fallow fields were located in the interior of The Dutchman Property as well as in peripheral areas that have remained as upland fields after cattle grazing had been eliminated. Many of these areas are comprised of cool season grasses, such as redtop and fescue grasses, and forbs such as plantains and members of the asteraceae family. Non-native weeds such as Canada thistle were found in this community, no doubt partially due to previous cattle grazing. Some of the transects located in the fallow upland fields included 1A,1B, 1C, 2D.2E, 2F, 3B, 3C, 3D, 3F, 3G, 4D, 5D,5E,5F, 7B, 14d,14E,14F, 16AE and 16AD. Generally redtop was one of the top three dominant species in the fallowed upland field community. Additional dominants were Baltic rush and fescue grasses. A few species were occasionally dominant in a specific transect or area, such as saline plantain, quack grass, Canada thistle, slender wheat grass and slimstem reedgrass.

Photograph 20. Fallow upland field in The Dutchman Property.

3. Fens, including bulrush flarks, seeps and springs (Photograph 21)

Fens or fen-like areas are located in the western portion of the property. These are underlain with peat/muck soils. These peat/muck soils were typically located on slightly raised "peat" mounds. A variety of sedges (*Carex* spp.), bulrushes, and small flower grass of Parnassus (*Parnassia parviflora*), elephants head lousewort (*Pedicularis groenlandica*), common bog and slender bog arrow-grasses (*Triglochin maritime & T. palustris*) were found in this community. Seep and spring areas (Photograph 21) were located in areas within fens. Floristically, they closely resembled the fen communities. It was not easy to differentiate the plant composition from the fen areas. The seeps and springs had small pockets of shallow open water pockets (several inches deep), while the fen areas had small rivulets. Bulrush flarks (the wet surfaces of a bog or similar wetland type) were also observed in the area where fens were found and consisted of dense growth of hardstem bulrush (*Scirpus acutus*) with interspersed sedges. These areas were typically found on slightly raised peat mounds in the western portion of The Dutchman Property. Transects 9BF, 9BG, 9BH, 9BI, 9BJ, 25A, 25B, 25C, 25D, 25E and 25F were located within the fen plant community. Baltic rush was in the top three dominant species in 9 of the 11 transects. Sedges (*Carex aquatilis, C. nebraskensis, C. praegracilis and an unidentified Carex sp.*) were one of the top three dominants in 7 of the 11 transects, and willows (*Salix boothii, S. candida, S lutea*) were in the top three in 3 of the 11 transects.

Photograph 21. Fen areas located over peat/muck soils in The Dutchman Property.

4. Wet sedge meadows (Photograph 22)

   Wet sedge meadows were usually observed along some of the creeks found in The Dutchman Property. These were comprised of sedges with occasional shrubs which at times were dense and quite tall. Transects 2A, 2B, 7A, 7B and 19A and 19B were located in or close to the wet sedge meadow plant community. Baltic rush and/or red top grass dominated in this community with some silverweed as the third dominant in some transects. Canada thistle was a minor component in some transects. This species most likely invaded when livestock grazed along the creek banks causing soil disturbance.

Photograph 22. Wet Sedge Meadow in The Dutchman Property.

5. Sedge meadows (Photograph 23)

Sedge meadows were not directly associated with water ways. They were also observed elsewhere and at times could be quite expansive. A number of sedge species, Baltic rush and scattered and low growing shrubs were the typical plant species. Transects 12A, 12B, 24BE, 24BF, 24BG, 24AC, 24AA, 24AB 23AC and 23AD were located in or close to sedge meadows. Baltic rush, slimstem reedgrass and Booth's willow were in general the 3 dominant species in these transects. Other species were sedges and hoary willow.

Photograph 23. Sedge Meadow in The Dutchman Property.

6. Riparian marsh (Photograph 24)

Riparian marsh areas were also observed along some of the creeks in The Dutchman Property. These areas typically had a greater composition of shallow emergent plants such as cattails and bulrush. Due to high water levels in 2011, this community was not quantitatively sampled.

Photograph 24. Riparian marsh in The Dutchman Property.

7. Riparian shrub covered areas including oxbow wetlands (Photograph 25).

These areas were also observed along some of the creeks at The Dutchman Property. Shrubs, mostly willow species, could be quite dense at times. The height of the shrubs is also typically the greatest in this community (personal observation). Oxbow wetlands found were wetlands where a creek channel had been cut off and the creek had taken another path, typically leaving depressional in the area of the old creek channel. These were associated with the riparian areas. Transects 10AA, 10AB, 10AC, 10AD, 10BE, 10BF, 10BG, 10BH, 22AA, 22AB, 22AC, 22AD, 22BE, 22BF, 22BG, 26B, 26C, 14A and 14B were sampled in this community. Baltic rush dominated, followed by willows (yellow and Booth's) which were also dominant in a number of transects, as was redtop grass.

Photograph 25. Shrub covered riparian area in The Dutchman Property.

8. Small tree covered areas (Photograph 26).

   These areas were comprised of aspen groves scattered in southern portions of The Dutchman Property. Some groves were small, comprised of several dozen small aspen trees and saplings, and some contained several hundreds of tree sized aspens. Most of these tree areas were comprised of trees that were 10 to 15cm (4-6 inches) diameter. Transects 21A, 21B and 26A crossed into small, tree covered areas. Baltic rush and Booth's willow were the two main dominants. Canada thistle was also found. This may have been where livestock congregated for shade and disturbed the ground story vegetation, leading to thistle establishment.

Photograph 26. Aspen Grove in The Dutchman Property.

9. Upwelling and drainage-ways (Photograph 27).

   In these areas with low shrubs such as shrubby cinquefoil (*Potentilla fruticosa*) and wetland sedge communities upwelling areas and shallow drainage-ways were observed and wetland sedges and Baltic rush were found. Shrubby cinquefoil (Photograph 27) was sometimes associated with these lower upwelling areas. Bare ground was typically more evident in these upwelling areas, with some transects averaging more than 50% bare-ground (Transects 6D and 6E). These areas seem to occur more frequently in the eastern areas of The Dutchman Property. Transects, 6D, 6E, 19E and 19F were located in or near these upwelling areas. The dominants were typically saline plantain, fescues, redtop and phlox.

Photograph 27. *Potentilla fruticosa* Shrubs in The Dutchman Property.

10. Open water ponds (artificial) (Photograph 28).

These open water ponds were confined to the eastern portion of The Dutchman Property and were most likely constructed for cattle watering. Where spoils have been deposited, upland cool season grasses predominated (foreground Photo 28).

Photograph 28. Open water pond in The Dutchman Property.

11. Fallowed uplands with introduced forage grasses

    These areas, with introduced forage grasses, legumes; and weeds, were for the most part located in the southeastern section of The Dutchman Property. Grasses such as quackgrass (*Andropogon repens*), Pumpelly's brome (*Bromus sp.*), foxtail (*Alopecurus sp.*), and wheatgrass were representatives of this community, as were clovers (*Trifolium spp.*). Transects 20 D, 20E and 20F were located in the fallowed upland fields. Baltic rush, meadow foxtail and brome grass were the typical dominants. Meadow foxtail and brome grass may have been planted for livestock forage grasses.

4.1 Wildlife Habitat Evaluation

Vegetation data and mapping of ecological units were used to characterize and evaluate the wildlife habitat improvements that may be occurring in the Dutchman wetlands and riparian lands. Specifically, for purposes of this supplemental report, the following ecological data were collected to document ecological conditions in the Dutchman wetlands and riparian lands:

- Vegetation diversity;
- Vegetation community structure;
- Vegetation function in terms of productivity; and
- Potential for use by approved animal species.

These data, such as herbaceous plant cover, frequency of occurrence, importance value, richness, biomass and woody plant structural measurements, were used to understand habitat structural, functional, and spatial measurements. They were also used to understand and qualitatively characterize wildlife habitat values in the project site. This task was focused on using the summary of the ecological data and mapping the spatial relationships of these variables, in order to develop qualitative characterization of some relationships among these variables.

This wildlife habitat evaluation procedure is not following USFWS and other techniques, typically referred to as Wildlife Habitat Procedures (HEPs), which are primarily modeling exercises conducted on a species by species basis. Instead, in this supplement, the goal is to use the quantitative characterizations of vegetation systems and present a basic understanding of the habitat values of key habitats. Another goal is to use casual observations of key wildlife species and groups to create a general model for the key wildlife groups found to use the habitats present in wetlands and riparian corridors. Some of the key wildlife observations included new observations of federal or state sensitive, rare, threatened, or endangered species, and reinforced observations of species known to be present from the 2005 threatened and endangered species report. Confirmed identifications of special status species were identified and have been documented in other locations of this report.

I. Habitat Types

Mapping of vegetation types has been presented elsewhere in this report. Here we summarize the major vegetation types that are condensed into the following habitat settings:

A. Riparian Tree, Shrub and Corridor Habitat

a. Tree copse systems
b. Clonal shrub systems
c. Mixed age-size class woody cover systems

B. Aquatic, and Fluvial Habitat

a. Open water, littoral zones
b. Sand, gravel bars
c. Pool and riffle aquatic systems
d. Ditch system
e. Dike and levee systems
f. Waterfowl pond systems
g. Thermal upwellings
h. Ephemeral wetlands
i. Intermittent irrigation channels
j. Perennial irrigation channels
k. Intermittent oxbow and overflow fluvial channels
l. Perennial fluvial channels

C. Sedge Meadows, Wet Prairie & Fen Upwellings

a. Minerotrophic depositional areas
b. Wetland mesic grassland ecotones with sedges and wet prairies

D. Old Fields

a. Areas transitional to sedge meadow/wet prairie
b. Remnant agricultural/agronomic and invasive grasslands

E. Existing Agricultural Fields

a. Perennial grass croplands
b. Nearby annual grain croplands

F. Infrastructure

a. Gravel roadway
b. Bridges
c. Graveled stream banks
d. Buildings, fence lines and other semi-permanent infrastructure

II. Habitat Structural and Composition Descriptions

A. Riparian Tree, Shrub and Corridor Habitat

This ecosystem type in the project area is primarily a continuous mixed age-class woody cover system found along the various stream courses traversing and abutting the Dutchman wetland system. Within and adjacent to this continuous corridor are found tree copse systems, dominated by 5-10 meter tall aspen growing in dense stands. Between the copse growths are clonal shrub systems of coyote and several other shrub forming willow species. Clones vary in size from dozens to hundreds of feet in diameter. They co-mingle with the copses and also "finger" out into sedge meadows and wet prairies.

Habitat and Species Correlations:

During the Dutchman studies, we observed many species of wildlife to be feeding, breeding and using these corridors for security. Observed using these habitat corridors were foraging moose, elk, mule deer, rabbit, and many bird species, including neotropical warblers (yellow warblers, yellow throat, etc.), among many others.

Most of the bird species observed using these corridors were found nesting in the clonal shrubs and on lower branches of younger aspen saplings. The structural characteristics of this habitat were found to support a majority of the species of wildlife typically found to be associated with Dutchman wetland site.

B. Aquatic, and Fluvial Habitat

This habitat type is diverse and is comprised of the continuum from channel-bottom in-stream structure to riffle and pool sequences which were found to contain rock and cobbles, embedded logs, and root systems of washed-out shrubs. The open water zones included submerged, rooted aquatic vegetation that transitioned toward the shorelines. In these littoral zones were found emergent plant species including sedges, reeds and others. Often, sand and gravel bars were then present and these transitioned beyond into the riparian tree, shrub and corridor habitat. Other types of aquatic settings were present, including irrigation and water conveyance ditching and associated dikes and levees. In some locations, oxbow wetlands, primarily comprised of clonal shrub and sedge meadow communities, were present.

Ponded systems included created waterfowl pond systems that were excavated with retaining dikes on the down-gradient side of the open water bodies. Open water bodies appeared to be several feet in depth and were primarily constructed into the underlying substrates. The dike systems around these ponds were heavily colonized by invasive plants species, including Canada thistle and others.

There were also ephemeral aquatic wetlands, especially fluvial wetlands found in oxbows and stream corridors connected to floodplain environs. Ephemeral oxbows typically were occupied by floodwaters briefly during spring flood events and were dominated by sedge meadows, wet prairie and the riparian, tree, shrub and corridor habitat.

We also found thermal upwelling wetlands which were small, unique open water bodies early in the year. Later, during the growing season, these are then filled in with submerged and emergent wetland vegetation. Intermittent and perennial irrigation channels and flumes were also present in the project area.

Habitat and Species Correlations:

The mosaic of these habitat types and interspersions of riparian tree and shrub habitat corridors should be considered as one system, at least for considerations of terrestrial wildlife habitat. The same wildlife species were found to cross freely throughout this mosaic, thus underscoring the importance of the intact mosaic from a spatial heterogeneity and structural diversity perspective.

Many additional species of birds, including waterfowl and shorebirds were found to utilize the open water and ponded aquatic habitats. According to design, ponded areas attracted dabbling and diving ducks. The stream systems also attracted species of shorebirds.

C. Sedge Meadows, Wet Prairie and Fen Upwellings

The most extensive habitat types present in the Dutchman wetland system were grassland-like, but found in seasonally wet to seasonally inundated shallow settings that cover a majority of the Dutchman site. The structural characteristics of these habitats are changing now that grazing cattle grazing have been removed from the Dutchman. Now, individual willow shrub colonization is occurring broadly over many of these habitat types.

This habitat type also includes some very interesting sparsely vegetated and seasonally saturated substrates that we refer to as minerorophic depositional areas. The slightly elevated areas were characterized by nearly bare, gray substrates which finely transitioned to slightly wetter areas that include wetland mesic grassland ecotones with sedges and wet prairies.

These habitat types were found to contain the highest levels of vegetation diversity in The Dutchman Property. These habitat types were also found to include some of the highest quality natural areas in the Dutchman wetland system.

Habitat and Species Correlations:

Wildlife species found using these ecosystems primarily included grassland birds such as bobolinks and savanna sparrows, and included pairs of sandhill cranes and long billed curlews. Song sparrows utilized the enhanced structure of the colonizing willow trees. Grassland ground-nesting birds were found throughout this habitat type. We found several short-eared owls and marsh hawks nesting in both of these habitat types.

D. Old Fields

Old dry-land farmed fields were present in the project site. These ranged from what has been a characterized as old fields, still dominated by the same previously planted perennial agronomic grasses and some of the associated forbs. These remnant agricultural/agronomic and invasive grasslands also had locations with populations of invasive plants including Canada thistle and other invasive plants. In locations where these former fields transitioned into wetter soils, we found areas transitional to sedge meadow/wet prairie vegetation communities.

Habitat and Species Correlations:

Wildlife use of this habitat was found primarily to be comprised of some of the same grassland birds found in the sedge meadows and wet prairie habitat types. In most locations, these old fields were also being used by foraging deer, and occasionally by many small mammals. Various raptorial bird species were observed foraging in these old fields. These included red tailed hawks, ferruginous hawks and sparrow hawks, and we also observed several short-eared owls and marsh hawks nesting in both this habitat type and in the sedge meadow and wet prairie grassland types.

E. Existing agricultural fields

Existing, off-property farm fields included annually irrigated and tilled row crops (annual grain croplands) and irrigated perennial grass croplands, which were harvested multiple times per year for hay production. After crop production, these landscapes were then annually grazed by livestock. In some locations, livestock were overwintered in these harvested settings.

Habitat and Species Correlations:

Large winter herds of elk were observed using these habitat types. A few bird species, such as horned larks and several sparrow species were observed regularly foraging in these fields.

F. Infrastructure

Beneath bridges and associated with some buildings, we observed some wildlife. The gravel and two-track roadways were frequently found to have tracks and signs of coyote, deer, and occasionally larger mammals.

Habitat and Species Correlations:

While limited as wildlife habitat, bridges over the stream systems and some of the eaves on buildings were found to provide habitat for several swallow species. Small mammals, including muskrat, beaver and voles, were found to be associated with these infrastructure locations.

Summary

The Dutchman wetland complex includes a diverse array of habitat types. Structural characteristics of each type, and in part their diversity, drive the use these habitat by wildlife. In general, farmlands and fallowed transitioning farmlands offer the least structure and species biodiversity of any of the habitats present. And, consequently, other than overwintering elk, these fields have very low wildlife use and low diversity of wildlife present at any time of the year. The most wildlife use was found in the most diverse (biologically and structurally) riparian tree, shrub and sedge meadow and wet prairie habitats present. Because all habitat types were co-mingled over the landscape of the Dutchman wetland complex, wildlife use of the complex is high.

The collected data and mapping of ecological units was used to characterize and evaluate the wildlife habitat improvements occurring from the removal of livestock in The Dutchman Property wetlands. This analysis is undertaken without the benefit of data from The Dutchman Property wetland during the period livestock grazing occurred. Instead, as part of our evaluation process during the 2011 field season, previously grazed and non-grazed wetland areas were sampled that were similar to wetland vegetation types found on The Dutchman Property.

Based on this analysis, some of the data document a moderate level in vegetation diversity in The Dutchman Property wetland where livestock grazing has been eliminated, compared to the Eulands pasture that is still grazed n the spring. Table 27 provides Timed Meander Search results of current spring-grazed (Area A) and un-grazed (Area G) areas. These searches were conducted both outside The Dutchman Property and within the property (Areas B-F) that previously had varying grazing frequencies. This Table documents the diversification in The Dutchman Property plant communities, compared to a grazed pasture. Only one area (Area D) had lower species diversity than the spring-grazed pasture.

Vegetation community structure has also changed since grazing cessation in the property. Where annual grazing reduced graminoid and other herbaceous plant diversity and prevented shrub development, dense growths of grasses, forbs, and a native plant shrub and tree layer has re-established in many locations. The five photographs below (Photographs 29-33) document the varying degrees of shrub-covered areas.

Photograph 29. Shrubby wetland in The Dutchman Property

Photograph 30. Shrubby wetland to the right side in photo in The Dutchman Property

Photograph 31. Short stature shrub covered wetland

Photograph 32. Moderate stature shrub wetlands in The Dutchman Property

Photograph 33. Taller stature shrub wetlands in The Dutchman Property

Vegetation function, in terms of primary productivity (Biomass in Table 28), was also measured along representative study transects in a spring-grazed portion on Euland's Property, in recently grazed Dutchman uplands (ungrazed since 2009), recently grazed Dutchman wetlands (ungrazed since 2009) and in non- grazed areas of the Warm Springs Wildlife Management Unit adjacent to The Dutchman Property. The analysis suggests that some of the native wetland ecosystems that have regenerated following grazing cessation were still less productive when compared to the Eulands spring-grazed area. Our analysis, however, is somewhat misleading since our sampling occurred at one point in time (approximately one month or more) after cattle had been removed that allowed the grazed vegetation to respond. If biomass sampling had been conducted in grazed areas immediately after cessation of grazing, these areas would have lower primary productivity (Biomass) resulting from biomass removal through grazing, than shown in the July measurements. It would also most likely have shown less primary productivity than the ungrazed areas sampled at that time. At the time of biomass sampling in July, there were no accessible, recently grazed sites available. A high level of biomass production in a wetland used for pasture was not unanticipated. Selection by local ranchers of grazing in wetland areas that were highly productive makes logical sense. Grazing in less productive systems, such as the interior uplands and wetlands on the Dutchman Property, probably meant livestock had to range farther, potentially causing greater wetland disturbance to obtain the same forage values as the higher productivity Euland wetland pasture areas.

Casual wildlife observations and bird lists created during our studies in The Dutchman Property wetland suggest that this site harbors a diversity of birds (Table 32). In addition to diversity, some rare bird species were also observed breeding, nesting or foraging in The Dutchman Property wetland.

Table 32. The Dutchman Property Wetland Wildlife Species Observed/Heard
***MT special concern species**

Birds	Mammals
Bald eagle*	Antelope
Black billed magpie	Beaver
Cinnamon teal	Elk
Clay colored sparrow	Moose
Eastern king bird	
Gadwall	
Golden eye canvas back	
Goldfinch	
Grasshopper sparrow*[1]	
Great blue heron*	
Henslow sparrow	
Lincoln sparrow	
Long-billed curlew*[1]	
Mallard	
Marsh hawk	
Raven	
Sandhill crane[1,2,3]	
Savanna sparrow	
Scaup	
Sharp shinned hawk	
Short-eared owls[3]	
Shoveler	
Song sparrow	
Sora rail	
Tree swallow	
Upland plover	
Western meadowlark	
Widgeon	
Wilson's snipe	
Yellow throat	
Yellow warbler	

1= in foraging, 2=breeding, 3=nesting

4.2 Threatened, Endangered and Special Concern Species and Natural Areas

Several State special concern bird species were observed foraging, nesting, or breeding during the field work in The Dutchman Property wetland. For each of these species, field ecologists confirmed identifications of special status species and documented their nesting, breeding, or foraging.

Ecologists also confirmed the identification and recorded State rare and special concern plant species which contribute to wildlife diversity in The Dutchman Property wetland. This includes the following State plants of concern: Mealy primrose (*Primula incana*), Slender cottongrass (*Eriophorum gracile)* and Alpine meadowrue (*Thalictrum alpinum)* (Montana Natural Heritage Program database 2011). Both Mealy primrose and Alpine meadowrue are classified as S2 in the State. These species ranked S2 are at a high risk of extinction and/or extirpation in the State due to very limited and/or declining population numbers and/or declining habitat range. Slender cottongrass is listed as S3 in the State and in the region, at risk of extinction and/or extirpation due to limited and declining numbers, range and/or habitat, even though it may be locally abundant.

In addition to the rare and special status species, the analysis discovered the rare fen plant community comprised of springs, seeps and rare/uncommon plants such as, *Eriophorum gracile*, *Triglochin palustre* and *Castilleja sulphurea.* These were found in western areas in The Dutchman Property, for which protection has been sought by such groups as The Nature Conservancy and others in Montana.

These Rocky Mountain subalpine-montane fens are defined by groundwater discharge, soil chemistry and peat accumulation (Montana Field Guide 2011). These fens are uncommon, but widely distributed in western Montana. Montane fens typically have precipitation as the main hydrological input. They are generally less acidic than bogs. They are one of the most diverse floristic habitats in Montana, and they contain a number of rare and vulnerable plant species that contribute to wildlife diversity. Constant high water levels lead to the accumulation of peat (usually greater than 15 inches). Fens located in southwestern Montana occur at elevations greater than 5,500 feet and occur in seeps and sub-irrigated meadows in valley bottoms that range from narrow to broad (Heidel and Rodemaker, 2008). These conditions are found in Deer Lodge County including The Dutchman Property. Within The Dutchman Property, these rare fens were concentrated in the western portion of the property on an area of significant peat accumulation with upwelling peat mounds and numerous seeps and springs.

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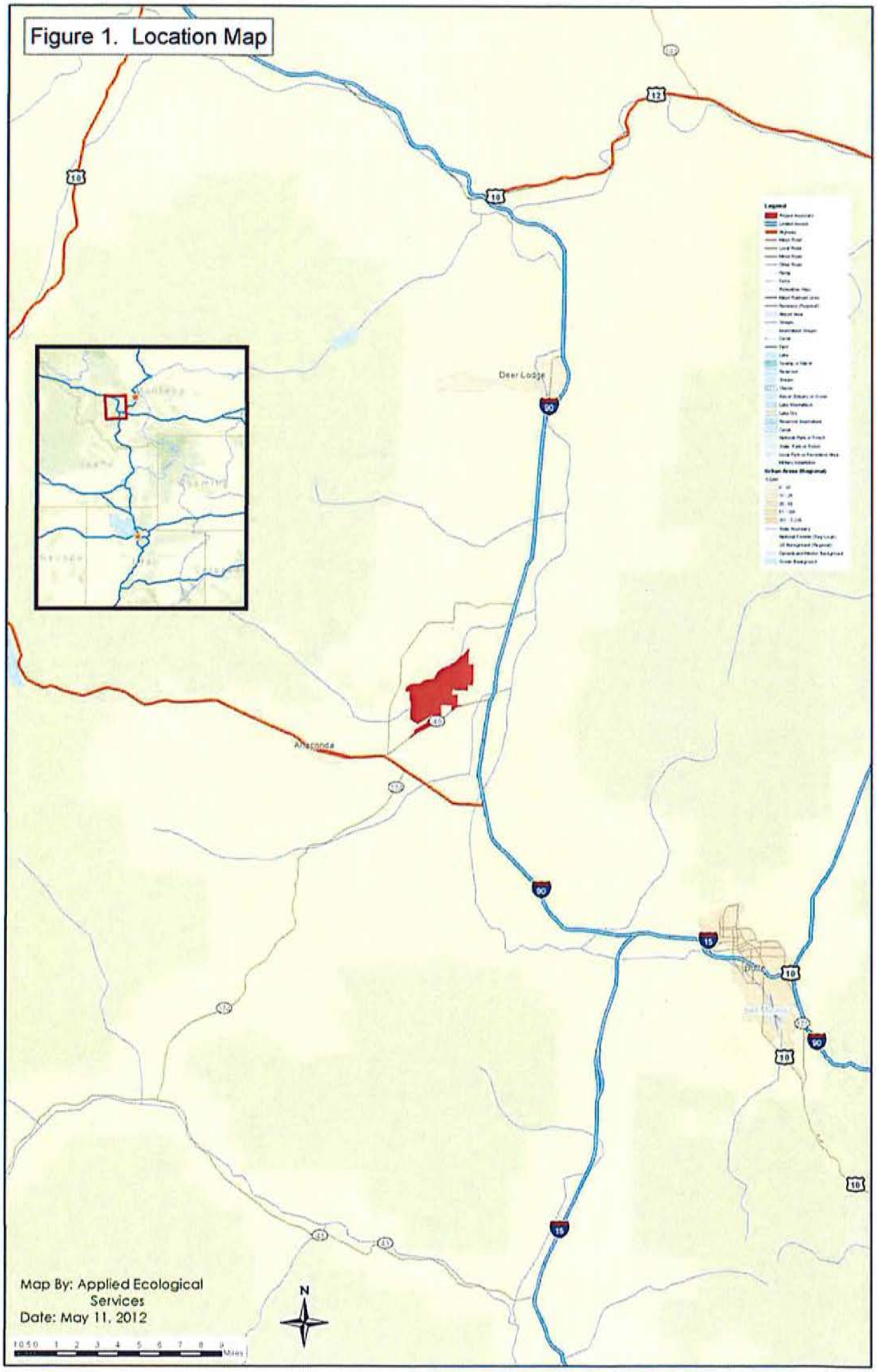
Figure 1. Location Map



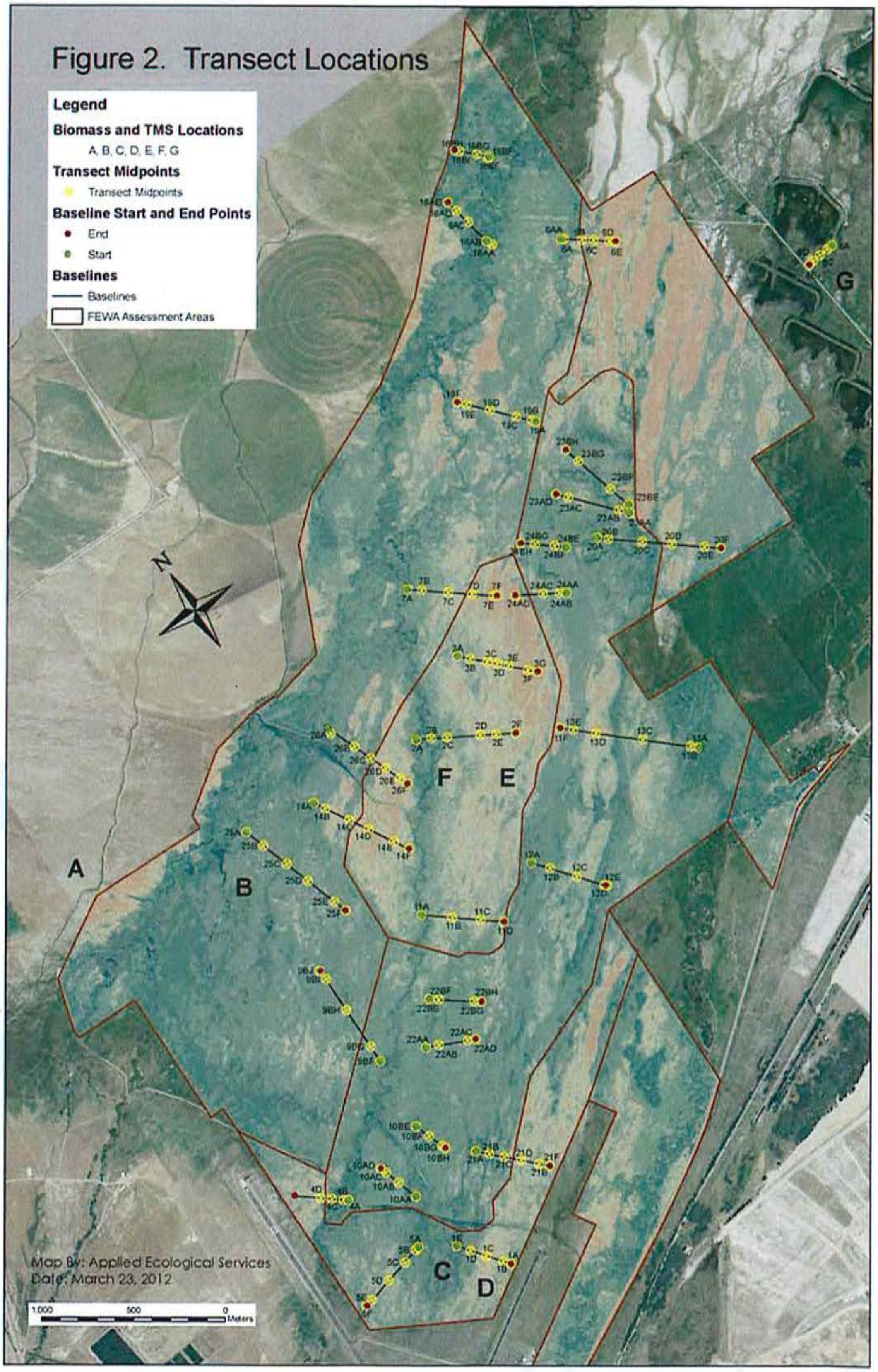
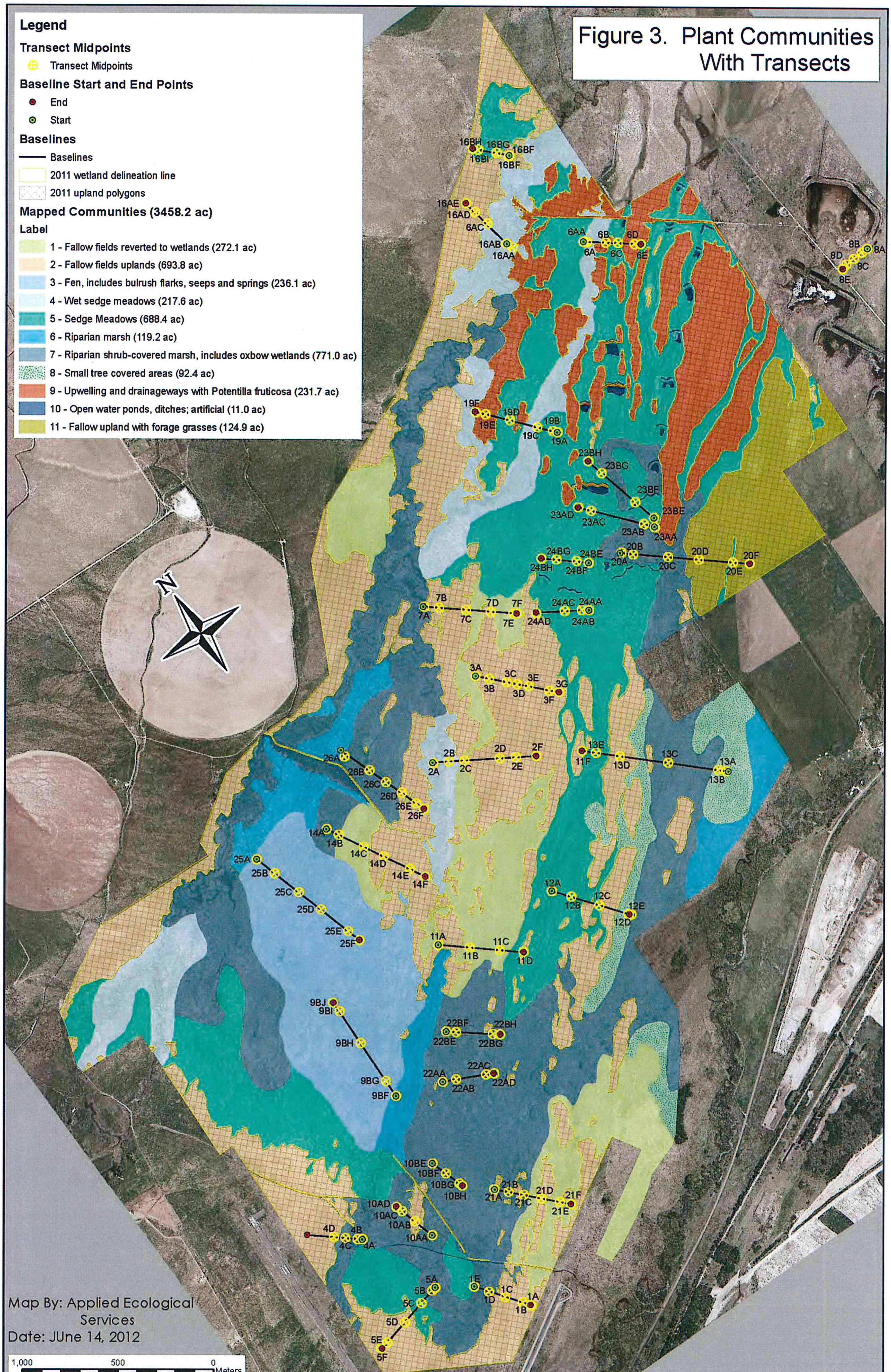


Figure 2. Transect Locations

Figure 3. Plant Community Map



Appendix 1. Vegetation Transect Data (Tables 1-139)

Table 1. Transect 1A
Dutchman Property

	Dutchman Property 1A					
			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Agrostis stolonifera	10	35.71	12.20	45.19	80.90	6.80
Elymus cinereus	2	7.14	0.60	2.22	9.37	1.26
Juncus balticus littoralis	9	32.14	8.60	31.85	63.99	7.29
Equisetum laevigatum	3	10.71	0.40	1.48	12.20	0.70
Phalaris arundinacea	1	3.57	0.10	0.37	3.94	0.32
Plantago eriopoda	1	3.57	0.10	0.37	3.94	0.32
Calamagrostis stricta	2	7.14	5.00	18.52	25.66	10.80
Totals	28	100.00	27.00	100.00	200.00	

Table 2. Transect 1B
Dutchman Property

	Dutchman Property 1B					
			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Agrostis stolonifera	10	24.39	25.50	47.49	71.88	20.61
Agropyron sp.	7	17.07	10.20	18.99	36.07	18.53
Plantago eriopoda	7	17.07	1.30	2.42	19.49	1.06
Juncus balticus littoralis	7	17.07	7.60	14.15	31.23	9.95
Equisetum laevigatum	1	2.44	0.20	0.37	2.81	0.63
Elymus cinereus	1	2.44	0.20	0.37	2.81	0.63
Poa pratensis	1	2.44	0.20	0.37	2.81	0.63
Cirsium arvense	1	2.44	0.10	0.19	2.63	0.32
Distichlis stricta	3	7.32	1.30	2.42	9.74	2.16
Calamagrostis stricta	2	4.88	7.00	13.04	17.91	16.36
Potentilla anserina	1	2.44	0.10	0.19	2.63	0.32
Totals	41	100.00	53.70	100.00	200.00	

Table 3. Transect 1C
Dutchman Property

	Dutchman Property 1C					
			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Sitanion Hystrix	3	4.76	4.50	3.89	8.65	8.64
Calamagrostis stricta	10	15.87	32.20	27.85	43.73	29.03
Agrostis stolonifera	8	12.70	23.50	20.33	33.03	18.57
Equisetum laevigatum	6	9.52	2.10	1.82	11.34	3.03
Agropyron sp.	8	12.70	6.00	5.19	17.89	6.86
Juncus balticus	9	14.29	30.20	26.12	40.41	28.15
Distichlis stricta	3	4.76	1.90	1.64	6.41	4.68
Plantago eriopoda	4	6.35	2.10	1.82	8.17	3.35
Cirsium arvense	1	1.59	0.40	0.35	1.93	1.26
Descurainia pinnata	1	1.59	0.30	0.26	1.85	0.95
Muhlenbergia richardsonis	7	11.11	9.70	8.39	19.50	10.21
Poa nevadensis	1	1.59	2.00	1.73	3.32	6.32
Polygonum aviculare	1	1.59	0.50	0.43	2.02	1.58
Smilacina stellata	1	1.59	0.20	0.17	1.76	0.63
Totals	63	100.00	115.60	100.00	200.00	

Table 4. Transect 1D

Dutchman Property **SPECIES**	Dutchman Property 1D AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	19.61	70.00	77.78	97.39	8.50
Taraxacum officinale	7	13.73	3.00	3.33	17.06	4.35
Equisetum laevigatum	7	13.73	1.20	1.33	15.06	1.48
Salix bebbiana	5	9.80	1.60	1.78	11.58	2.12
Potentilla anserina	1	1.96	0.10	0.11	2.07	0.32
Calamagrostis stricta	7	13.73	7.60	8.44	22.17	7.60
Agrostis stolonifera	6	11.76	5.30	5.89	17.65	5.36
Epilobium ciliatum	1	1.96	0.10	0.11	2.07	0.32
Carex nebrascensis	2	3.92	0.20	0.22	4.14	0.42
Salix geyeriana	3	5.88	0.70	0.78	6.66	1.16
Salix exigua	1	1.96	0.10	0.11	2.07	0.32
Cirsium arvense	1	1.96	0.10	0.11	2.07	0.32
Totals	51	100.00	90.00	100.00	200.00	

Table 5. Transect 1E

Dutchman Property SPECIES	Dutchman Property 1E AF	RF	AVG AC	10 RC	IV	STD
Salix exigua	1	2.17	1.00	0.99	3.16	3.16
Juncus balticus littoralis	10	21.74	61.30	60.39	82.13	26.10
Calamagrostis stricta	3	6.52	2.80	2.76	9.28	5.12
Carex nebrascensis	10	21.74	22.80	22.46	44.20	24.68
Rumex sp.	3	6.52	0.40	0.39	6.92	0.70
Equisetum arvense	2	4.35	2.60	2.56	6.91	7.88
Rosa woodsii	1	2.17	0.20	0.20	2.37	0.63
Carex sp.(1)	1	2.17	2.00	1.97	4.14	6.32
Salix boothii	5	10.87	4.80	4.73	15.60	6.27
Salix bebbiana	1	2.17	1.00	0.99	3.16	3.16
Agrostis stolonifera	2	4.35	0.60	0.59	4.94	1.26
Equisetum laevigatum	3	6.52	0.50	0.49	7.01	0.85
Mentha arvensis	1	2.17	0.10	0.10	2.27	0.32
Potentilla anserina	1	2.17	0.20	0.20	2.37	0.63
Salix sp.	1	2.17	1.00	0.99	3.16	3.16
Carex sp.(2)	1	2.17	0.20	0.20	2.37	0.63
Totals	46	100.00	101.50	100.00	200.00	

Table 6. Transect 2A

Dutchman Property SPECIES	Dutchman Property 2A AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	20.41	65.50	79.39	99.80	25.54
Helianthella uniflorus	7	14.29	2.50	3.03	17.32	3.06
Cirsium arvense	6	12.24	4.20	5.09	17.34	7.57
Potentilla anserina	7	14.29	2.10	2.55	16.83	1.66
Carex sp.	3	6.12	0.30	0.36	6.49	0.48
Agrostis stolonifera	2	4.08	1.00	1.21	5.29	2.11
Salix geyeriana	2	4.08	2.40	2.91	6.99	6.31
Lepidium chalepense	1	2.04	0.20	0.24	2.28	0.63
Carex nebrascensis	1	2.04	0.20	0.24	2.28	0.63
Smilacina stellata	3	6.12	0.90	1.09	7.21	1.66
Iris missouriensis	1	2.04	0.50	0.61	2.65	1.58

Table 6. Transect 2A (cont.) Dutchman Property 2A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Taraxacum officinale	1	2.04	1.00	1.21	3.25	3.16
Rosa woodsii	2	4.08	0.70	0.85	4.93	1.64
Coronilla varia	2	4.08	0.50	0.61	4.69	1.08
Calamagrostis stricta	1	2.04	0.50	0.61	2.65	1.58
Totals	49	100.00	82.50	100.00	200.00	

Table 7. Transect 2B Dutchman Property 2B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	13.70	52.00	55.85	69.55	12.29
Agrostis stolonifera	9	12.33	16.60	17.83	30.16	15.61
Solidago sp.	6	8.22	3.00	3.22	11.44	4.69
Calamagrostis stricta	3	4.11	1.10	1.18	5.29	1.79
Potentilla anserina	8	10.96	7.70	8.27	19.23	10.42
Taraxacum officinale	7	9.59	3.00	3.22	12.81	6.06
Angelica arguta	1	1.37	2.00	2.15	3.52	6.32
Cirsium arvense	7	9.59	1.70	1.83	11.42	1.49
Rumex occidentalis	1	1.37	0.10	0.11	1.48	0.32
Aster falcatus	3	4.11	0.70	0.75	4.86	1.34
Carex sp.	3	4.11	1.20	1.29	5.40	2.30
Trifolium sp.	1	1.37	0.10	0.11	1.48	0.32
Carex nebrascensis	1	1.37	0.30	0.32	1.69	0.95
Iris missouriensis	2	2.74	0.60	0.64	3.38	1.26
Smilacina stellata	3	4.11	1.40	1.50	5.61	2.37
Galium sp.	1	1.37	0.10	0.11	1.48	0.32
Tragopogon sp.	2	2.74	0.30	0.32	3.06	0.67
Astragalus sp.	2	2.74	0.70	0.75	3.49	1.49
Phleum pratense	1	1.37	0.20	0.21	1.58	0.63
Agropyron sp.	1	1.37	0.10	0.11	1.48	0.32
Plantago eriopoda	1	1.37	0.20	0.21	1.58	0.63
Totals	73	100.00	93.10	100.00	200.00	

Table 8. Transect 2C Dutchman Property 2C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	10	21.28	56.00	66.19	87.47	32.21
Juncus balticus littoralis	8	17.02	17.30	20.45	37.47	25.20
Smilacina stellata	6	12.77	2.30	2.72	15.48	2.63
Plantago eriopoda	4	8.51	4.60	5.44	13.95	7.35
Helianthus sp.	1	2.13	0.20	0.24	2.36	0.63
Aster falcatus	4	8.51	0.70	0.83	9.34	1.06
Helianthella uniflorus	2	4.26	0.20	0.24	4.49	0.42
Potentilla anserina	1	2.13	0.10	0.12	2.25	0.32
Taraxacum officinale	7	14.89	1.40	1.65	16.55	1.51
Festuca occidentalis	1	2.13	1.00	1.18	3.31	3.16
Agropyron sp.	1	2.13	0.30	0.35	2.48	0.95
Distichlis stricta	1	2.13	0.30	0.35	2.48	0.95
Carex nebrascensis	1	2.13	0.20	0.24	2.36	0.63
Totals	47	100.00	84.60	100.00	200.00	

Table 9. Transect 2D

Dutchman Property	Dutchman Property 2D		AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Festuca idahoensis	10	15.15	38.00	38.50	53.65	1.58
Agropyron sp.	7	10.61	7.20	7.29	17.90	5.63
Plantago eriopoda	9	13.64	20.50	20.77	34.41	7.85
Phlox kelseyi	1	1.52	0.50	0.51	2.02	0.63
Juncus dudleyi	8	12.12	4.80	4.86	16.98	6.43
Distichlis stricta	5	7.58	5.70	5.78	13.35	2.18
Smilacina stellata	1	1.52	0.20	0.20	1.72	18.52
Agrostis stolonifera	6	9.09	5.50	5.57	14.66	1.64
Aster falcatus	6	9.09	2.10	2.13	11.22	2.18
Spartina gracilis	6	9.09	11.20	11.35	20.44	18.52
Helianthella uniflorus	2	3.03	0.70	0.71	3.74	1.64
Rosa woodii	1	1.52	1.50	1.52	3.03	4.74
Castilleja sp.	1	1.52	0.20	0.20	1.72	0.63
Gentiana sp.	3	4.55	0.60	0.61	5.15	0.97
Totals	66	100.00	98.70	100.00	200.00	

Table 10. Transect 2E

Dutchman Property	Dutchman Property 2E		AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Spartina gracilis	2	3.45	3.50	4.00	7.45	26.93
Plantago eriopoda	8	13.79	3.50	4.00	17.80	14.93
Juncus balticus littoralis	8	13.79	15.20	17.39	31.18	87.77
Helianthella uniflorus	5	8.62	0.90	1.03	9.65	4.12
Festuca idahoensis	4	6.90	13.00	14.87	21.77	90.21
Agropyron trachycaulum	1	1.72	1.00	1.14	2.87	10.00
Agrostis stolonifera	7	12.07	42.50	48.63	60.70	172.12
Smilacina stellata	4	6.90	3.00	3.43	10.33	25.22
Taraxacum officinale	3	5.17	0.60	0.69	5.86	3.46
Zigadenus elegans	7	12.07	2.20	2.52	14.59	9.38
Iris missouriensis	2	3.45	0.70	0.80	4.25	5.39
Dodecatheon pulchellum	3	5.17	0.50	0.57	5.74	3.00
Aster falcatus	3	5.17	0.60	0.69	5.86	3.46
Distichlis stricta	1	1.72	0.20	0.23	1.95	2.00
Totals	58	100.00	87.40	100.00	200.00	

Table 11. Transect 2F

Dutchman Property	Dutchman Property 2F		AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Plantago eriopoda	10	12.20	24.00	23.69	35.89	6.58
Aster ericoides	4	4.88	1.60	1.58	6.46	3.10
Helianthella uniflorus	6	7.32	1.60	1.58	8.90	1.65
Rosa woodsii	2	2.44	1.00	0.99	3.43	2.11
Festuca idahoensis	10	12.20	43.50	42.94	55.14	17.80
Agropyron sp.	7	8.54	7.60	7.50	16.04	10.20
Juncus dudleyi	7	8.54	6.30	6.22	14.76	8.78
Phlox kelseyi	4	4.88	1.90	1.88	6.75	3.31
Comandra umbellata	4	4.88	2.10	2.07	6.95	3.31

Table 11. Transect 2F (Cont.) Dutchman Property 2F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Spartina gracilis	9	10.98	5.60	5.53	16.50	7.71
Smilacina stellata	3	3.66	1.00	0.99	4.65	1.76
Oxytropis sp.	1	1.22	0.50	0.49	1.71	1.58
Equisetum laevigatum	4	4.88	0.70	0.69	5.57	0.95
Potentilla fruticosa	2	2.44	1.00	0.99	3.43	2.11
Distichlis stricta	2	2.44	0.50	0.49	2.93	1.08
Agrostis spp.	1	1.22	0.20	0.20	1.42	0.63
Agrostis stolonifera	4	4.88	1.80	1.78	6.65	3.16
Poa nevadensis	2	2.44	0.40	0.39	2.83	0.84
Totals	82	100.00	101.30	100.00	200.00	

Table 12. Transect 3A Dutchman Property 3A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	10	16.39	40.20	43.41	59.81	21.84
Agropyron trachycaulum	5	8.20	4.30	4.64	12.84	6.17
Smilacina stellata	6	9.84	1.40	1.51	11.35	1.71
Juncus balticus littoralis	10	16.39	30.50	32.94	49.33	15.89
Solidago sp.	4	6.56	0.60	0.65	7.21	0.84
Dodecatheon pulchellum	3	4.92	0.50	0.54	5.46	0.97
Potentilla anserina	5	8.20	1.40	1.51	9.71	1.78
Festuca idahoensis	2	3.28	5.50	5.94	9.22	11.65
Zigadenus elegans	1	1.64	0.10	0.11	1.75	0.32
Cirsium arvense	3	4.92	1.50	1.62	6.54	3.17
Carex nebrascensis	1	1.64	0.10	0.11	1.75	0.32
Aster falcatus	1	1.64	0.10	0.11	1.75	0.32
Carex sp.	1	1.64	0.20	0.22	1.86	0.63
Iris missouriensis	4	6.56	2.00	2.16	8.72	4.67
Taraxacum officinale	2	3.28	0.70	0.76	4.03	1.49
Trifolium hybridum	1	1.64	3.00	3.24	4.88	9.49
Plantago eriopoda	2	3.28	0.50	0.54	3.82	1.08
Totals	61	100.00	92.60	100.00	200.00	

Table 13. Transect 3B Dutchman Property 3B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Festuca idahoensis	5	11.36	6.50	7.19	18.55	9.73
Agrostis stolonifera	9	20.45	61.00	67.48	87.93	36.35
Plantago eriopoda	10	22.73	5.80	6.42	29.14	2.97
Smilacina stellata	2	4.55	0.30	0.33	4.88	0.67
Aster falcatus	3	6.82	0.50	0.55	7.37	0.85
Cirsium arvense	1	2.27	0.10	0.11	2.38	0.32
Aster sp.	1	2.27	0.10	0.11	2.38	0.32
Agropyron sp.	7	15.91	8.00	8.85	24.76	9.71
Poa pratensis	5	11.36	8.00	8.85	20.21	38.75
Haplopappus uniflorus	1	2.27	0.10	0.11	2.38	0.32
Totals	44	100.00	90.40	100.00	200.00	

Table 14. Transect 3C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Plantago eriopoda	8	19.05	3.60	8.87	27.91	3.17
Festuca idahoensis	7	16.67	6.70	16.50	33.17	10.35
Calamagrostis stricta	2	4.76	0.60	1.48	6.24	1.58
Agrostis stolonifera	8	19.05	24.90	61.33	80.38	25.42
Poa nevadensis	2	4.76	1.50	3.69	8.46	3.37
Haplopappus uniflorus	2	4.76	0.40	0.99	5.75	0.97
Equisetum laevigatum	1	2.38	0.10	0.25	2.63	0.32
Aster falcatus	4	9.52	1.00	2.46	11.99	1.63
Rosa woodsii	4	9.52	1.40	3.45	12.97	2.12
Unknown Poaceae	1	2.38	0.10	0.25	2.63	0.32
Unidentified Forb	1	2.38	0.10	0.25	2.63	0.32
Dodecatheon pulchellum	1	2.38	0.10	0.25	2.63	0.32
Juncus balticus littoralis	1	2.38	0.10	0.25	2.63	0.32
Totals	42	100.00	40.60	100.00	200.00	

Dutchman Property 3C

Table 15. Transect 3D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Festuca occidentalis	10	18.18	36.50	51.12	69.30	22.49
Plantago eriopoda	10	18.18	18.50	25.91	44.09	5.30
Agropyron sp.	8	14.55	8.00	11.20	25.75	15.04
Gentiana sp.	4	7.27	0.60	0.84	8.11	0.84
Haplopappus uniflorus	5	9.09	0.70	0.98	10.07	0.82
Aster falcatus	7	12.73	4.10	5.74	18.47	4.93
Comandra umbellata	1	1.82	0.50	0.70	2.52	1.58
Taraxacum officinale	1	1.82	0.10	0.14	1.96	0.32
Rosa woodsii	4	7.27	0.80	1.12	8.39	1.03
Juncus balticus littoralis	1	1.82	0.50	0.70	2.52	1.58
Composite rosette sp.	1	1.82	0.20	0.28	2.10	0.63
Spartina gracilis	2	3.64	0.70	0.98	4.62	1.64
Equisetum laevigatum	1	1.82	0.20	0.28	2.10	0.63
Totals	55	100.00	71.40	100.00	200.00	

Dutchman Property 3D

Table 16. Transect 3F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Potentilla fruticosa	3	4.76	5.00	6.83	11.59	8.82
Festuca occidentalis	10	15.87	37.50	51.23	67.10	23.48
Phlox kelseyi	9	14.29	8.90	12.16	26.44	9.73
Plantago eriopoda	10	15.87	15.50	21.17	37.05	5.99
Aster falcatus	8	12.70	1.80	2.46	15.16	1.48
Comandra umbellata	4	6.35	0.70	0.96	7.31	0.95
Gentiana sp.	4	6.35	0.40	0.55	6.90	0.52
Smilacina stellata	3	4.76	0.40	0.55	5.31	0.70
Agropyron sp.	4	6.35	1.60	2.19	8.53	2.37
Haplopappus uniflorus	5	7.94	0.80	1.09	9.03	0.92
Equisetum laevigatum	2	3.17	0.50	0.68	3.86	1.08

Dutchman Property 3F

Table 16. Transect 3F (Cont.) Dutchman Property 3F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Elymus cinereus	1	1.59	0.10	0.14	1.72	0.32
Totals	63	100.00	73.20	100.00	200.00	

Table 17. Transect 3G Dutchman Property 3G

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Festuca occidentalis	10	16.95	25.00	40.45	57.40	20.41
Plantago eriopoda	10	16.95	13.10	21.20	38.15	6.56
Aster falcatus	9	15.25	4.00	6.47	21.73	2.26
Agropyron trachycaulum	6	10.17	2.90	4.69	14.86	3.25
Potentilla fruticosa	2	3.39	6.50	10.52	13.91	14.15
Gentiana sp.	6	10.17	0.80	1.29	11.46	0.92
Smilacina stellata	4	6.78	0.70	1.13	7.91	0.95
Comandra umbellata	2	3.39	0.20	0.32	3.71	0.42
Phlox kelseyi	3	5.08	3.00	4.85	9.94	7.80
Haplopappus uniflorus	3	5.08	0.30	0.49	5.57	0.48
Agrostis stolonifera	3	5.08	5.20	8.41	13.50	12.62
Solidago canadensis	1	1.69	0.10	0.16	1.86	0.32
Totals	59	100.00	61.80	100.00	200.00	

Table 18. Transect 4A Dutchman Property 4A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	9	17.31	74.00	54.37	71.68	32.39
Salix boothii	5	9.62	7.50	5.51	15.13	9.50
Carex nebrascensis	8	15.38	24.00	17.63	33.02	29.80
Agrostis stolonifera	6	11.54	12.50	9.18	20.72	24.18
Potentilla anserina	1	1.92	2.00	1.47	3.39	6.32
Aster falcatus	4	7.69	1.70	1.25	8.94	2.36
Cirsium arvense	2	3.85	1.50	1.10	4.95	3.37
Carex aquatilis altior	3	5.77	2.70	1.98	7.75	6.29
Carex utriculata	5	9.62	4.60	3.38	13.00	9.43
Typha latifolia	1	1.92	1.00	0.73	2.66	3.16
Equisetum arvense	3	5.77	0.90	0.66	6.43	1.66
Calamagrostis stricta	4	7.69	3.50	2.57	10.26	4.74
Festuca idahoensis	1	1.92	0.20	0.15	2.07	0.63
Totals	52	100.00	136.10	100.00	200.00	

Table 19. Transect 4B Dutchman Property 4B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex nebrascensis	8	24.24	10.50	15.33	39.57	17.47
Carex aquatilis altior	2	6.06	4.20	6.13	12.19	12.59
Epilobium ciliatum	1	3.03	0.10	0.15	3.18	0.32
Agrostis stolonifera	2	6.06	4.50	6.57	12.63	10.12
Salix sp.	1	3.03	0.40	0.58	3.61	1.26

Table 19. Transect 4B (Cont.)

Dutchman Property 4B

Dutchman Property		AVG		10		
SPECIES	AF	RF	AC	RC	IV	STD
Juncus balticus littoralis	4	12.12	21.50	31.39	43.51	30.00
Potentilla anserina	2	6.06	0.30	0.44	6.50	0.67
Solidago sp.	3	9.09	1.10	1.61	10.70	1.91
Cirsium arvense	2	6.06	0.20	0.29	6.35	0.42
Carex utriculata	4	12.12	23.00	33.58	45.70	31.55
Ribes setosum	1	3.03	0.50	0.73	3.76	1.58
Salix bebbiana	1	3.03	2.00	2.92	5.95	6.32
Rumex salicifolius	1	3.03	0.10	0.15	3.18	0.32
Aster falcatus	1	3.03	0.10	0.15	3.18	0.32
Totals	33	100.00	68.50	100.00	200.00	

Table 20. Transect 4C

Dutchman Property 4C

Dutchman Property		AVG		10		
SPECIES	AF	RF	AC	RC	IV	STD
Juncus balticus littoralis	10	24.39	49.50	76.74	101.13	24.32
Carex nebrascensis	8	19.51	2.00	3.10	22.61	1.83
Rumex sp.	4	9.76	1.00	1.55	11.31	1.63
Agrostis stolonifera	8	19.51	6.90	10.70	30.21	5.84
Potentilla anserina	2	4.88	0.20	0.31	5.19	0.42
Equisetum laevigatum	2	4.88	0.50	0.78	5.65	1.08
Calamagrostis stricta	3	7.32	2.20	3.41	10.73	4.16
Salix boothii	2	4.88	1.00	1.55	6.43	2.11
Triglochin palustris	1	2.44	0.20	0.31	2.75	0.63
Carex utriculata	1	2.44	1.00	1.55	3.99	3.16
Totals	41	100.00	64.50	100.00	200.00	

Table 21. Transect 4D

Dutchman Property 4D

Dutchman Property		AVG		10		
SPECIES	AF	RF	AC	RC	IV	STD
Agrostis stolonifera	10	26.32	74.50	64.50	90.82	30.59
Plantago aristata	9	23.68	8.00	6.93	30.61	6.65
Spartina gracilis	8	21.05	9.20	7.97	29.02	8.22
Agropyron intermedium	1	2.63	8.00	6.93	9.56	25.30
Agropyron sp.	1	2.63	1.00	0.87	3.50	3.16
Juncus balticus littoralis	4	10.53	12.00	10.39	20.92	18.14
Aster falcatus	2	5.26	0.70	0.61	5.87	1.64
Descurainia pinnata	2	5.26	1.10	0.95	6.22	3.14
Iva axillaris	1	2.63	1.00	0.87	3.50	3.16
Totals	38	100.00	115.50	100.00	200.00	

Table 22. Transect 5A

Dutchman Property 5A

Dutchman Property		AVG		10		
SPECIES	AF	RF	AC	RC	IV	STD
Carex nebrascensis	10	18.87	20.80	13.78	32.65	22.13
Carex sp.	2	3.77	4.00	2.65	6.42	9.66

Table 22. Transect 5A (Cont.) Dutchman Property 5A

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Salix boothii	9	16.98	42.20	27.97	44.95	29.43
Calamagrostis stricta	2	3.77	0.40	0.27	4.04	0.84
Sphenopholis sp	1	1.89	0.20	0.13	2.02	0.63
Pedicularis groenlandica	1	1.89	0.50	0.33	2.22	1.58
Juncus balticus littoralis	10	18.87	70.50	46.72	65.59	30.95
Carex utriculata	8	15.09	5.30	3.51	18.61	4.40
Salix exigua	4	7.55	5.00	3.31	10.86	7.45
Deschampsia cespitosa	2	3.77	1.20	0.80	4.57	3.16
Equisetum laevigatum	4	7.55	0.80	0.53	8.08	1.03
Totals	53	100.00	150.90	100.00	200.00	

Table 23. Transect 5B Dutchman Property 5B

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Salix boothii	4	10.26	10.20	12.23	22.49	17.01
Juncus balticus littoralis	10	25.64	58.50	70.14	95.78	28.87
Equisetum laevigatum	3	7.69	0.40	0.48	8.17	0.70
Carex nebrascensis	8	20.51	10.50	12.59	33.10	14.95
Rumex sp.	4	10.26	1.30	1.56	11.82	1.89
Potentilla anserina	1	2.56	0.20	0.24	2.80	0.63
Agrostis stolonifera	3	7.69	1.00	1.20	8.89	1.76
Epilobium ciliatum	1	2.56	0.10	0.12	2.68	0.32
Equisetum arvense	1	2.56	0.50	0.60	3.16	1.58
Calamagrostis stricta	1	2.56	0.20	0.24	2.80	0.63
Salix exigua	1	2.56	0.20	0.24	2.80	0.63
Triglochin palustris	1	2.56	0.10	0.12	2.68	0.32
Deschampsia cespitosa	1	2.56	0.20	0.24	2.80	0.63
Totals	39	100.00	83.40	100.00	200.00	

Table 24. Transect 5C Dutchman Property 5C

Dutchman Wetland SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Salix bebbiana	2	4.76	1.70	2.47	7.24	4.72
Juncus balticus littoralis	10	23.81	44.50	64.77	88.58	17.39
Calamagrostis stricta	5	11.90	15.50	22.56	34.47	24.38
Agrostis stolonifera	2	4.76	0.50	0.73	5.49	1.27
Equisetum laevigatum	5	11.90	0.80	1.16	13.07	1.03
Cirsium arvense	1	2.38	0.10	0.15	2.53	0.32
Taraxacum officinale	1	2.38	0.10	0.15	2.53	0.32
Carex nebraskensis	10	23.81	4.60	6.70	30.51	7.31
Solidago sp.	5	11.90	0.80	1.16	13.07	1.03
Distichlis stricta	1	2.38	0.10	0.15	2.53	0.32
Totals	42	100.00	68.70	100.00	200.00	

Table 25. Transect 5D Dutchman Property 5D

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Calamagrostis stricta	10	15.38	46.50	30.86	46.24	21.86
Salix exigua	4	6.15	0.90	0.60	6.75	1.60
Juncus balticus littoralis	11	16.92	52.00	34.51	51.43	20.71
Equisetum laevigatum	9	13.85	2.00	1.33	15.17	1.25
Poa nevadensis	3	4.62	1.40	0.93	5.54	3.13
Agrostis stolonifera	11	16.92	39.50	26.21	43.13	17.23
Carex nebraskensis	10	15.38	6.70	4.45	19.83	6.36
Aster falcatus	3	4.62	1.10	0.73	5.35	2.08
Rosa acicularis	3	4.62	0.40	0.27	4.88	0.70
Agropyron sp.	1	1.54	0.20	0.13	1.67	0.63
Totals	65	100.00	150.70	100.00	200.00	

Table 26. Transect 5E Dutchman Property 5E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	11	21.15	44.50	36.00	57.16	20.34
Juncus balticus littoralis	11	21.15	36.00	29.13	50.28	27.06
Sphenopholis sp.	3	5.77	1.40	1.13	6.90	3.13
Smilacina stellata	1	1.92	0.20	0.16	2.08	0.63
Deschampsia cespitosa	2	3.85	0.70	0.57	4.41	1.64
Calamagrostis stricta	9	17.31	32.00	25.89	43.20	31.02
Rumex salicifolius	1	1.92	0.20	0.16	2.08	0.63
Agropyron sp.	2	3.85	2.00	1.62	5.46	4.83
Equisetum laevigatum	6	11.54	3.00	2.43	13.97	4.00
Taraxacum officinale	1	1.92	0.50	0.40	2.33	1.58
Agrostis alba	1	1.92	2.00	1.62	3.54	6.32
Iris missouriensis	4	7.69	1.10	0.89	8.58	1.66
Totals	52	100.00	123.60	100.00	200.00	

Table 27. Transect 5F Dutchman Property 5F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Calamagrostis stricta	7	20.00	5.20	7.62	27.62	5.09
Agrostis stolonifera	10	28.57	24.80	36.36	64.94	15.58
Juncus balticus littoralis	10	28.57	36.50	53.52	82.09	18.86
Equisetum laevigatum	5	14.29	1.20	1.76	16.05	1.40
Poa nevadensis	1	2.86	0.20	0.29	3.15	0.63
Salix exigua	2	5.71	0.30	0.44	6.15	0.67
Totals	35	100.00	68.20	100.00	200.00	

Table 28. Transect 6AA Dutchman Property 6AA

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	9	14.52	38.80	43.74	58.26	25.12
Salix candida	1	1.61	0.20	0.23	1.84	0.63
Salix lutea	6	9.68	13.80	15.56	25.24	18.29
Aster falcatus	7	11.29	1.10	1.24	12.53	0.99
Potentilla anserina	9	14.52	4.80	5.41	19.93	4.78
Calamagrostis stricta	1	1.61	0.10	0.11	1.73	0.32
Carex nebrascensis	4	6.45	0.50	0.56	7.02	0.71
Poa nevadensis	7	11.29	7.00	7.89	19.18	8.15
Rosa woodsii	1	1.61	0.30	0.34	1.95	0.95
Deschampsia cespitosa	3	4.84	0.50	0.56	5.40	0.85
Agrostis stolonifera	4	6.45	19.20	21.65	28.10	34.27
Festuca sp.	1	1.61	0.10	0.11	1.73	0.32
Dodecatheon pulchellum	4	6.45	0.70	0.79	7.24	1.25
Smilacina stellata	2	3.23	0.70	0.79	4.01	1.64
Agropyron sp.	1	1.61	0.30	0.34	1.95	0.95
Cirsium arvense	2	3.23	0.60	0.68	3.90	1.58
Totals	62	100.00	88.70	100.00	200.00	

Table 29. 6A Dutchman Property 6A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	13.33	67.50	64.66	77.99	22.76
Carex nebraskensis	6	8.00	0.90	0.86	8.86	0.99
Carex sp.(1)	1	1.33	0.20	0.19	1.52	0.63
Salix lutea	1	1.33	2.00	1.92	3.25	6.32
Potentilla anserina	9	12.00	2.70	2.59	14.59	2.87
Aster sp	7	9.33	1.10	1.05	10.39	0.99
Taraxacum officinale	1	1.33	0.10	0.10	1.43	0.32
Equisetum laevigatum	1	1.33	0.10	0.10	1.43	0.32
Sonchus sp.	1	1.33	0.10	0.10	1.43	0.32
Salix bebbiana	5	6.67	11.60	11.11	17.78	19.95
Carex sp. (2)	1	1.33	0.10	0.10	1.43	0.32
Salix candida	4	5.33	2.50	2.39	7.73	4.79
Epilobium sp.	3	4.00	0.30	0.29	4.29	0.48
Lysimachia sp.	3	4.00	0.30	0.29	4.29	0.48
Potentilla fruticosa	1	1.33	0.60	0.57	1.91	1.90
Deschampsia cespitosa	3	4.00	0.30	0.29	4.29	0.48
Triglochin sp	1	1.33	0.10	0.10	1.43	0.32
Viola sp.	1	1.33	0.10	0.10	1.43	0.32
Salix boothii	1	1.33	1.50	1.44	2.77	4.74
Solidago gigantea	4	5.33	3.10	2.97	8.30	6.44
Taraxacum officinale	2	2.67	0.30	0.29	2.95	0.67
Muhlenbergia sp.	2	2.67	4.10	3.93	6.59	12.62
Mentha arvensis	1	1.33	0.10	0.10	1.43	0.32

Table 29. Transect 6A (Cont.) Dutchman Property 6A

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Alopecurus sp.	1	1.33	4.00	3.83	5.16	12.65
Agropyron sp.	1	1.33	0.10	0.10	1.43	0.32
Cirsium arvense	1	1.33	0.10	0.10	1.43	0.32
Dodecatheon pulchellum	2	2.67	0.40	0.38	3.05	0.97
Agrostis stolonifera	1	1.33	0.10	0.10	1.43	0.32
Totals	75	100.00	104.40	100.00	200.00	

Table 30. Transect 6B Dutchman Property 6B

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Juncus torreyi	1	1.64	0.50	0.65	2.29	1.58
Agrostis stolonifera	8	13.11	30.50	39.61	52.73	29.95
Zigadenus elegans	6	9.84	1.70	2.21	12.04	3.02
Phlox kelseyi	7	11.48	7.90	10.26	21.74	15.27
Plantago eriopoda	5	8.20	1.00	1.30	9.50	1.15
Aster falcatus	2	3.28	0.40	0.52	3.80	0.97
Smilacina stellata	3	4.92	0.80	1.04	5.96	1.40
Galium sp.	1	1.64	0.10	0.13	1.77	0.32
Dodecatheon pulchellum	3	4.92	1.20	1.56	6.48	3.12
Potentilla fruticosa	1	1.64	2.00	2.60	4.24	6.32
Carex sp.	2	3.28	1.20	1.56	4.84	3.16
Equisetum laevigatum	2	3.28	0.20	0.26	3.54	0.42
Helianthus sp.	4	6.56	1.50	1.95	8.51	2.12
Antennaria sp.	2	3.28	0.40	0.52	3.80	0.97
Cirsium arvense	1	1.64	0.20	0.26	1.90	0.63
Juncus balticus littoralis	4	6.56	19.10	24.81	31.36	31.01
Helianthella uniflorus	1	1.64	0.20	0.26	1.90	0.63
Salix lutea	2	3.28	5.00	6.49	9.77	12.69
Salix candida	2	3.28	1.60	2.08	5.36	3.37
Potentilla anserina	2	3.28	0.40	0.52	3.80	0.97
Plantago eriopoda	1	1.64	0.10	0.13	1.77	0.32
Poa nevadensis	1	1.64	1.00	1.30	2.94	3.16
Totals	61	100.00	77.00	100.00	200.00	

Table 31. Transect 6C Dutchman Property 6C

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Deschampsia cespitosa	6	10.34	2.30	3.03	13.38	2.67
Juncus balticus littoralis	10	17.24	47.00	61.92	79.16	17.83
Potentilla fruticosa	6	10.34	15.60	20.55	30.90	23.67
Poa nevadensis	1	1.72	0.50	0.66	2.38	1.58
Dodecatheon pulchellum	5	8.62	1.60	2.11	10.73	2.01
Carex sp.	4	6.90	1.10	1.45	8.35	1.85
Eriophorum gracile	4	6.90	1.60	2.11	9.00	2.50
Salix candida	3	5.17	1.50	1.98	7.15	3.17
Juncus longistylis	1	1.72	0.10	0.13	1.86	0.32

Table 31. Transect 6C (Cont.) Dutchman Property 6C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Allium schoenoprasum	2	3.45	0.20	0.26	3.71	0.42
Pedicularis groenlandica	1	1.72	0.10	0.13	1.86	0.32
Aster sp.	1	1.72	0.10	0.13	1.86	0.32
Zigadenus elegans	1	1.72	0.10	0.13	1.86	0.32
Salix planifolia	2	3.45	1.30	1.71	5.16	3.20
Aster sp.	2	3.45	0.20	0.26	3.71	0.42
Potentilla anserina	6	10.34	1.40	1.84	12.19	1.71
Smilacina stellata	1	1.72	1.00	1.32	3.04	3.16
Agropyron sp.	1	1.72	0.10	0.13	1.86	0.32
Calamagrostis stricta	1	1.72	0.10	0.13	1.86	0.32
Totals	58	100.00	75.90	100.00	200.00	

Table 32. Transect 6D Dutchman Property 6D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron sp.	7	10.94	3.50	11.29	22.23	4.99
Plantago eriopoda	8	12.50	5.20	16.77	29.27	3.79
Aster falcatus	7	10.94	2.00	6.45	17.39	1.89
Festuca occidentalis	10	15.63	7.70	24.84	40.46	5.03
Haplopappus uniflorus	7	10.94	1.90	6.13	17.07	1.73
Equisetum laevigatum	1	1.56	0.30	0.97	2.53	0.95
Composite rosette sp.	1	1.56	0.10	0.32	1.89	0.32
Aster spp.	8	12.50	3.60	11.61	24.11	3.20
Phlox kelseyi	6	9.38	4.70	15.16	24.54	6.46
Gentiana sp.	3	4.69	0.30	0.97	5.66	0.48
Rosa woodsii	3	4.69	0.70	2.26	6.95	1.34
Helianthus sp.	2	3.13	0.70	2.26	5.38	1.64
Agrostis stolonifera	1	1.56	0.30	0.97	2.53	0.95
Totals	64	100.00	31.00	100.00	200.00	

Table 33. Transect 6E Dutchman Property 6E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus torreyi	2	2.86	13.00	28.20	31.06	27.51
Salix candida	2	2.86	0.40	0.87	3.72	0.84
Potentilla fruticosa	3	4.29	4.50	9.76	14.05	12.52
Agrostis stolonifera	2	2.86	2.20	4.77	7.63	6.29
Agropyron sp.	8	11.43	3.60	7.81	19.24	3.24
Deschampsia cespitosa	1	1.43	0.50	1.08	2.51	1.58
Rosa woodsii	7	10.00	3.10	6.72	16.72	3.45
Zigadenus elegans	2	2.86	0.40	0.87	3.72	0.84
Juncus balticus littoralis	1	1.43	0.30	0.65	2.08	0.95
Smilacina stellata	1	1.43	0.50	1.08	2.51	1.58
Haplopappus uniflorus	6	8.57	1.60	3.47	12.04	1.78
Aster falcatus	6	8.57	1.30	2.82	11.39	1.16
Aster spp.	7	10.00	3.60	7.81	17.81	3.24
Festuca occidentalis	6	8.57	4.10	8.89	17.47	4.95

Table 33. Transect 6E (Cont.)

Dutchman Property 6E

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Distichlis stricta	4	5.71	1.90	4.12	9.84	3.21
Plantago eriopoda	4	5.71	2.90	6.29	12.00	4.12
Phlox kelseyi	3	4.29	1.30	2.82	7.11	2.16
Equisetum laevigatum	4	5.71	0.70	1.52	7.23	1.06
Composite rosette sp.	1	1.43	0.20	0.43	1.86	0.63
Totals	70	100.00	46.10	100.00	200.00	

Table 34. Transect 7A

Dutchman Property 7A

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Juncus balticus littoralis	10	14.93	27.40	32.97	47.90	20.14
Agrostis stolonifera	9	13.43	22.50	27.08	40.51	13.79
Calamagrostis stricta	2	2.99	4.50	5.42	8.40	9.56
Potentilla anserina	10	14.93	4.40	5.29	20.22	2.46
Taraxacum officinale	9	13.43	2.90	3.49	16.92	1.45
Aster falcatus	1	1.49	0.10	0.12	1.61	0.32
Forb sp.	7	10.45	4.70	5.66	16.10	7.44
Cirsium arvense	4	5.97	0.60	0.72	6.69	0.97
Iris missouriensis	1	1.49	0.10	0.12	1.61	0.32
Alopecurus pratensis	1	1.49	1.00	1.20	2.70	3.16
Salix bebbiana	2	2.99	4.00	4.81	7.80	8.76
Poa nevadensis	5	7.46	8.60	10.35	17.81	11.72
Salix exigua	2	2.99	0.50	0.60	3.59	1.08
Smilacina stellata	1	1.49	0.10	0.12	1.61	0.32
Sonchus arvensis	2	2.99	0.20	0.24	3.23	0.42
Agropyron trachycaulum	1	1.49	1.50	1.81	3.30	4.74
Totals	67	100.00	83.10	100.00	200.00	

Table 35. Transect 7B

Dutchman Property 7B

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Agrostis stolonifera	7	10.00	21.70	27.71	37.71	26.39
Juncus balticus littoralis	7	10.00	14.50	18.52	28.52	15.36
Plantago eriopoda	6	8.57	6.00	7.66	16.23	8.10
Smilacina stellata	5	7.14	1.30	1.66	8.80	1.70
Aster falcatus	4	5.71	1.20	1.53	7.25	1.75
Helianthella uniflorus	4	5.71	1.10	1.40	7.12	1.66
Agropyron sp.	7	10.00	11.20	14.30	24.30	18.71
Cirsium arvense	8	11.43	2.80	3.58	15.00	2.90
Haplopappus uniflorus	1	1.43	0.20	0.26	1.68	0.63
Festuca occidentalis	2	2.86	1.30	1.66	4.52	3.20
Hordeum jubatum	1	1.43	0.20	0.26	1.68	0.63
Iris missouriensis	2	2.86	1.50	1.92	4.77	3.37
Taraxacum officinale	4	5.71	0.80	1.02	6.74	1.03
Oxytropis sp.	1	1.43	0.20	0.26	1.68	0.63

Table 35. Transect 7B (Cont.) Dutchman Property 7B

Dutchman Property

SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Elymus cinereus	1	1.43	0.20	0.26	1.68	0.63
Poa nevadensis	1	1.43	4.00	5.11	6.54	12.65
Sonchus sp.	2	2.86	0.40	0.51	3.37	0.84
Potentilla anserina	4	5.71	6.00	7.66	13.38	8.10
Agropyron repens	2	2.86	3.50	4.47	7.33	8.18
Rosa woodsii	1	1.43	0.20	0.26	1.68	0.63
Totals	70	100.00	78.30	100.00	200.00	

Table 36. Transect 7C Dutchman Property 7C

Dutchman Property

SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	8	18.18	41.70	45.33	63.51	39.29
Aster falcatus	7	15.91	1.40	1.52	17.43	1.26
Helianthus sp.	1	2.27	0.50	0.54	2.82	1.58
Plantago eriopoda	9	20.45	17.20	18.70	39.15	21.68
Juncus balticus littoralis	9	20.45	18.50	20.11	40.56	11.80
Equisetum arvense	1	2.27	0.10	0.11	2.38	0.32
Smilacina stellata	2	4.55	2.20	2.39	6.94	4.66
Potentilla anserina	1	2.27	0.10	0.11	2.38	0.32
Agropyron sp.	4	9.09	6.30	6.85	15.94	10.60
Festuca idahoensis	2	4.55	4.00	4.35	8.89	9.66
Totals	44	100.00	92.00	100.00	200.00	

Table 37. Transect 7D Dutchman Property 7D

Dutchman Property

SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Festuca idahoensis	7	15.56	6.70	24.72	40.28	6.98
Plantago eriopoda	9	20.00	7.40	27.31	47.31	9.98
Aster sp.	4	8.89	0.40	1.48	10.36	0.52
Aster falcatus	7	15.56	0.70	2.58	18.14	0.48
Rosa woodsii	3	6.67	0.40	1.48	8.14	0.70
Agrostis stolonifera	7	15.56	8.00	29.52	45.08	9.78
Juncus balticus littoralis	3	6.67	3.00	11.07	17.74	4.83
Dodecatheon pulchellum	2	4.44	0.20	0.74	5.18	0.42
Agropyron sp.	2	4.44	0.20	0.74	5.18	0.42
Carex sp.	1	2.22	0.10	0.37	2.59	0.32
Totals	45	100.00	27.10	100.00	200.00	

Table 38. Transect 7E Dutchman Property 7E

Dutchman Property

SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	10	15.63	38.50	59.88	75.50	27.39
Rosa woodsii	1	1.56	0.80	1.24	2.81	2.53
Festuca idahoensis	1	1.56	2.00	3.11	4.67	6.32

Table 38. Transect 7E (Cont.) Dutchman Property 7E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	8	12.50	12.30	19.13	31.63	9.70
Dodecatheon pulchellum	7	10.94	1.50	2.33	13.27	1.08
Plantago eriopoda	8	12.50	2.40	3.73	16.23	1.71
Smilacina stellata	3	4.69	0.80	1.24	5.93	1.62
Sisyrinchium montanum	1	1.56	0.10	0.16	1.72	0.32
Helianthella uniflorus	7	10.94	2.50	3.89	14.83	3.06
Aster falcatus	5	7.81	0.80	1.24	9.06	0.92
Composite - red rosette	2	3.13	0.30	0.47	3.59	0.67
Potentilla anserina	2	3.13	0.20	0.31	3.44	0.42
Zigadenus elegans	3	4.69	1.30	2.02	6.71	3.13
Gentiana sp.	1	1.56	0.10	0.16	1.72	0.32
Taraxacum officinale	1	1.56	0.10	0.16	1.72	0.32
Triglochin palustris	1	1.56	0.10	0.16	1.72	0.32
Triglochin maritima	1	1.56	0.10	0.16	1.72	0.32
Lysimachia sp.	1	1.56	0.10	0.16	1.72	0.32
Phlox kelseyi	1	1.56	0.30	0.47	2.03	0.95
Totals	64	100.00	64.30	100.00	200.00	

Table 39. Transect 7F Dutchman Property 7F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	10	17.24	32.50	59.96	77.20	22.02
Juncus balticus littoralis	9	15.52	11.50	21.22	36.73	9.37
Zigadenus elegans	6	10.34	1.70	3.14	13.48	2.45
Helianthella uniflorus	8	13.79	2.80	5.17	18.96	1.93
Festuca idahoensis	2	3.45	1.00	1.85	5.29	2.11
Smilacina stellata	3	5.17	0.60	1.11	6.28	1.07
Dodecatheon pulchellum	8	13.79	1.40	2.58	16.38	0.97
Haplopappus uniflorus	1	1.72	0.20	0.37	2.09	0.63
Plantago eriopoda	3	5.17	1.00	1.85	7.02	1.76
Composite rosette - red veined	2	3.45	0.40	0.74	4.19	0.84
Aster falcatus	2	3.45	0.40	0.74	4.19	0.84
Gentiana sp.	1	1.72	0.10	0.18	1.91	0.32
Agropyron sp.	1	1.72	0.20	0.37	2.09	0.63
Phlox kelseyi	1	1.72	0.20	0.37	2.09	0.63
Potentilla anserina	1	1.72	0.20	0.37	2.09	0.63
Totals	58	100.00	54.20	100.00	200.00	

Table 40. Transect 8A Dutchman Property 8A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	5	12.20	25.00	35.21	47.41	28.38
Carex nebrascensis	2	4.88	0.50	0.70	5.58	1.08
Agrostis stolonifera	7	17.07	18.30	25.77	42.85	20.71

Table 40. Transect 8A (Cont.) Dutchman Property 8A

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Carex sp.	1	2.44	0.30	0.42	2.86	0.95
Potentilla anserina	2	4.88	0.40	0.56	5.44	0.97
Agropyron repens	2	4.88	3.50	4.93	9.81	9.44
Smilacina stellata	1	2.44	5.00	7.04	9.48	15.81
Sonchus arvensis	3	7.32	0.50	0.70	8.02	0.97
Unidentified Forb	2	4.88	0.40	0.56	5.44	0.97
Aster falcatus	5	12.20	0.90	1.27	13.46	1.52
Cirsium arvense	1	2.44	0.20	0.28	2.72	0.63
Poa nevadensis	4	9.76	2.60	3.66	13.42	4.72
Equisetum laevigatum	1	2.44	0.30	0.42	2.86	0.95
Plantago eriopoda	1	2.44	1.00	1.41	3.85	3.16
Agropyron intermedium	1	2.44	6.50	9.15	11.59	20.55
Medicago sativa	1	2.44	0.10	0.14	2.58	0.32
Carex utriculata	2	4.88	5.50	7.75	12.62	14.23
Totals	41	100.00	71.00	100.00	200.00	

Table 41. Transect 8B Dutchman Property 8B

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Agropyron repens	7	14.58	14.70	20.91	35.49	24.42
Juncus balticus littoralis	6	12.50	20.50	29.16	41.66	27.63
Sonchus arvensis	6	12.50	3.40	4.84	17.34	4.55
Agrostis stolonifera	6	12.50	22.50	32.01	44.51	23.95
Poa nevadensis	2	4.17	2.00	2.84	7.01	4.22
Potentilla anserina	7	14.58	1.90	2.70	17.29	1.97
Aster falcatus	5	10.42	0.90	1.28	11.70	1.20
Carex sp.	1	2.08	0.10	0.14	2.23	0.32
Cirsium arvense	3	6.25	1.40	1.99	8.24	3.17
Plantago eriopoda	1	2.08	0.20	0.28	2.37	0.63
Smilacina stellata	1	2.08	0.10	0.14	2.23	0.32
Unidentified Forb	1	2.08	0.10	0.14	2.23	0.32
Distichlis stricta	2	4.17	2.50	3.56	7.72	5.40
Totals	48	100.00	70.30	100.00	200.00	

Table 42. Transect 8C Dutchman Property 8C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	9	15.52	34.80	38.24	53.76	30.41
Agrostis stolonifera	8	13.79	23.30	25.60	39.40	26.42
Potentilla anserina	8	13.79	2.60	2.86	16.65	1.78
Poa nevadensis	3	5.17	0.90	0.99	6.16	1.73
Sonchus arvensis	6	10.34	2.80	3.08	13.42	4.61
Distichlis stricta	1	1.72	1.50	1.65	3.37	4.74
Cirsium arvense	2	3.45	0.60	0.66	4.11	1.58
Smilacina stellata	3	5.17	1.10	1.21	6.38	1.85

Table 42. Transect 8C (Cont.) Dutchman Property 8C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Aster falcatus	6	10.34	1.00	1.10	11.44	1.15
Agropyron repens	7	12.07	21.30	23.41	35.48	34.19
Vicia sp.	2	3.45	0.40	0.44	3.89	0.97
Medicago sativa	2	3.45	0.60	0.66	4.11	1.58
Carex sp.	1	1.72	0.10	0.11	1.83	0.32
Totals	58	100.00	91.00	100.00	200.00	

Table 43. Transect 8D Dutchman Property 8D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	6	10.34	22.00	28.65	38.99	25.41
Juncus balticus littoralis	6	10.34	16.00	20.83	31.18	23.31
Poa nevadensis	5	8.62	2.60	3.39	12.01	3.34
Equisetum laevigatum	2	3.45	0.20	0.26	3.71	0.42
Smilacina stellata	2	3.45	0.60	0.78	4.23	1.58
Cirsium arvense	4	6.90	2.10	2.73	9.63	2.96
Aster falcatus	8	13.79	1.60	2.08	15.88	1.17
Sonchus arvensis	4	6.90	2.60	3.39	10.28	4.79
Potentilla anserina	4	6.90	1.20	1.56	8.46	2.04
Agropyron repens	4	6.90	14.80	19.27	26.17	25.04
Taraxacum officinale	1	1.72	0.20	0.26	1.98	0.63
Vicia sp.	1	1.72	0.10	0.13	1.85	0.32
Agropyron intermedium	1	1.72	1.00	1.30	3.03	3.16
Plantago eriopoda	4	6.90	7.50	9.77	16.66	10.07
Distichlis stricta	2	3.45	3.50	4.56	8.01	9.44
Carex sp.	1	1.72	0.10	0.13	1.85	0.32
Unidentified Forb	1	1.72	0.10	0.13	1.85	0.32
Festuca idahoensis	1	1.72	0.50	0.65	2.38	1.58
Antennaria sp.	1	1.72	0.10	0.13	1.85	0.32
Totals	58	100.00	76.80	100.00	200.00	

Table 44. Transect 8E Dutchman Property 8E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	9	16.67	28.50	32.87	49.54	22.98
Juncus balticus littoralis	8	14.81	40.00	46.14	60.95	25.39
Smilacina stellata	1	1.85	0.20	0.23	2.08	0.63
Potentilla anserina	4	7.41	0.90	1.04	8.45	1.60
Sonchus arvensis	9	16.67	1.40	1.61	18.28	0.84
Vicia sp.	4	7.41	0.50	0.58	7.98	0.71
Cirsium arvense	5	9.26	1.40	1.61	10.87	2.01
Aster falcatus	3	5.56	0.40	0.46	6.02	0.70
Agropyron repens	1	1.85	7.00	8.07	9.93	22.14
Poa nevadensis	1	1.85	0.10	0.12	1.97	0.32

Table 44. Transect 8E (Cont.) Dutchman Property 8E

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Unidentified Forb	4	7.41	0.40	0.46	7.87	0.52
Distichlis stricta	1	1.85	5.00	5.77	7.62	15.81
Plantago eriopoda	1	1.85	0.50	0.58	2.43	1.58
Equisetum laevigatum	3	5.56	0.40	0.46	6.02	0.70
Totals	54	100.00	86.70	100.00	200.00	

Table 45. Transect 9BF Dutchman Property 9BF

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Juncus balticus littoralis	8	16.33	35.50	43.08	59.41	28.23
Calamagrostis stricta	2	4.08	0.60	0.73	4.81	1.58
Smilacina stellata	1	2.04	0.30	0.36	2.40	0.95
Carex nebrascensis	6	12.24	3.60	4.37	16.61	4.43
Solidago sp.	3	6.12	0.90	1.09	7.21	1.91
Triglochin maritima	1	2.04	0.10	0.12	2.16	0.32
Equisetum arvense	2	4.08	0.20	0.24	4.32	0.42
Potentilla anserina	4	8.16	0.50	0.61	8.77	0.71
Helianthella uniflorus	1	2.04	0.10	0.12	2.16	0.32
Carex aquatilis altior	3	6.12	22.00	26.70	32.82	36.76
Mimulus guttatus	3	6.12	4.70	5.70	11.83	9.48
Aster spp.	4	8.16	3.40	4.13	12.29	5.52
Agrostis stolonifera	1	2.04	0.10	0.12	2.16	0.32
Epilobium ciliatum	2	4.08	0.40	0.49	4.57	0.97
Salix lutea	3	6.12	5.90	7.16	13.28	11.51
Solidago sp.	1	2.04	0.50	0.61	2.65	1.58
Salix candida	1	2.04	2.50	3.03	5.07	7.91
Aster falcatus	1	2.04	0.80	0.97	3.01	2.53
Pedicularis groenlandica	1	2.04	0.20	0.24	2.28	0.63
Parnassia parviflora	1	2.04	0.10	0.12	2.16	0.32
Totals	49	100.00	82.40	100.00	200.00	

Table 46. Transect 9BG Dutchman Property 9BG

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Aster falcatus	8	13.11	4.50	3.72	16.83	5.19
Juncus balticus littoralis	10	16.39	72.00	59.45	75.85	22.01
Potentilla anserina	10	16.39	17.20	14.20	30.60	13.31
Agrostis stolonifera	2	3.28	3.20	2.64	5.92	9.44
Triglochin maritima	6	9.84	1.20	0.99	10.83	1.03
Agropyron sp.	1	1.64	0.20	0.17	1.80	0.63
Distichlis stricta	2	3.28	1.20	0.99	4.27	3.16
Smilacina stellata	3	4.92	1.40	1.16	6.07	3.13
Calamagrostis stricta	2	3.28	5.50	4.54	7.82	15.71
Deschampsia cespitosa	5	8.20	3.20	2.64	10.84	4.10

Table 46. Transect 9BG (Cont.)

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix boothii	4	6.56	6.50	5.37	11.92	8.83
Carex nebrascensis	3	4.92	2.00	1.65	6.57	3.50
Salix wolfii	2	3.28	1.00	0.83	4.10	2.11
Cirsium arvense	3	4.92	2.00	1.65	6.57	3.50
Totals	61	100.00	121.10	100.00	200.00	

Dutchman Property 9BG

Table 47. Transect 9BH

Dutchman Property 9BH

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	18.18	79.00	53.85	72.03	21.83
Agrostis stolonifera	8	14.55	15.60	10.63	25.18	24.67
Smilacina stellata	3	5.45	4.50	3.07	8.52	8.32
Aster falcatus	8	14.55	6.90	4.70	19.25	6.30
Potentilla anserina	4	7.27	5.20	3.54	10.82	8.39
Agropyron trachycaulum	1	1.82	1.00	0.68	2.50	3.16
Salix boothii	4	7.27	11.00	7.50	14.77	19.12
Salix wolfii	2	3.64	1.50	1.02	4.66	3.37
Eriophorum gracile	3	5.45	1.50	1.02	6.48	2.42
Deschampsia cespitosa	4	7.27	1.40	0.95	8.23	2.07
Carex utriculata	1	1.82	0.20	0.14	1.95	0.63
Parnassia parviflora	1	1.82	0.50	0.34	2.16	1.58
Triglochin maritima	3	5.45	1.40	0.95	6.41	3.13
Scirpus acutus	3	5.45	17.00	11.59	17.04	33.35
Totals	55	100.00	146.70	100.00	200.00	

Table 48. Transect 9BI

Dutchman Property 9BI

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	3	4.62	6.80	12.90	17.52	15.89
Salix boothii	9	13.85	5.20	9.87	23.71	7.45
Pedicularis groenlandica	6	9.23	4.60	8.73	17.96	5.13
Aster spp.	1	1.54	0.10	0.19	1.73	0.32
Equisetum laevigatum	4	6.15	1.80	3.42	9.57	3.29
Triglochin maritima	5	7.69	0.90	1.71	9.40	1.10
Carex sp. - dark	9	13.85	21.00	39.85	53.69	26.44
Salix candida	7	10.77	4.90	9.30	20.07	5.20
Parnassia parviflora	3	4.62	0.70	1.33	5.94	1.16
Juncus balticus littoralis	4	6.15	2.50	4.74	10.90	3.54
Taraxacum officinale	1	1.54	0.20	0.38	1.92	0.63
Aster falcatus	2	3.08	0.60	1.14	4.22	1.58
Carex nebrascensis	1	1.54	0.30	0.57	2.11	0.95
Scirpus acutus	5	7.69	1.50	2.85	10.54	1.84
Muhlenbergia glomerata	2	3.08	0.30	0.57	3.65	0.67
Sisyrinchium montanum	1	1.54	0.50	0.95	2.49	1.58

Table 48. Transect 9BI (Cont.) Dutchman Property 9BI

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Distichlis stricta	1	1.54	0.30	0.57	2.11	0.95
Eleocharis palustris	1	1.54	0.50	0.95	2.49	1.58
Totals	65	100.00	52.70	100.00	200.00	

Table 49. Transect 9BJ Dutchman Property 9BJ

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Juncus sp.	1	1.45	0.10	0.14	1.59	0.32
Betula glandulosa	4	5.80	7.40	10.25	16.05	14.77
Equisetum laevigatum	4	5.80	3.30	4.57	10.37	6.40
Pedicularis groenlandica	1	1.45	0.20	0.28	1.73	0.63
Carex sp.	6	8.70	5.30	7.34	16.04	9.25
Aster falcatus	3	4.35	0.70	0.97	5.32	1.57
Potentilla anserina	3	4.35	0.80	1.11	5.46	1.48
Juncus balticus littoralis	9	13.04	37.00	51.25	64.29	21.50
Salix lutea	8	11.59	9.10	12.60	24.20	9.81
Carex nebrascensis	3	4.35	0.30	0.42	4.76	0.48
Deschampsia cespitosa	3	4.35	0.40	0.55	4.90	0.70
Calamagrostis stricta	7	10.14	1.40	1.94	12.08	1.58
Triglochin maritima	6	8.70	2.70	3.74	12.44	3.37
Salix candida	5	7.25	1.70	2.35	9.60	2.36
Juncus alpinus	1	1.45	0.10	0.14	1.59	0.32
Sonchus arvensis	2	2.90	1.10	1.52	4.42	3.14
Taraxacum officinale	1	1.45	0.10	0.14	1.59	0.32
Agrostis stolonifera	1	1.45	0.20	0.28	1.73	0.63
Distichlis stricta	1	1.45	0.30	0.42	1.86	0.95
Totals	69	100.00	72.20	100.00	200.00	

Table 50. Transect 10AA Dutchman Property 10AA

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Juncus balticus littoralis	9	16.98	38.50	57.21	74.19	23.81
Calamagrostis stricta	5	9.43	4.00	5.94	15.38	5.16
Carex nebrascensis	9	16.98	3.10	4.61	21.59	1.97
Agrostis stolonifera	5	9.43	3.20	4.75	14.19	6.14
Cirsium arvense	1	1.89	0.10	0.15	2.04	0.32
Haplopappus uniflorus	1	1.89	0.20	0.30	2.18	0.63
Salix boothii	7	13.21	13.00	19.32	32.52	11.83
Pedicularis groenlandica	2	3.77	1.10	1.63	5.41	2.60
Aster falcatus	7	13.21	2.70	4.01	17.22	2.67
Rosa woodsii	1	1.89	0.40	0.59	2.48	1.26
Triglochin maritima	1	1.89	0.10	0.15	2.04	0.32
Oxytropis sp.	3	5.66	0.30	0.45	6.11	0.48
Populus tremuloides	1	1.89	0.50	0.74	2.63	1.58

Table 50. Transect 10AA (Cont.) Dutchman Property 10AA

Dutchman Property

SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Equisetum arvense	1	1.89	0.10	0.15	2.04	0.32
Totals	53	100.00	67.30	100.00	200.00	

Table 51. Transect 10AB Dutchman Property 10AB

Dutchman Property

SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Aster spp.	6	9.09	1.20	1.80	10.89	1.23
Agrostis stolonifera	10	15.15	32.00	47.98	63.13	12.52
Agropyron sp.	2	3.03	0.20	0.30	3.33	0.42
Potentilla anserina	4	6.06	2.00	3.00	9.06	2.94
Cirsium arvense	10	15.15	7.20	10.79	25.95	5.35
Aster falcatus	10	15.15	5.60	8.40	23.55	5.78
Juncus balticus littoralis	9	13.64	15.50	23.24	36.87	14.68
Equisetum laevigatum	1	1.52	0.20	0.30	1.82	0.63
Smilacina stellata	5	7.58	0.80	1.20	8.78	1.03
Solidago gigantea	2	3.03	0.30	0.45	3.48	0.67
Hordeum jubatum	1	1.52	0.10	0.15	1.67	0.32
Rosa woodsii	3	4.55	0.60	0.90	5.45	1.26
Iris missouriensis	1	1.52	0.20	0.30	1.82	0.63
Helianthella uniflorus	1	1.52	0.30	0.45	1.96	0.95
Zigadenus elegans	1	1.52	0.50	0.75	2.26	1.58
Totals	66	100.00	66.70	100.00	200.00	

Table 52. Transect 10AC Dutchman Property 10AC

Dutchman Property

SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Salix boothii	7	12.50	10.90	15.20	27.70	12.03
Juncus balticus littoralis	10	17.86	39.50	55.09	72.95	26.19
Aster falcatus	9	16.07	5.10	7.11	23.18	4.31
Cirsium arvense	2	3.57	0.50	0.70	4.27	1.08
Potentilla anserina	7	12.50	2.10	2.93	15.43	2.56
Agrostis stolonifera	1	1.79	0.50	0.70	2.48	1.58
Calamagrostis stricta	4	7.14	4.50	6.28	13.42	9.26
Deschampsia cespitosa	1	1.79	0.50	0.70	2.48	1.58
Carex nebrascensis	6	10.71	3.20	4.46	15.18	6.11
Salix wolfii	2	3.57	1.90	2.65	6.22	4.77
Agrostis stolonifera	5	8.93	2.70	3.77	12.69	3.43
Equisetum laevigatum	2	3.57	0.30	0.42	3.99	0.67
Totals	56	100.00	71.70	100.00	200.00	

Table 53. Transect 10AD
Dutchman Property

Dutchman Property 10AD

SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	17.86	43.00	63.05	80.91	20.17
Carex nebrascensis	8	14.29	2.40	3.52	17.80	2.27
Agrostis stolonifera	7	12.50	5.00	7.33	19.83	5.14
Salix boothii	7	12.50	5.10	7.48	19.98	5.45
Potentilla anserina	5	8.93	2.00	2.93	11.86	3.68
Aster falcatus	8	14.29	3.20	4.69	18.98	2.57
Calamagrostis stricta	4	7.14	4.70	6.89	14.03	7.51
Salix wolfii	3	5.36	1.70	2.49	7.85	3.27
Deschampsia cespitosa	1	1.79	0.30	0.44	2.23	0.95
Triglochin maritima	1	1.79	0.10	0.15	1.93	0.32
Cirsium arvense	1	1.79	0.50	0.73	2.52	1.58
Rosa woodsii	1	1.79	0.20	0.29	2.08	0.63
Totals	56	100.00	68.20	100.00	200.00	

Table 54. Transect 10BE
Dutchman Property

Dutchman Property 10BE

SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Poa nevadensis	6	10.17	9.50	6.72	16.89	9.56
Juncus balticus littoralis	10	16.95	56.00	39.63	56.58	29.51
Aster falcatus	10	16.95	7.70	5.45	22.40	3.89
Potentilla anserina	10	16.95	25.00	17.69	34.64	27.59
Cirsium arvense	7	11.86	6.70	4.74	16.61	8.69
Smilacina stellata	1	1.69	0.30	0.21	1.91	0.95
Salix boothii	8	13.56	30.70	21.73	35.29	28.49
Calamagrostis stricta	3	5.08	3.20	2.26	7.35	6.68
Salix wolfii	1	1.69	1.00	0.71	2.40	3.16
Dodecatheon pulchellum	1	1.69	0.20	0.14	1.84	0.63
Rosa acicularis	1	1.69	0.50	0.35	2.05	1.58
Distichlis stricta	1	1.69	0.50	0.35	2.05	1.58
Totals	59	100.00	141.30	100.00	200.00	

Table 55. Transect 10BF
Dutchman Property

Dutchman Property 10BF

SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	15.87	65.50	48.09	63.96	23.39
Deschampsia cespitosa	2	3.17	1.50	1.10	4.28	3.37
Sphenopholis sp.	2	3.17	0.30	0.22	3.39	0.67
Carex nebrascensis	2	3.17	3.10	2.28	5.45	9.46
Calamagrostis stricta	7	11.11	14.00	10.28	21.39	12.87
Potentilla anserina	7	11.11	15.00	11.01	22.12	18.86
Aster falcatus	10	15.87	6.90	5.07	20.94	5.34

Table 55. Transect 10BF (Cont.) Dutchman Property 10BF

Dutchman Property		AVG		10		
SPECIES	AF	RF	AC	RC	IV	STD
Salix boothii	1	1.59	0.50	0.37	1.95	1.58
Cirsium arvense	9	14.29	21.50	15.79	30.07	23.34
Triglochin maritima	2	3.17	0.80	0.59	3.76	1.75
Agrostis stolonifera	2	3.17	4.00	2.94	6.11	9.66
Smilacina stellata	1	1.59	0.30	0.22	1.81	0.95
Agropyron sp.	3	4.76	0.90	0.66	5.42	1.66
Poa nevadensis	5	7.94	1.90	1.40	9.33	2.28
Totals	63	100.00	136.20	100.00	200.00	

Table 56. Transect 10BG Dutchman Property 10BG

Dutchman Property		AVG		10		
SPECIES	AF	RF	AC	RC	IV	STD
Salix wolfii	2	3.23	0.50	0.62	3.85	1.08
Juncus balticus littoralis	10	16.13	48.00	59.48	75.61	25.84
Salix sp.	6	9.68	4.20	5.20	14.88	4.96
Potentilla anserina	2	3.23	5.00	6.20	9.42	10.80
Solidago sp.	9	14.52	8.30	10.29	24.80	15.28
Aster sp.	2	3.23	0.20	0.25	3.47	0.42
Agrostis stolonifera	6	9.68	6.00	7.43	17.11	6.58
Agropyron sp.	4	6.45	1.40	1.73	8.19	2.27
Sonchus sp.	4	6.45	1.00	1.24	7.69	1.63
Rosa woodsii	2	3.23	0.70	0.87	4.09	1.49
Deschampsia cespitosa	1	1.61	0.20	0.25	1.86	0.63
Triglochin maritima	1	1.61	0.10	0.12	1.74	0.32
Taraxacum officinale	3	4.84	2.10	2.60	7.44	4.72
Carex nebrascensis	2	3.23	0.50	0.62	3.85	1.27
Cirsium arvense	3	4.84	0.30	0.37	5.21	0.48
Smilacina stellata	2	3.23	0.70	0.87	4.09	1.64
Helianthus sp.	1	1.61	0.30	0.37	1.98	0.95
Unidentified Seedling	1	1.61	1.00	1.24	2.85	3.16
Lepidium chalepense	1	1.61	0.20	0.25	1.86	0.63
Totals	62	100.00	80.70	100.00	200.00	

Table 57. Transect 10BH Dutchman Property 10BH

Dutchman Property		AVG		10		
SPECIES	AF	RF	AC	RC	IV	STD
Juncus balticus littoralis	11	17.74	75.00	51.41	69.15	20.68
Salix boothii	8	12.90	11.50	7.88	20.79	10.81
Cirsium arvense	5	8.06	3.20	2.19	10.26	4.10
Potentilla anserina	1	1.61	0.50	0.34	1.96	1.58
Smilacina stellata	1	1.61	0.20	0.14	1.75	0.63
Poa nevadensis	3	4.84	1.70	1.17	6.00	3.33

Table 57. Transect 10BH (Cont.) Dutchman Property 10BH

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Calamagrostis stricta	8	12.90	26.00	17.82	30.72	25.91
Salix wolfii	3	4.84	3.50	2.40	7.24	5.80
Agropyron sp.	2	3.23	2.20	1.51	4.73	6.29
Muhlenbergia glomerata	4	6.45	3.70	2.54	8.99	5.70
Deschampsia cespitosa	1	1.61	2.00	1.37	2.98	6.32
Agrostis stolonifera	3	4.84	9.00	6.17	11.01	16.63
Dodecatheon pulchellum	2	3.23	1.00	0.69	3.91	2.11
Taraxacum officinale	3	4.84	1.70	1.17	6.00	3.33
Helianthella uniflorus	1	1.61	1.50	1.03	2.64	4.74
Equisetum laevigatum	2	3.23	1.00	0.69	3.91	2.11
Betula occidentalis	3	4.84	1.90	1.30	6.14	4.68
Zigadenus elegans	1	1.61	0.30	0.21	1.82	0.95
Totals	62	100.00	145.90	100.00	200.00	

Table 58. Transect 11A Dutchman Property 11A

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Agrostis stolonifera	2	4.00	2.30	3.19	7.19	6.29
Potentilla anserina	6	12.00	1.60	2.22	14.22	2.12
Smilacina stellata	3	6.00	1.90	2.64	8.64	4.68
Helianthella uniflorus	1	2.00	0.10	0.14	2.14	0.32
Agropyron sp.	2	4.00	0.20	0.28	4.28	0.42
Aster falcatus	8	16.00	4.90	6.80	22.80	4.33
Aster sp.	1	2.00	0.10	0.14	2.14	0.32
Juncus balticus littoralis	8	16.00	50.50	70.04	86.04	34.52
Plantago eriopoda	2	4.00	0.20	0.28	4.28	0.42
Sonchus arvensis	2	4.00	1.00	1.39	5.39	2.54
Taraxacum officinale	3	6.00	1.20	1.66	7.66	3.12
Cirsium arvense	6	12.00	4.60	6.38	18.38	5.36
Salix sp.	2	4.00	3.00	4.16	8.16	6.32
Calamagrostis stricta	1	2.00	0.10	0.14	2.14	0.32
Carex nebrascensis	2	4.00	0.20	0.28	4.28	0.42
Carex sp.	1	2.00	0.20	0.28	2.28	0.63
Totals	50	100.00	72.10	100.00	200.00	

Table 59. Transect 11B Dutchman Property 11B

Dutchman Property SPECIES	AF	AVG RF	AC	10 RC	IV	STD
Potentilla anserina	10	13.89	4.40	5.02	18.91	1.96
Smilacina stellata	8	11.11	3.20	3.65	14.76	3.01
Agrostis stolonifera	10	13.89	46.50	53.02	66.91	14.54
Juncus balticus littoralis	10	13.89	26.50	30.22	44.11	19.73
Sonchus arvensis	5	6.94	1.30	1.48	8.43	1.64

Table 59. Transect 11B (Cont.)

Dutchman Property

SPECIES	AF	RF	AC	RC	IV	STD
Dutchman Property 11B		AVG		10		
Agropyron sp.	5	6.94	0.60	0.68	7.63	0.70
Dodecatheon pulchellum	2	2.78	0.80	0.91	3.69	1.69
Aster falcatus	4	5.56	0.80	0.91	6.47	1.55
Iris missouriensis	3	4.17	0.50	0.57	4.74	0.97
Potamogeton gramineus	1	1.39	0.10	0.11	1.50	0.32
Calamagrostis stricta	1	1.39	0.50	0.57	1.96	1.58
Cirsium arvense	5	6.94	0.60	0.68	7.63	0.70
Triglochin palustris	4	5.56	1.00	1.14	6.70	1.89
Taraxacum officinale	2	2.78	0.40	0.46	3.23	0.97
Aster sp.	2	2.78	0.50	0.57	3.35	1.08
Totals	72	100.00	87.70	100.00	200.00	

Table 60. Transect 11C

Dutchman Property

SPECIES	AF	RF	AC	RC	IV	STD
Dutchman Property 11C		AVG		10		
Agrostis stolonifera	10	18.87	38.50	48.67	67.54	26.04
Zigadenus elegans	1	1.89	0.40	0.51	2.39	1.26
Plantago eriopoda	10	18.87	18.20	23.01	41.88	9.38
Juncus balticus littoralis	2	3.77	2.50	3.16	6.93	6.35
Dodecatheon pulchellum	1	1.89	0.10	0.13	2.01	0.32
Helianthella uniflorus	1	1.89	0.10	0.13	2.01	0.32
Potentilla anserina	1	1.89	0.10	0.13	2.01	0.32
Haplopappus uniflorus	9	16.98	3.50	4.42	21.41	2.12
Phlox kelseyi	6	11.32	2.40	3.03	14.35	2.27
Aster falcatus	2	3.77	0.80	1.01	4.78	1.75
Gentiana sp.	1	1.89	0.10	0.13	2.01	0.32
Festuca occidentalis	2	3.77	4.20	5.31	9.08	12.59
Cirsium arvense	2	3.77	0.40	0.51	4.28	0.97
Agropyron sp.	5	9.43	7.80	9.86	19.29	10.14
Totals	53	100.00	79.10	100.00	200.00	

Table 61. Transect 11D

Dutchman Property

SPECIES	AF	RF	AC	RC	IV	STD
Dutchman Property 11D		AVG		10		
Phlox kelseyi	2	4.08	0.70	0.82	4.90	1.49
Agrostis stolonifera	10	20.41	60.50	70.60	91.00	29.39
Plantago eriopoda	10	20.41	19.50	22.75	43.16	13.58
Aster falcatus	9	18.37	1.50	1.75	20.12	0.71
Haplopappus uniflorus	2	4.08	0.20	0.23	4.32	0.42
Cirsium arvense	10	20.41	2.50	2.92	23.33	1.65
Agropyron sp.	2	4.08	0.20	0.23	4.32	0.42
Smilacina stellata	2	4.08	0.20	0.23	4.32	0.42
Solidago sp.	2	4.08	0.40	0.47	4.55	0.97
Totals	49	100.00	85.70	100.00	200.00	

Table 62. Transect 12A Dutchman Property 12A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex nebrascensis	3	11.11	6.50	11.99	23.10	15.64
Carex sp.	10	37.04	39.00	71.96	108.99	22.71
Juncus balticus littoralis	3	11.11	0.70	1.29	12.40	1.57
Triglochin maritima	3	11.11	0.90	1.66	12.77	1.45
Scirpus acutus	3	11.11	5.00	9.23	20.34	9.72
Unidentified Forb	1	3.70	0.30	0.55	4.26	0.95
Calamagrostis stricta	1	3.70	0.10	0.18	3.89	0.32
Salix candida	1	3.70	0.10	0.18	3.89	0.32
Triglochin palustris	1	3.70	0.10	0.18	3.89	0.32
Carex sp.	1	3.70	1.50	2.77	6.47	4.74
Totals	27	100.00	54.20	100.00	200.00	

Table 63. Transect 12B Dutchman Property 12B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix boothii	6	9.52	14.10	16.87	26.39	19.04
Salix candida	8	12.70	9.50	11.36	24.06	10.58
Juncus balticus littoralis	10	15.87	28.00	33.49	49.37	14.94
Potentilla anserina	2	3.17	0.30	0.36	3.53	0.67
Haplopappus uniflorus	1	1.59	0.10	0.12	1.71	0.32
Calamagrostis stricta	9	14.29	17.70	21.17	35.46	13.93
Triglochin maritima	3	4.76	0.30	0.36	5.12	0.48
Poa nevadensis	1	1.59	1.00	1.20	2.78	3.16
Pedicularis groenlandica	2	3.17	0.40	0.48	3.65	0.84
Juncus longistylis	4	6.35	0.90	1.08	7.43	1.20
Carex nebrascensis	2	3.17	0.40	0.48	3.65	0.84
Juncus alpinus	1	1.59	0.20	0.24	1.83	0.63
Salix lutea	6	9.52	8.20	9.81	19.33	15.88
Deschampsia cespitosa	2	3.17	0.70	0.84	4.01	1.64
Thalictrum alpinum	3	4.76	1.50	1.79	6.56	2.80
Carex sp.	2	3.17	0.20	0.24	3.41	0.42
Triglochin palustris	1	1.59	0.10	0.12	1.71	0.32
Totals	63	100.00	83.60	100.00	200.00	

Table 64. Transect 12C Dutchman Property 12C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	10	12.99	43.50	43.90	56.88	21.61
Phlox kelseyi	7	9.09	12.40	12.51	21.60	13.24
Dodecatheon pulchellum	6	7.79	5.60	5.65	13.44	12.25
Plantago eriopoda	10	12.99	20.80	20.99	33.98	15.48
Zigadenus elegans	6	7.79	2.50	2.52	10.31	2.68
Potentilla anserina	5	6.49	1.90	1.92	8.41	2.08
Betula occidentalis	2	2.60	1.10	1.11	3.71	3.14
Aster falcatus	9	11.69	1.90	1.92	13.61	0.88
Juncus longistylis	2	2.60	0.20	0.20	2.80	0.42
Triglochin palustris	1	1.30	0.10	0.10	1.40	0.32

Table 64. Transect 12C (Cont.) Dutchman Property 12C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Triglochin maritima	2	2.60	0.20	0.20	2.80	0.42
Gentiana sp.	1	1.30	0.20	0.20	1.50	0.63
Smilacina stellata	3	3.90	0.40	0.40	4.30	0.70
Equisetum laevigatum	1	1.30	0.20	0.20	1.50	0.63
Carex sp.	1	1.30	0.50	0.50	1.80	1.58
Aster sp.	3	3.90	0.80	0.81	4.70	1.62
Juncus balticus littoralis	4	5.19	4.90	4.94	10.14	9.43
Cirsium arvense	1	1.30	0.10	0.10	1.40	0.32
Festuca idahoensis	1	1.30	1.50	1.51	2.81	4.74
Haplopappus uniflorus	1	1.30	0.20	0.20	1.50	0.63
Rosa woodsii	1	1.30	0.10	0.10	1.40	0.32
Totals	77	100.00	99.10	100.00	200.00	

Table 65. Transect 12D Dutchman Property 12D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	7	9.46	12.00	15.96	25.42	12.95
Juncus balticus littoralis	9	12.16	38.00	50.53	62.69	24.97
Salix lutea	5	6.76	4.30	5.72	12.47	6.83
Salix boothii	4	5.41	2.60	3.46	8.86	3.81
Salix candida	3	4.05	1.20	1.60	5.65	1.99
Helianthella uniflorus	7	9.46	3.20	4.26	13.71	3.46
Potentilla anserina	8	10.81	4.60	6.12	16.93	3.37
Equisetum laevigatum	2	2.70	0.20	0.27	2.97	0.42
Sonchus arvensis	5	6.76	0.80	1.06	7.82	0.92
Unidentified. Composite	1	1.35	0.10	0.13	1.48	0.32
Potentilla anserina	1	1.35	0.10	0.13	1.48	0.32
Taraxacum officinale	2	2.70	0.30	0.40	3.10	0.67
Triglochin maritima	2	2.70	0.40	0.53	3.23	0.84
Carex sp. - dark	2	2.70	0.80	1.06	3.77	1.75
Smilacina stellata	5	6.76	0.90	1.20	7.95	0.99
Zigadenus elegans	1	1.35	0.60	0.80	2.15	1.90
Deschampsia cespitosa	2	2.70	0.70	0.93	3.63	1.64
Juncus longistylis	1	1.35	0.20	0.27	1.62	0.63
Spartina gracilis	1	1.35	0.50	0.66	2.02	1.58
Equisetum arvense	2	2.70	1.80	2.39	5.10	3.82
Carex aquatilis altior	2	2.70	0.70	0.93	3.63	1.64
Ribes setosum	1	1.35	0.20	0.27	1.62	0.63
Populus tremuloides	1	1.35	1.00	1.33	2.68	3.16
Totals	74	100.00	75.20	100.00	200.00	

Table 66. Transect 12E Dutchman Property 12E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Rumex sp.	3	4.92	0.40	0.57	5.48	0.70
Cirsium arvense	1	1.64	0.30	0.42	2.06	0.95
Alopecurus pratensis	2	3.28	1.10	1.56	4.83	3.14

Table 66. Transect 12E (Cont.) Dutchman Property 12E

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Rosa woodsii	2	3.28	1.00	1.41	4.69	2.54
Potentilla anserina	6	9.84	3.60	5.09	14.93	5.10
Salix planifolia	4	6.56	4.30	6.08	12.64	6.86
Juncus balticus littoralis	10	16.39	51.00	72.14	88.53	23.78
Ribes inerme	2	3.28	0.40	0.57	3.84	0.84
Agrostis stolonifera	8	13.11	1.80	2.55	15.66	1.23
Zigadenus elegans	1	1.64	0.20	0.28	1.92	0.63
Salix lutea	1	1.64	0.10	0.14	1.78	0.32
Dodecatheon pulchellum	2	3.28	0.90	1.27	4.55	1.91
Taraxacum officinale	3	4.92	0.30	0.42	5.34	0.48
Equisetum laevigatum	2	3.28	0.20	0.28	3.56	0.42
Aster falcatus	4	6.56	0.70	0.99	7.55	1.06
Carex sp.	1	1.64	1.50	2.12	3.76	4.74
Carex nebrascensis	1	1.64	0.20	0.28	1.92	0.63
Calamagrostis stricta	2	3.28	0.30	0.42	3.70	0.67
Aster sp.	1	1.64	0.10	0.14	1.78	0.32
Smilacina stellata	3	4.92	2.10	2.97	7.89	3.67
Agropyron sp.	1	1.64	0.10	0.14	1.78	0.32
Triglochin sp.	1	1.64	0.10	0.14	1.78	0.32
Totals	61	100.00	70.70	100.00	200.00	

Table 67. Transect 13A Dutchman Property 13A

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Juncus balticus littoralis	6	17.65	30.00	64.79	82.44	33.75
Alopecurus pratensis	2	5.88	4.50	9.72	15.60	9.56
Potentilla anserina	3	8.82	1.00	2.16	10.98	1.76
Agrostis stolonifera	3	8.82	1.80	3.89	12.71	3.36
Helianthella uniflorus	1	2.94	0.50	1.08	4.02	1.58
Trifolium hybridum	1	2.94	0.20	0.43	3.37	0.63
Aster falcatus	2	5.88	0.40	0.86	6.75	0.84
Calamagrostis stricta	3	8.82	4.70	10.15	18.97	12.51
Salix candida	1	2.94	0.20	0.43	3.37	0.63
Betula occidentalis	1	2.94	0.30	0.65	3.59	0.95
Taraxacum officinale	1	2.94	0.20	0.43	3.37	0.63
Equisetum arvense	2	5.88	0.30	0.65	6.53	0.67
Viola sp. - blue	1	2.94	0.10	0.22	3.16	0.32
Carex nebrascensis	1	2.94	0.20	0.43	3.37	0.63
Zigadenus elegans	1	2.94	0.40	0.86	3.81	1.26
Triglochin palustris	1	2.94	0.10	0.22	3.16	0.32
Smilacina stellata	2	5.88	0.30	0.65	6.53	0.67
Salix boothii	1	2.94	1.00	2.16	5.10	3.16
Polygonum amphibium	1	2.94	0.10	0.22	3.16	0.32
Totals	34	100.00	46.30	100.00	200.00	

Table 68. Transect 13B Dutchman Property 13B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	20.83	37.70	54.01	74.84	16.04
Iris missouriensis	1	2.08	0.30	0.43	2.51	0.95
Potentilla anserina	4	8.33	5.20	7.45	15.78	8.72
Agrostis stolonifera	4	8.33	2.60	3.72	12.06	4.09
Aster falcatus	2	4.17	0.30	0.43	4.60	0.67
Oxytropis sp.	1	2.08	0.20	0.29	2.37	0.63
Helianthella uniflorus	2	4.17	0.60	0.86	5.03	1.35
Trifolium longipes	1	2.08	0.10	0.14	2.23	0.32
Salix boothii	4	8.33	5.50	7.88	16.21	8.32
Calamagrostis stricta	5	10.42	8.50	12.18	22.59	10.55
Smilacina stellata	2	4.17	0.60	0.86	5.03	1.35
Dodecatheon pulchellum	1	2.08	0.50	0.72	2.80	1.58
Carex nebrascensis	2	4.17	1.80	2.58	6.75	3.82
Salix lutea	1	2.08	0.30	0.43	2.51	0.95
Taraxacum officinale	2	4.17	0.60	0.86	5.03	1.58
Betula occidentalis	1	2.08	1.00	1.43	3.52	3.16
Alopecurus pratensis	3	6.25	3.50	5.01	11.26	7.84
Sonchus sp.	1	2.08	0.20	0.29	2.37	0.63
Carex spp.	1	2.08	0.30	0.43	2.51	0.95
Totals	48	100.00	69.80	100.00	200.00	

Table 69. Transect 13C Dutchman Property 13C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	9	10.98	31.00	27.73	38.70	20.66
Juncus balticus littoralis	10	12.20	50.50	45.17	57.37	22.91
Equisetum laevigatum	2	2.44	0.30	0.27	2.71	0.67
Dodecatheon pulchellum	6	7.32	2.10	1.88	9.20	3.18
Zigadenus elegans	2	2.44	0.50	0.45	2.89	1.08
Smilacina stellata	9	10.98	3.60	3.22	14.20	2.80
Potentilla anserina	10	12.20	10.20	9.12	21.32	7.16
Cirsium arvense	4	4.88	0.50	0.45	5.33	0.71
Aster sp.	6	7.32	2.40	2.15	9.46	3.13
Aster falcatus	6	7.32	1.70	1.52	8.84	1.77
Plantago eriopoda	4	4.88	2.80	2.50	7.38	5.29
Festuca idahoensis	1	1.22	1.00	0.89	2.11	3.16
Salix lutea	3	3.66	0.80	0.72	4.37	1.62
Carex sp.	3	3.66	0.70	0.63	4.28	1.16
Agropyron sp.	1	1.22	0.20	0.18	1.40	0.63
Zizia aptera	1	1.22	0.50	0.45	1.67	1.58
Calamagrostis stricta	1	1.22	2.50	2.24	3.46	7.91
Triglochin maritima	2	2.44	0.20	0.18	2.62	0.42
Rumex sp	1	1.22	0.20	0.18	1.40	0.63
Taraxacum officinale	1	1.22	0.10	0.09	1.31	0.32
Totals	82	100.00	111.80	100.00	200.00	

Table 70. Transect 13D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Equisetum laevigatum	5	7.35	0.90	2.18	9.53	1.29
Festuca idahoensis	9	13.24	5.60	13.56	26.79	3.57
Agropyron sp.	9	13.24	4.00	9.69	22.92	3.59
Plantago eriopoda	10	14.71	11.80	28.57	43.28	5.98
Rosa woodsii	3	4.41	0.50	1.21	5.62	0.97
Haplopappus uniflorus	6	8.82	1.10	2.66	11.49	1.37
Phlox kelseyi	4	5.88	2.30	5.57	11.45	4.11
Aster sp.	1	1.47	0.30	0.73	2.20	0.95
Poa pratensis	3	4.41	0.70	1.69	6.11	1.57
Aster sp.	6	8.82	2.30	5.57	14.39	3.27
Agrostis stolonifera	2	2.94	3.00	7.26	10.21	6.75
Taraxacum officinale	1	1.47	0.10	0.24	1.71	0.32
Potentilla fruticosa	5	7.35	8.00	19.37	26.72	10.06
Comandra umbellata	3	4.41	0.60	1.45	5.86	1.07
Carex sp.	1	1.47	0.10	0.24	1.71	0.32
Totals	68	100.00	41.30	100.00	200.00	

Dutchman Property 13D

Table 71. Transect 13E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	29.41	80.00	75.12	104.53	18.56
Calamagrostis stricta	3	8.82	1.70	1.60	10.42	3.33
Carex nebrascensis	4	11.76	1.20	1.13	12.89	1.75
Potentilla fruticosa	7	20.59	8.10	7.61	28.19	13.25
Deschampsia cespitosa	4	11.76	1.10	1.03	12.80	1.73
Carex sp.	2	5.88	0.20	0.19	6.07	0.42
Dodecatheon pulchellum	4	11.76	0.50	0.47	12.23	0.71
Triglochin maritima	2	5.88	0.20	0.19	6.07	0.42
Triglochin palustris	1	2.94	0.10	0.09	3.04	0.32
Calamagrostis canadensis	3	8.82	0.40	0.38	9.20	0.70
Potentilla anserina	2	5.88	0.20	0.19	6.07	0.42
Aster sp.	1	2.94	0.20	0.19	3.13	0.63
Agrostis stolonifera	1	2.94	0.20	0.19	3.13	0.63
Juncus longistylis	2	5.88	0.20	0.19	6.07	0.42
Populus tremuloides	2	5.88	0.30	0.28	6.16	0.67
Festuca idahoensis	2	5.88	1.60	1.50	7.38	4.72
Rumex sp.	1	2.94	0.30	0.28	3.22	0.95
Smilacina stellata	1	2.94	0.10	0.09	3.04	0.32
Salix bebbiana	1	2.94	1.00	0.94	3.88	3.16
Salix boothii	3	8.82	4.80	4.51	13.33	9.62
Equisetum laevigatum	1	2.94	0.10	0.09	3.04	0.32
Salix lutea	1	2.94	4.00	3.76	6.70	12.65
Totals	34	170.59	106.50	100.00	270.59	

Dutchman Property 13E

Table 72. Transect 13F Dutchman Property 13F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	4	6.15	15.50	21.20	27.36	23.86
Plantago eriopoda	10	15.38	8.50	11.63	27.01	5.66
Festuca idahoensis	9	13.85	19.50	26.68	40.52	16.63
Rosa woodsii	3	4.62	0.80	1.09	5.71	1.40
Haplopappus uniflorus	5	7.69	0.60	0.82	8.51	0.70
Aster falcatus	8	12.31	2.20	3.01	15.32	1.32
Agropyron sp.	10	15.38	10.60	14.50	29.89	10.94
Smilacina stellata	2	3.08	0.20	0.27	3.35	0.42
Potentilla fruticosa	5	7.69	8.50	11.63	19.32	12.70
Juncus balticus littoralis	2	3.08	0.40	0.55	3.62	0.84
Sonchus arvensis	1	1.54	0.20	0.27	1.81	0.63
Phlox kelseyi	3	4.62	5.70	7.80	12.41	12.04
Taraxacum officinale	1	1.54	0.10	0.14	1.68	0.32
Zigadenus elegans	1	1.54	0.20	0.27	1.81	0.63
Plantago aristata	1	1.54	0.10	0.14	1.68	0.32
Totals	65	100.00	73.10	100.00	200.00	

Table 73. Transect 14A Dutchman Property 14A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Betula glandulosa	10	16.67	15.60	16.40	33.07	8.59
Juncus balticus littoralis	10	16.67	57.00	59.94	76.60	25.73
Rubus acaulis	1	1.67	2.50	2.63	4.30	7.91
Potentilla anserina	5	8.33	1.10	1.16	9.49	1.37
Carex nebrascensis	1	1.67	0.30	0.32	1.98	0.95
Equisetum laevigatum	1	1.67	0.10	0.11	1.77	0.32
Salix boothii	7	11.67	3.70	3.89	15.56	3.80
Zigadenus elegans	1	1.67	0.20	0.21	1.88	0.63
Salix candida	7	11.67	2.10	2.21	13.87	2.38
Scirpus acutus	2	3.33	0.70	0.74	4.07	1.64
Potentilla fruticosa	5	8.33	3.50	3.68	12.01	4.12
Dodecatheon pulchellum	5	8.33	2.30	2.42	10.75	2.50
Smilacina stellata	1	1.67	0.20	0.21	1.88	0.63
Distichlis stricta	1	1.67	5.00	5.26	6.92	15.81
Sonchus arvensis	1	1.67	0.10	0.11	1.77	0.32
Carex sp. - blue/green	1	1.67	0.50	0.53	2.19	1.58
Agrostis stolonifera	1	1.67	0.20	0.21	1.88	0.63
Totals	60	100.00	95.10	100.00	200.00	

Table 74. 14B Dutchman Property 14B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	12.66	89.50	60.19	72.85	19.78
Salix boothii	9	11.39	22.00	14.79	26.19	21.37
Deschampsia cespitosa	7	8.86	3.80	2.56	11.42	2.78
Potentilla anserina	10	12.66	7.50	5.04	17.70	8.06
Triglochin maritima	3	3.80	0.60	0.40	4.20	1.07

Table 74. 14B (Cont.)

Dutchman Property 14B						
Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Carex nebrascensis	4	5.06	1.20	0.81	5.87	1.75
Salix wolfii	5	6.33	3.70	2.49	8.82	5.19
Zigadenus elegans	4	5.06	0.70	0.47	5.53	0.95
Aster falcatus	4	5.06	1.60	1.08	6.14	3.10
Taraxacum officinale	1	1.27	0.10	0.07	1.33	0.32
Dodecatheon pulchellum	4	5.06	1.40	0.94	6.00	2.07
Juncus longistylis	1	1.27	0.20	0.13	1.40	0.63
Pedicularis groenlandica	2	2.53	0.70	0.47	3.00	1.64
Scirpus acutus	1	1.27	1.00	0.67	1.94	3.16
Solidago gigantea	2	2.53	1.50	1.01	3.54	3.37
Sonchus arvensis	2	2.53	8.30	5.58	8.11	25.21
Agrostis stolonifera	3	3.80	1.90	1.28	5.08	4.68
Betula glandulosa	1	1.27	0.50	0.34	1.60	1.58
Eriophorum gracile	1	1.27	0.10	0.07	1.33	0.32
Calamagrostis stricta	3	3.80	0.90	0.61	4.40	1.66
Agropyron sp.	1	1.27	0.50	0.34	1.60	1.58
Festuca idahoensis	1	1.27	1.00	0.67	1.94	3.16
Totals	79	100.00	148.70	100.00	200.00	

Table 75. Transect 14C

Dutchman Property 14C						
Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Juncus balticus littoralis	10	15.15	98.00	70.61	85.76	6.32
Salix wolfii	4	6.06	5.20	3.75	9.81	9.91
Salix boothii	7	10.61	13.00	9.37	19.97	11.60
Juncus longistylis	3	4.55	0.40	0.29	4.83	0.70
Juncus nodosus	2	3.03	0.40	0.29	3.32	0.84
Deschampsia cespitosa	9	13.64	7.70	5.55	19.18	5.64
Potentilla anserina	4	6.06	0.80	0.58	6.64	1.03
Eriophorum gracile	2	3.03	0.50	0.36	3.39	1.08
Calamagrostis stricta	7	10.61	7.10	5.12	15.72	12.40
Aster falcatus	4	6.06	0.60	0.43	6.49	0.84
Carex utriculata	1	1.52	0.20	0.14	1.66	0.63
Potentilla fruticosa	4	6.06	2.10	1.51	7.57	4.63
Sium suave	1	1.52	0.20	0.14	1.66	0.63
Typha latifolia	1	1.52	0.20	0.14	1.66	0.63
Dodecatheon pulchellum	4	6.06	1.30	0.94	7.00	2.06
Carex nebrascensis	2	3.03	0.60	0.43	3.46	1.58
Distichlis stricta	1	1.52	0.50	0.36	1.88	1.58
Totals	66	100.00	138.80	100.00	200.00	

Table 76. Transect 14D

Dutchman Property 14D						
Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Agrostis stolonifera	8	17.02	14.50	29.96	46.98	10.66
Plantago eriopoda	10	21.28	16.70	34.50	55.78	13.72
Unidentified Composite	6	12.77	0.60	1.24	14.01	0.52

Table 76. Transect 14D (Cont.) Dutchman Property 14D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Smilacina stellata	1	2.13	0.10	0.21	2.33	0.32
Festuca ovina	7	14.89	5.10	10.54	25.43	7.48
Potentilla fruticosa	1	2.13	6.00	12.40	14.52	18.97
Rumex sp.	2	4.26	0.30	0.62	4.88	0.67
Equisetum laevigatum	1	2.13	0.10	0.21	2.33	0.32
Aster sp.	4	8.51	0.60	1.24	9.75	0.84
Distichlis stricta	1	2.13	0.10	0.21	2.33	0.32
Zigadenus elegans	1	2.13	0.10	0.21	2.33	0.32
Taraxacum officinale	3	6.38	1.10	2.27	8.66	2.51
Agropyron sp	1	2.13	3.00	6.20	8.33	9.49
Unidentified Poaceae	1	2.13	0.10	0.21	2.33	0.32
Totals	47	100.00	48.40	100.00	200.00	

Table 77. Transect 14E Dutchman Property 14E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Plantago eriopoda	9	16.98	29.50	34.06	51.05	16.91
Festuca idahoensis	4	7.55	3.70	4.27	11.82	6.60
Juncus balticus littoralis	6	11.32	5.80	6.70	18.02	5.55
Helianthella uniflorus	5	9.43	0.80	0.92	10.36	0.92
Phlox kelseyi	3	5.66	3.10	3.58	9.24	7.85
Aster falcatus	7	13.21	2.30	2.66	15.86	2.91
Spartina gracilis	3	5.66	2.20	2.54	8.20	4.16
Gentiana sp.	2	3.77	0.30	0.35	4.12	0.67
Agropyron sp.	3	5.66	7.00	8.08	13.74	13.98
Agrostis stolonifera	6	11.32	31.00	35.80	47.12	33.73
Composite - unidentified	2	3.77	0.20	0.23	4.00	0.42
Taraxacum officinale	1	1.89	0.10	0.12	2.00	0.32
Aster sp.	1	1.89	0.50	0.58	2.46	1.58
Smilacina stellata	1	1.89	0.10	0.12	2.00	0.32
Totals	53	100.00	86.60	100.00	200.00	

Table 78. Transect 16AA Dutchman Property 16AA

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex sp.	1	3.23	0.10	0.23	3.46	0.32
Solidago sp.	4	12.90	4.20	9.86	22.76	6.56
Iris missouriensis	2	6.45	0.70	1.64	8.09	1.64
Smilacina stellata	3	9.68	1.60	3.76	13.43	3.34
Juncus balticus littoralis	2	6.45	4.50	10.56	17.01	12.57
Poa nevadensis	4	12.90	21.50	50.47	63.37	33.83
Cirsium arvense	4	12.90	3.90	9.15	22.06	7.85
Equisetum laevigatum	2	6.45	0.20	0.47	6.92	0.42
Agropyron sp.	2	6.45	0.20	0.47	6.92	0.42
Potentilla sp.	1	3.23	0.20	0.47	3.70	0.63
Achillea millefolium	3	9.68	5.20	12.21	21.88	12.62
Oxytropis sp.	1	3.23	0.10	0.23	3.46	0.32
Taraxacum officinale	1	3.23	0.10	0.23	3.46	0.32

Table 78. Transect 16AA (Cont.) Dutchman Property 16AA

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Solidago canadensis	1	3.23	0.10	0.23	3.46	0.32
Totals	31	100.00	42.60	100.00	200.00	

Table 79. Transect 16AB Dutchman Property 16AB

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	8	16.00	12.80	21.62	37.62	17.72
Alopecurus pratensis	4	8.00	7.60	12.84	20.84	12.24
Calamagrostis stricta	2	4.00	0.40	0.68	4.68	0.84
Smilacina stellata	5	10.00	6.60	11.15	21.15	12.30
Potentilla anserina	4	8.00	1.00	1.69	9.69	1.49
Iris missouriensis	1	2.00	0.20	0.34	2.34	0.63
Sonchus arvensis	1	2.00	0.20	0.34	2.34	0.63
Taraxacum officinale	1	2.00	0.10	0.17	2.17	0.32
Agropyron repens	2	4.00	2.70	4.56	8.56	7.86
Solidago gigantea	1	2.00	0.20	0.34	2.34	0.63
Carex nebrascensis	5	10.00	18.80	31.76	41.76	28.92
Angelica arguta	2	4.00	0.30	0.51	4.51	0.67
Carex sp.(1)	3	6.00	4.00	6.76	12.76	8.10
Rumex sp.	3	6.00	0.80	1.35	7.35	1.40
Unidentified. Seedling	2	4.00	0.30	0.51	4.51	0.67
Lemna minor	2	4.00	0.50	0.84	4.84	1.08
Salix boothii	1	2.00	1.50	2.53	4.53	4.74
Triglochin maritima	1	2.00	0.10	0.17	2.17	0.32
Carex sp. (2)	1	2.00	1.00	1.69	3.69	3.16
Trifolium hybridum	1	2.00	0.10	0.17	2.17	0.32
Totals	50	100.00	59.20	100.00	200.00	

Table 80. Transect 16AC Dutchman Property 16AC

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex utriculata	2	4.44	2.10	4.24	8.69	6.30
Carex nebrascensis	3	6.67	6.30	12.73	19.39	15.68
Epilobium ciliatum	1	2.22	0.10	0.20	2.42	0.32
Carex aquatilis altior	3	6.67	1.70	3.43	10.10	3.33
Juncus balticus littoralis	8	17.78	28.50	57.58	75.35	24.73
Alopecurus pratensis	4	8.89	3.50	7.07	15.96	9.35
Rumex crispus	2	4.44	0.20	0.40	4.85	0.42
Mentha arvensis	1	2.22	0.10	0.20	2.42	0.32
Solidago gigantea	3	6.67	1.20	2.42	9.09	2.53
Angelica arguta	2	4.44	0.30	0.61	5.05	0.67
Dodecatheon pulchellum	1	2.22	0.20	0.40	2.63	0.63
Potentilla anserina	1	2.22	0.20	0.40	2.63	0.63
Equisetum laevigatum	1	2.22	0.10	0.20	2.42	0.32
Cirsium arvense	4	8.89	1.10	2.22	11.11	1.73
Aster falcatus	2	4.44	0.20	0.40	4.85	0.42
Smilacina stellata	2	4.44	1.10	2.22	6.67	3.14
Agropyron sp.	1	2.22	1.00	2.02	4.24	3.16

Table 80. Transect 16AC (Cont.) Dutchman Property 16AC

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Taraxacum officinale	1	2.22	0.10	0.20	2.42	0.32
Astragalus sp.	2	4.44	0.70	1.41	5.86	1.49
Solidago canadensis	1	2.22	0.80	1.62	3.84	2.53
Totals	45	100.00	49.50	100.00	200.00	

Table 81. Transect 16AD Dutchman Property16AD

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron repens	10	27.78	40.50	56.25	84.03	29.01
Juncus balticus littoralis	7	19.44	9.50	13.19	32.64	13.08
Taraxacum officinale	4	11.11	0.70	0.97	12.08	0.95
Cirsium arvense	2	5.56	0.40	0.56	6.11	0.84
Potentilla anserina	1	2.78	0.10	0.14	2.92	0.32
Equisetum laevigatum	3	8.33	0.40	0.56	8.89	0.70
Poa nevadensis	7	19.44	19.80	27.50	46.94	23.67
Carex sp.	1	2.78	0.40	0.56	3.33	1.26
Plantago eriopoda	1	2.78	0.20	0.28	3.06	0.63
Totals	36	100.00	72.00	100.00	200.00	

Table 82. Transect 16AE Dutchman Property 16AE

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron sp.	2	7.14	0.80	5.97	13.11	1.75
Alopecurus pratensis.	10	35.71	6.20	46.27	81.98	5.67
Juncus balticus littoralis	10	35.71	5.20	38.81	74.52	5.81
Cirsium arvense	3	10.71	0.80	5.97	16.68	1.32
Taraxacum officinale	2	7.14	0.30	2.24	9.38	0.67
Poa pratensis	1	3.57	0.10	0.75	4.32	0.32
Totals	28	100.00	13.40	100.00	200.00	

Table 83. Transect 16BF Dutchman Property 16BF

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron sp.	5	11.36	9.00	12.68	24.04	14.30
Poa pratensis	2	4.55	0.30	0.42	4.97	0.67
Alopecurus pratensis	1	2.27	0.50	0.70	2.98	1.58
Rumex sp.	1	2.27	0.50	0.70	2.98	1.58
Juncus balticus littoralis	6	13.64	29.00	40.85	54.48	31.43
Carex nebrascensis	1	2.27	0.60	0.85	3.12	1.90
Cirsium arvense	6	13.64	2.60	3.66	17.30	3.24
Angelica arguta	1	2.27	0.10	0.14	2.41	0.32
Solidago gigantea	2	4.55	0.50	0.70	5.25	1.08
Carex sp.	1	2.27	0.40	0.56	2.84	1.26
Agropyron sp.	6	13.64	23.40	32.96	46.59	32.48
Unidentified Dicot	1	2.27	0.10	0.14	2.41	0.32
Equisetum laevigatum	2	4.55	0.40	0.56	5.11	0.97
Carex sp.	2	4.55	0.20	0.28	4.83	0.42
Taraxacum officinale	1	2.27	0.10	0.14	2.41	0.32

Table 83. Transect 16BF (Cont.) Dutchman Property 16BF

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Potentilla anserina	2	4.55	2.20	3.10	7.64	6.29
Helianthus sp.	1	2.27	0.10	0.14	2.41	0.32
Smilacina stellata	1	2.27	0.50	0.70	2.98	1.58
Dodecatheon pulchellum	1	2.27	0.40	0.56	2.84	1.26
Erigeron sp.	1	2.27	0.10	0.14	2.41	0.32
Totals	44	100.00	71.00	100.00	200.00	

Table 84. Transect 16BG Dutchman Property 16BG

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	17.24	49.00	49.85	67.09	26.23
Poa pratensis	2	3.45	0.40	0.41	3.86	0.97
Agropyron sp.	5	8.62	31.50	32.04	40.67	33.83
Cirsium arvense	6	10.34	2.70	2.75	13.09	3.23
Smilacina stellata	3	5.17	1.20	1.22	6.39	1.99
Taraxacum officinale	1	1.72	0.10	0.10	1.83	0.32
Equisetum laevigatum	1	1.72	0.10	0.10	1.83	0.32
Potentilla anserina	8	13.79	1.70	1.73	15.52	1.06
Conyza canadensis	1	1.72	0.20	0.20	1.93	0.63
Solidago gigantea	6	10.34	2.10	2.14	12.48	3.18
Unidentified Dicot	1	1.72	0.10	0.10	1.83	0.32
Carex sp.	1	1.72	0.20	0.20	1.93	0.63
Salix sp.	1	1.72	4.00	4.07	5.79	12.65
Salix lutea	1	1.72	0.80	0.81	2.54	2.53
Calamagrostis stricta	4	6.90	3.30	3.36	10.25	9.39
Carex nebrascensis	3	5.17	0.30	0.31	5.48	0.48
Agropyron sp.	1	1.72	0.10	0.10	1.83	0.32
Aster sp.	2	3.45	0.40	0.41	3.86	0.97
Deschampsia cespitosa	1	1.72	0.10	0.10	1.83	0.32
Totals	58	100.00	98.30	100.00	200.00	

Table 85. Transect 16BH Dutchman Property 16BH

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron elongatum	1	2.78	0.50	1.26	4.04	1.58
Juncus balticus littoralis	8	22.22	15.70	39.65	61.87	21.25
Alopecurus pratensis	10	27.78	15.20	38.38	66.16	16.70
Solidago sp.	1	2.78	0.10	0.25	3.03	0.32
Carex nebrascensis	7	19.44	1.90	4.80	24.24	1.79
Calamagrostis stricta	3	8.33	5.00	12.63	20.96	12.47
Angelica arguta	2	5.56	0.20	0.51	6.06	0.42
Aster sp.	3	8.33	0.50	1.26	9.60	0.85
Potentilla anserina	1	2.78	0.50	1.26	4.04	1.58
Totals	36	100.00	39.60	100.00	200.00	

Table 86. Transect 16BI Dutchman Property 16BI

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Alopecurus pratensis	10	22.73	38.00	49.03	71.76	14.94
Juncus balticus littoralis	10	22.73	30.50	39.35	62.08	15.89
Solidago missouriensis	8	18.18	4.40	5.68	23.86	3.86
Cirsium arvense	9	20.45	3.00	3.87	24.33	3.27
Smilacina stellata	5	11.36	1.40	1.81	13.17	3.06
Forb composite	1	2.27	0.10	0.13	2.40	0.32
Triglochin palustris	1	2.27	0.10	0.13	2.40	0.32
Totals	44	100.00	77.50	100.00	200.00	

Table 87. Transect 19A Dutchman Property 19A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	9	13.24	28.00	27.24	40.47	24.52
Salix candida	1	1.47	0.50	0.49	1.96	1.58
Dodecatheon pulchellum	8	11.76	5.10	4.96	16.73	4.01
Potentilla anserina	10	14.71	11.50	11.19	25.89	26.17
Deschampsia cespitosa	3	4.41	10.30	10.02	14.43	21.47
Agrostis stolonifera	6	8.82	21.50	20.91	29.74	24.50
Smilacina stellata	9	13.24	4.00	3.89	17.13	2.67
Aster falcatus	2	2.94	0.30	0.29	3.23	0.67
Allium schoenoprasum	2	2.94	0.30	0.29	3.23	0.67
Taraxacum officinale	1	1.47	0.10	0.10	1.57	0.32
Solidago sp.	2	2.94	0.20	0.19	3.14	0.42
Poa nevadensis	6	8.82	19.70	19.16	27.99	28.18
Carex sp.	1	1.47	0.10	0.10	1.57	0.32
Zigadenus elegans	3	4.41	0.60	0.58	5.00	1.26
Iris missouriensis	2	2.94	0.20	0.19	3.14	0.42
Equisetum laevigatum	2	2.94	0.20	0.19	3.14	0.42
Potentilla sp.	1	1.47	0.20	0.19	1.67	0.63
Totals	68	100.00	102.80	100.00	200.00	

Table 88. Transect 19B Dutchman Property 19B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Deschampsia cespitosa	1	1.52	2.50	3.60	5.11	7.91
Juncus balticus littoralis	6	9.09	5.30	7.63	16.72	6.46
Potentilla anserina	8	12.12	2.40	3.45	15.57	1.65
Solidago gigantea	2	3.03	0.50	0.72	3.75	1.08
Carex sp.	1	1.52	0.30	0.43	1.95	0.95
Agrostis stolonifera	9	13.64	38.00	54.68	68.31	23.83
Smilacina stellata	9	13.64	3.70	5.32	18.96	3.06
Taraxacum officinale	3	4.55	2.00	2.88	7.42	4.69
Aster falcatus	3	4.55	1.90	2.73	7.28	3.41
Dodecatheon pulchellum	5	7.58	7.90	11.37	18.94	13.78
Cirsium arvense	3	4.55	0.60	0.86	5.41	0.97
Plantago eriopoda	5	7.58	1.20	1.73	9.30	1.32
Gentiana sp.	2	3.03	0.20	0.29	3.32	0.42

Table 88. Transect 19B (Cont.) Dutchman Property 19B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Zigadenus elegans	3	4.55	1.90	2.73	7.28	4.68
Equisetum laevigatum	1	1.52	0.20	0.29	1.80	0.63
Festuca occidentalis	1	1.52	0.20	0.29	1.80	0.63
Haplopappus uniflorus	2	3.03	0.40	0.58	3.61	0.84
Allium schoenoprasum	1	1.52	0.10	0.14	1.66	0.32
Iris missouriensis	1	1.52	0.20	0.29	1.80	0.63
Totals	66	100.00	69.50	100.00	200.00	

Table 89. Transect 19C Dutchman Property 19C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix planifolia	8	11.43	11.10	14.98	26.41	9.93
Dodecatheon pulchellum	6	8.57	4.50	6.07	14.64	5.66
Salix candida	7	10.00	1.50	2.02	12.02	1.43
Taraxacum officinale	2	2.86	0.40	0.54	3.40	0.97
Juncus balticus littoralis	10	14.29	49.00	66.13	80.41	24.81
Juncus longistylis	1	1.43	0.20	0.27	1.70	0.63
Carex sp.	2	2.86	0.60	0.81	3.67	1.58
Triglochin sp.	1	1.43	0.10	0.13	1.56	0.32
Deschampsia cespitosa	3	4.29	0.70	0.94	5.23	1.57
Agropyron sp.	3	4.29	0.30	0.40	4.69	0.48
Agrostis stolonifera	4	5.71	0.90	1.21	6.93	1.60
Aster sp.	3	4.29	0.60	0.81	5.10	1.26
Sisyrinchium montanum	1	1.43	0.10	0.13	1.56	0.32
Potentilla anserina	7	10.00	1.70	2.29	12.29	1.77
Carex nebrascensis	4	5.71	0.80	1.08	6.79	1.14
Equisetum laevigatum	1	1.43	0.10	0.13	1.56	0.32
Solidago sp.	3	4.29	0.80	1.08	5.37	1.62
Composite	2	2.86	0.30	0.40	3.26	0.67
Carex utriculata	1	1.43	0.30	0.40	1.83	0.95
Glyceria striata	1	1.43	0.10	0.13	1.56	0.32
Totals	70	100.00	74.10	100.00	200.00	

Table 90. Transect 19D Dutchman Property 19D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix bebbiana	3	4.05	4.50	4.55	8.61	8.64
Juncus balticus littoralis	10	13.51	68.00	68.83	82.34	12.95
Carex nebrascensis	6	8.11	0.90	0.91	9.02	0.88
Dodecatheon pulchellum	10	13.51	10.90	11.03	24.55	14.82
Deschampsia cespitosa	3	4.05	0.50	0.51	4.56	0.85
Potentilla anserina	9	12.16	2.20	2.23	14.39	1.48
Aster sp.	3	4.05	0.40	0.40	4.46	0.70
Solidago gigantea	2	2.70	0.20	0.20	2.91	0.42
Calamagrostis stricta	5	6.76	3.20	3.24	10.00	6.11
Carex sp.	2	2.70	0.40	0.40	3.11	0.97
Castilleja sulphurea	1	1.35	0.20	0.20	1.55	0.63

Table 90. Transect 19D (Cont.) Dutchman Property 19D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix candida	2	2.70	1.20	1.21	3.92	3.16
Zigadenus elegans	1	1.35	0.10	0.10	1.45	0.32
Smilacina stellata	7	9.46	3.30	3.34	12.80	3.50
Agrostis stolonifera	5	6.76	1.10	1.11	7.87	1.29
Agropyron sp.	1	1.35	0.10	0.10	1.45	0.32
Cirsium arvense	1	1.35	0.10	0.10	1.45	0.32
Taraxacum officinale	2	2.70	0.70	0.71	3.41	1.64
Muhlenbergia sp.	1	1.35	0.80	0.81	2.16	2.53
Totals	74	100.00	98.80	100.00	200.00	

Table 91. Transect 19E Dutchman Property 19E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	8	13.79	24.80	29.99	43.78	26.11
Plantago eriopoda	10	17.24	30.20	36.52	53.76	18.66
Aster falcatus	9	15.52	4.20	5.08	20.60	3.79
Juncus balticus littoralis	4	6.90	3.00	3.63	10.52	4.83
Festuca occidentalis	10	17.24	16.30	19.71	36.95	24.09
Potentilla anserina	1	1.72	0.50	0.60	2.33	1.58
Smilacina stellata	4	6.90	0.60	0.73	7.62	0.84
Dodecatheon pulchellum	1	1.72	0.10	0.12	1.85	0.32
Cirsium arvense	2	3.45	0.30	0.36	3.81	0.67
Equisetum arvense	3	5.17	0.40	0.48	5.66	0.70
Equisetum laevigatum	1	1.72	0.20	0.24	1.97	0.63
Agropyron sp.	2	3.45	0.70	0.85	4.29	1.64
Spartina gracilis	1	1.72	1.00	1.21	2.93	3.16
Lepidium chalepense	2	3.45	0.40	0.48	3.93	0.84
Totals	58	100.00	82.70	100.00	200.00	

Table 92. Transect 19F Dutchman Property 19F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	9	11.84	16.50	24.30	36.14	12.26
Juncus balticus littoralis	6	7.89	7.50	11.05	18.94	12.91
Zigadenus elegans	1	1.32	0.30	0.44	1.76	0.95
Plantago eriopoda	7	9.21	16.40	24.15	33.36	17.88
Smilacina stellata	7	9.21	1.70	2.50	11.71	1.89
Potentilla anserina	4	5.26	2.00	2.95	8.21	3.30
Dodecatheon pulchellum	4	5.26	1.90	2.80	8.06	3.31
Phlox kelseyi	6	7.89	8.30	12.22	20.12	10.38
Helianthus sp. tall	3	3.95	0.80	1.18	5.13	1.48
Aster falcatus	4	5.26	0.80	1.18	6.44	1.03
Equisetum arvense	3	3.95	0.40	0.59	4.54	0.70
Festuca occidentalis	3	3.95	1.00	1.47	5.42	1.76
Gentiana sp.	1	1.32	0.10	0.15	1.46	0.32
Lepidium chalepense	1	1.32	0.10	0.15	1.46	0.32
Haplopappus uniflorus	2	2.63	0.40	0.59	3.22	0.84
Cirsium arvense	4	5.26	0.90	1.33	6.59	1.37

Table 92. Transect 19F (Cont.) Dutchman Property 19F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Gentiana sp.	1	1.32	0.10	0.15	1.46	0.32
Agropyron sp.	1	1.32	0.50	0.74	2.05	1.58
Salix boothii	3	3.95	2.30	3.39	7.33	4.79
Triglochin maritima	2	2.63	1.00	1.47	4.10	2.54
Equisetum laevigatum	1	1.32	0.10	0.15	1.46	0.32
Solidago canadensis	1	1.32	0.30	0.44	1.76	0.95
Carex sp.	1	1.32	2.50	3.68	5.00	7.91
Deschampsia cespitosa	1	1.32	1.50	2.21	3.52	4.74
Angelica arguta	1	1.32	0.10	0.15	1.46	0.32
Solidago gigantea	1	1.32	0.10	0.15	1.46	0.32
Parnassia parviflora	1	1.32	0.10	0.15	1.46	0.32
Salix candida	1	1.32	0.20	0.29	1.61	0.63
Totals	76	105.26	67.90	100.00	205.26	

Table 93. Transect 20A Dutchman Property 20A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	13.51	71.50	59.58	73.10	15.28
Calamagrostis stricta	4	5.41	3.10	2.58	7.99	5.32
Scirpus acutus	1	1.35	0.40	0.33	1.68	1.26
Triglochin palustris	1	1.35	0.30	0.25	1.60	0.95
Carex sp.(1)	5	6.76	2.40	2.00	8.76	3.72
Carex sp.(2)	1	1.35	1.00	0.83	2.18	3.16
Salix candida	4	5.41	3.90	3.25	8.66	7.85
Salix boothii	7	9.46	13.90	11.58	21.04	14.27
Aster sp.	8	10.81	1.70	1.42	12.23	1.77
Thalictrum alpinum	4	5.41	14.00	11.67	17.07	18.38
Zigadenus elegans	3	4.05	1.10	0.92	4.97	2.51
Dodecatheon pulchellum	5	6.76	3.20	2.67	9.42	7.71
Betula occidentalis	1	1.35	0.10	0.08	1.43	8.42
Castilleja sulphurea	2	2.70	0.30	0.25	2.95	0.11
Equisetum laevigatum	3	4.05	0.40	0.33	4.39	0.61
Taraxacum officinale	1	1.35	0.10	0.08	1.43	0.32
Smilacina stellata	2	2.70	0.20	0.17	2.87	0.42
Solidago gigantea	3	4.05	0.30	0.25	4.30	0.48
Carex nebrascensis	3	4.05	0.30	0.25	4.30	0.48
Deschampsia cespitosa	2	2.70	0.20	0.17	2.87	0.42
Salix bebbiana	1	1.35	0.40	0.33	1.68	1.26
Muhlenbergia sp.	1	1.35	1.00	0.83	2.18	3.16
Equisetum arvense	1	1.35	0.10	0.08	1.43	0.32
Juncus longistylis	1	1.35	0.10	0.08	1.43	0.32
Totals	74	100.00	120.00	100.00	200.00	

Table 94. Transect 20B Dutchman Property 20B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex aquatilis altior	7	10.94	15.90	20.81	31.75	20.02
Carex nebrascensis	2	3.13	0.60	0.79	3.91	1.58
Calamagrostis stricta	3	4.69	0.90	1.18	5.87	1.52
Thalictrum alpinum	7	10.94	11.20	14.66	25.60	14.48
Salix lutea	3	4.69	0.70	0.92	5.60	1.25
Juncus balticus littoralis	10	15.63	27.00	35.34	50.97	14.18
Solidago sp.	1	1.56	0.10	0.13	1.69	0.32
Juncus longistylis	2	3.13	0.20	0.26	3.39	0.42
Salix candida	6	9.38	5.00	6.54	15.92	8.07
Carex sp.	1	1.56	0.10	0.13	1.69	0.32
Equisetum laevigatum	1	1.56	0.10	0.13	1.69	0.32
Deschampsia cespitosa	2	3.13	0.40	0.52	3.65	0.97
Aster falcatus	1	1.56	0.10	0.13	1.69	0.32
Smilacina stellata	1	1.56	0.10	0.13	1.69	0.32
Betula occidentalis	2	3.13	1.50	1.96	5.09	3.37
Salix planifolia	5	7.81	10.50	13.74	21.56	16.74
Dodecatheon pulchellum	2	3.13	0.30	0.39	3.52	0.67
Eriophorum gracile	1	1.56	0.10	0.13	1.69	0.32
Allium schoenoprasum	2	3.13	0.70	0.92	4.04	1.64
Trifolium sp.	2	3.13	0.20	0.26	3.39	0.42
Alopecurus pratensis	1	1.56	0.20	0.26	1.82	0.63
Potentilla anserina	1	1.56	0.40	0.52	2.09	1.26
Pedicularis groenlandica	1	1.56	0.10	0.13	1.69	0.32
Totals	64	100.00	76.40	100.00	200.00	

Table 95. Transect 20C Dutchman Property 20C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix bebbiana	1	1.47	4.00	4.71	6.18	12.65
Carex nebrascensis	2	2.94	2.70	3.18	6.12	7.86
Alopecurus pratensis	1	1.47	2.00	2.35	3.82	6.32
Sium suave	1	1.47	0.20	0.24	1.71	0.63
Juncus balticus littoralis	9	13.24	30.00	35.29	48.53	23.45
Salix boothii	5	7.35	3.20	3.76	11.12	4.73
Dodecatheon pulchellum	7	10.29	6.20	7.29	17.59	7.87
Carex sp.	6	8.82	4.40	5.18	14.00	6.15
Deschampsia cespitosa	3	4.41	1.40	1.65	6.06	3.13
Solidago gigantea	3	4.41	1.10	1.29	5.71	1.85
Potentilla anserina	6	8.82	1.50	1.76	10.59	1.43
Potentilla fruticosa	1	1.47	0.20	0.24	1.71	0.63
Smilacina stellata	3	4.41	2.10	2.47	6.88	4.72
Thalictrum alpinum	4	5.88	19.00	22.35	28.24	26.01
Equisetum laevigatum	1	1.47	0.10	0.12	1.59	0.32
Aster falcatus	1	1.47	0.20	0.24	1.71	0.63
Zigadenus elegans	5	7.35	2.10	2.47	9.82	3.14
Gentiana sp.	1	1.47	0.10	0.12	1.59	0.32
Sonchus arvensis	1	1.47	0.10	0.12	1.59	0.32
Triglochin maritima	2	2.94	0.50	0.59	3.53	1.08

Table 95. Transect 20C (Cont.) Dutchman Property 20C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Muhlenbergia richardsonis	2	2.94	2.50	2.94	5.88	6.35
Allium schoenoprasum	1	1.47	0.20	0.24	1.71	0.63
Salix candida	1	1.47	0.50	0.59	2.06	1.58
Helianthella uniflorus	1	1.47	0.50	0.59	2.06	1.58
Agrostis stolonifera	1	1.47	0.20	0.24	1.71	0.63
Totals	68	101.47	85.00	100.00	201.47	

Table 96. Transect 20D Dutchman Property 20D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	5	6.49	1.80	3.42	9.92	2.15
Dodecatheon pulchellum	3	3.90	3.10	5.89	9.79	7.85
Rosa woodsii	4	5.19	0.90	1.71	6.91	1.37
Agropyron sp.	8	10.39	7.50	14.26	24.65	5.89
Agrostis stolonifera	5	6.49	6.20	11.79	18.28	8.94
Allium schoenoprasum	1	1.30	0.20	0.38	1.68	0.63
Potentilla anserina	3	3.90	2.90	5.51	9.41	6.30
Zigadenus elegans	1	1.30	0.20	0.38	1.68	0.63
Potentilla fruticosa	3	3.90	6.20	11.79	15.68	15.70
Aster falcatus	9	11.69	2.50	4.75	16.44	2.37
Carex sp.	1	1.30	0.30	0.57	1.87	0.95
Sonchus arvensis	1	1.30	0.40	0.76	2.06	1.26
Helianthus sp.	2	2.60	0.40	0.76	3.36	0.84
Festuca occidentalis	6	7.79	5.00	9.51	17.30	5.46
Phlox kelseyi	1	1.30	0.50	0.95	2.25	1.58
Zizia aptera	1	1.30	0.30	0.57	1.87	0.95
Plantago eriopoda	7	9.09	7.00	13.31	22.40	7.80
Poa nevadensis	1	1.30	1.00	1.90	3.20	3.16
Smilacina stellata	3	3.90	1.70	3.23	7.13	3.33
Composite - unidentified	1	1.30	0.10	0.19	1.49	0.32
Cirsium arvense	3	3.90	0.50	0.95	4.85	0.97
Haplopappus uniflorus	5	6.49	2.70	5.13	11.63	3.43
Aster spp.	1	1.30	0.30	0.57	1.87	0.95
Gentiana sp.	2	2.60	0.30	0.57	3.17	0.67
Equisetum laevigatum	2	2.60	0.40	0.76	3.36	0.84
Symphoricarpos occidentalis	1	1.30	0.20	0.38	1.68	0.63
Totals	77	103.90	52.60	100.00	203.90	

Table 97. Transect 20E Dutchman Property 20E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Zizia aptera	2	3.45	0.20	0.40	3.85	0.42
Potentilla anserina	6	10.34	3.10	6.19	16.53	3.93
Poa nevadensis	2	3.45	1.00	2.00	5.44	2.11
Alopecurus pratensis	7	12.07	9.40	18.76	30.83	10.36
Agrostis stolonifera	4	6.90	1.40	2.79	9.69	2.12
Taraxacum officinale	7	12.07	1.90	3.79	15.86	1.91

Table 97. Transect 20E (Cont.) Dutchman Property 20E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	7	12.07	10.00	19.96	32.03	9.72
Potentilla fruticosa	1	1.72	0.10	0.20	1.92	0.32
Composite 1	2	3.45	0.50	1.00	4.45	1.08
Solidago sp.	1	1.72	0.10	0.20	1.92	0.32
Smilacina stellata	5	8.62	3.50	6.99	15.61	5.02
Carex sp.	1	1.72	0.40	0.80	2.52	1.26
Cirsium arvense	3	5.17	0.30	0.60	5.77	0.48
Aster falcatus	1	1.72	0.10	0.20	1.92	0.32
Trifolium longipes	1	1.72	0.30	0.60	2.32	0.95
Dodecatheon pulchellum	2	3.45	0.30	0.60	4.05	0.67
Helianthella uniflorus	1	1.72	0.10	0.20	1.92	0.32
Composite 2	1	1.72	0.10	0.20	1.92	0.32
Agropyron sp.	1	1.72	0.30	0.60	2.32	0.95
Potamogeton gramineus	1	1.72	0.50	1.00	2.72	1.58
Agrostis stolonifera	2	3.45	5.50	10.98	14.43	13.01
Smilacina stellata	3	5.17	1.70	3.39	8.57	3.33
Potentilla anserina	3	5.17	1.40	2.79	7.97	2.80
Cirsium arvense	2	3.45	0.30	0.60	4.05	0.67
Aster falcatus	3	5.17	2.80	5.59	10.76	7.83
Dodecatheon pulchellum	2	3.45	0.70	1.40	4.85	1.64
Agropyron sp.	3	5.17	1.00	2.00	7.17	1.76
Juncus balticus littoralis	2	3.45	1.50	2.99	6.44	3.37
Zigadenus elegans	1	1.72	0.20	0.40	2.12	0.63
Trifolium hybridum	1	1.72	0.10	0.20	1.92	0.32
Poa nevadensis	1	1.72	1.00	2.00	3.72	3.16
Festuca occidentalis	1	1.72	0.20	0.40	2.12	0.63
Plantago eriopoda	1	1.72	0.10	0.20	1.92	0.32
Totals	58	139.66	50.10	100.00	239.66	

Table 98. Transect 20F Dutchman Property 20F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Alopecurus pratensis	4	9.09	14.50	16.74	25.83	27.73
Juncus balticus littoralis	8	18.18	8.20	9.47	27.65	7.69
Cirsium arvense	7	15.91	1.60	1.85	17.76	1.65
Iris missouriensis	2	4.55	0.50	0.58	5.12	1.27
Agropyron repens	1	2.27	4.00	4.62	6.89	12.65
Bromus inermis	8	18.18	44.00	50.81	68.99	39.43
Poa nevadensis	3	6.82	8.50	9.82	16.63	16.67
Lysimachia sp.	1	2.27	0.10	0.12	2.39	0.32
Trifolium hybridum	2	4.55	0.20	0.23	4.78	0.42
Carex sp.	3	6.82	4.00	4.62	11.44	9.37
Linaria sp.	2	4.55	0.40	0.46	5.01	0.97
Plantago eriopoda	1	2.27	0.20	0.23	2.50	0.63
Equisetum laevigatum	1	2.27	0.20	0.23	2.50	0.63
Erysimum cheiranthoides	1	2.27	0.20	0.23	2.50	0.63
Totals	44	100.00	86.60	100.00	200.00	

Table 99. Transect 21A

Dutchman Wetland 21A

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	9	14.06	38.00	49.54	63.61	28.50
Cirsium arvense	10	15.63	5.80	7.56	23.19	7.21
Lepidium chalepense	6	9.38	2.00	2.61	11.98	2.05
Helianthella uniflorus	9	14.06	6.30	8.21	22.28	7.79
Potentilla anserina	6	9.38	9.00	11.73	21.11	13.45
Juncus balticus littoralis	6	9.38	10.50	13.69	23.06	16.53
Smilacina stellata	5	7.81	0.90	1.17	8.99	1.20
Equisetum arvense	1	1.56	0.30	0.39	1.95	0.95
Taraxacum officinale	2	3.13	0.20	0.26	3.39	0.42
Agropyron sp.	1	1.56	0.20	0.26	1.82	0.63
Equisetum laevigatum	1	1.56	0.10	0.13	1.69	0.32
Aster ericoides	3	4.69	0.60	0.78	5.47	1.07
Zigadenus elegans	1	1.56	0.10	0.13	1.69	0.32
Poa nevadensis	1	1.56	2.00	2.61	4.17	6.32
Populus tremuloides	2	3.13	0.50	0.65	3.78	1.08
Rosa woodsii	1	1.56	0.20	0.26	1.82	0.63
Totals	64	100.00	76.70	100.00	200.00	

Table 100. Transect 21B

Dutchman Wetland 21B

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Populus tremuloides	3	6.67	5.50	4.55	11.21	9.56
Juncus balticus littoralis	7	15.56	48.50	40.08	55.64	39.09
Agrostis stolonifera	6	13.33	12.50	10.33	23.66	24.41
Aster falcatus	5	11.11	1.40	1.16	12.27	2.01
Potentilla anserina	5	11.11	2.40	1.98	13.09	4.70
Cyperus sp.	1	2.22	0.10	0.08	2.30	0.32
Salix boothii	6	13.33	23.30	19.26	32.59	28.98
Carex nebrascensis	2	4.44	1.50	1.24	5.68	3.37
Calamagrostis stricta	8	17.78	25.50	21.07	38.85	29.48
Equisetum laevigatum	1	2.22	0.20	0.17	2.39	0.63
Triglochin maritima	1	2.22	0.10	0.08	2.30	0.32
Totals	45	100.00	121.00	100.00	200.00	

Table 101. Transect 21C

Dutchman Wetland 21C

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	20.00	61.00	43.73	63.73	33.48
Salix boothii	7	14.00	29.50	21.15	35.15	33.78
Smilacina stellata	2	4.00	0.70	0.50	4.50	1.64
Potentilla anserina	3	6.00	0.80	0.57	6.57	1.62
Aster falcatus	4	8.00	2.20	1.58	9.58	3.43
Carex nebrascensis	2	4.00	0.70	0.50	4.50	1.64
Agrostis stolonifera	10	20.00	22.10	15.84	35.84	29.82
Calamagrostis stricta	4	8.00	16.00	11.47	19.47	27.87
Salix wolfii	2	4.00	1.20	0.86	4.86	3.16
Triglochin maritima	1	2.00	0.20	0.14	2.14	0.63

Table 101. Transect 21C (Cont.) Dutchman Wetland 21C

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Dodecatheon pulchellum	1	2.00	0.20	0.14	2.14	0.63
Betula occidentalis	1	2.00	4.00	2.87	4.87	12.65
Equisetum laevigatum	1	2.00	0.20	0.14	2.14	0.63
Zigadenus elegans	1	2.00	0.20	0.14	2.14	0.63
Poa nevadensis	1	2.00	0.50	0.36	2.36	1.58
Totals	50	100.00	139.50	100.00	200.00	

Table 102. Transect 21D Dutchman Wetland 21D

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron sp.	9	23.08	29.80	55.29	78.36	26.35
Calamagrostis stricta	1	2.56	3.00	5.57	8.13	9.49
Agrostis stolonifera	8	20.51	12.70	23.56	44.07	16.21
Plantago eriopoda	3	7.69	0.30	0.56	8.25	0.48
Panicum capillare	4	10.26	0.40	0.74	11.00	0.52
Juncus balticus littoralis	6	15.38	4.00	7.42	22.81	4.19
Distichlis stricta	1	2.56	0.10	0.19	2.75	0.32
Hordeum jubatum	1	2.56	0.10	0.19	2.75	0.32
Equisetum laevigatum	1	2.56	0.10	0.19	2.75	0.32
Poa pratensis	2	5.13	0.20	0.37	5.50	0.42
Potentilla anserina	1	2.56	3.00	5.57	8.13	9.49
Composite	1	2.56	0.10	0.19	2.75	0.32
Lepidium chalepense	1	2.56	0.10	0.19	2.75	0.32
Totals	39	100.00	53.90	100.00	200.00	

Table 103. Transect 21E Dutchman Wetland 21E

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron sp.	6	12.77	4.00	7.23	20.00	6.38
Juncus balticus littoralis	10	21.28	34.00	61.48	82.76	16.30
Agrostis stolonifera	8	17.02	9.20	16.64	33.66	8.55
Calamagrostis stricta	2	4.26	0.40	0.72	4.98	0.84
Zigadenus elegans	5	10.64	0.90	1.63	12.27	1.10
Carex nebrascensis	1	2.13	0.20	0.36	2.49	0.63
Betula occidentalis	1	2.13	1.00	1.81	3.94	3.16
Salix candida	3	6.38	2.70	4.88	11.27	5.33
Salix boothii	2	4.26	0.50	0.90	5.16	1.08
Carex lanuginosa	1	2.13	0.30	0.54	2.67	0.95
Thalictrum alpinum	1	2.13	1.00	1.81	3.94	3.16
Triglochin maritima	1	2.13	0.20	0.36	2.49	0.63
Plantago eriopoda	2	4.26	0.30	0.54	4.80	0.67
Potentilla anserina	2	4.26	0.30	0.54	4.80	0.67
Aster falcatus	1	2.13	0.10	0.18	2.31	0.32
Aster sp.	1	2.13	0.20	0.36	2.49	0.63
Totals	47	100.00	55.30	100.00	200.00	

Table 104. Transect 21F

Dutchman Wetland 21F

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Poa nevadensis	8	19.05	7.00	6.29	25.34	11.99
Agrostis stolonifera	8	19.05	10.10	9.08	28.13	18.00
Agropyron sp.	6	14.29	2.10	1.89	16.17	2.18
Rosa woodsii	1	2.38	0.20	0.18	2.56	0.63
Calamagrostis stricta	9	21.43	71.00	63.85	85.28	33.81
Juncus balticus littoralis	8	19.05	18.20	16.37	35.41	24.13
Hierochloe odorata	2	4.76	2.60	2.34	7.10	7.88
Totals	42	100.00	111.20	100.00	200.00	

Table 105. Transect 22AA

Dutchman Property 22AA

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	9	14.06	60.50	60.38	74.44	28.13
Potentilla anserina	9	14.06	1.80	1.80	15.86	1.55
Smilacina stellata	2	3.13	0.50	0.50	3.62	1.08
Salix sp.	1	1.56	0.80	0.80	2.36	2.53
Calamagrostis stricta	5	7.81	12.00	11.98	19.79	14.57
Agrostis stolonifera	2	3.13	3.50	3.49	6.62	7.47
Aster sp.	7	10.94	5.00	4.99	15.93	7.01
Carex nebrascensis	5	7.81	0.80	0.80	8.61	0.92
Taraxacum officinale	6	9.38	0.70	0.70	10.07	0.67
Deschampsia cespitosa	2	3.13	0.50	0.50	3.62	1.08
Salix lutea	4	6.25	10.00	9.98	16.23	14.34
Carex sp.	1	1.56	0.10	0.10	1.66	0.32
Helianthella uniflorus	1	1.56	0.10	0.10	1.66	0.32
Zigadenus elegans	2	3.13	0.30	0.30	3.42	0.67
Triglochin maritima	3	4.69	0.30	0.30	4.99	0.48
Salix bebbiana	1	1.56	2.50	2.50	4.06	7.91
Equisetum laevigatum	1	1.56	0.10	0.10	1.66	0.32
Galium sp.	1	1.56	0.20	0.20	1.76	0.63
Muhlenbergia sp.	1	1.56	0.20	0.20	1.76	0.63
Agropyron sp.	1	1.56	0.30	0.30	1.86	0.95
Totals	64	100.00	100.20	100.00	200.00	

Table 106. Transect 22AB

Dutchman Property 22AB

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	17.54	57.00	59.38	76.92	10.59
Salix lutea	7	12.28	16.90	17.60	29.88	19.96
Potentilla anserina	8	14.04	8.10	8.44	22.47	9.64
Calamagrostis stricta	2	3.51	5.00	5.21	8.72	10.80
Carex nebrascensis	1	1.75	0.10	0.10	1.86	0.32
Helianthella uniflorus	1	1.75	0.10	0.10	1.86	0.32
Aster sp.	8	14.04	2.10	2.19	16.22	2.08
Smilacina stellata	3	5.26	0.90	0.94	6.20	1.91
Taraxacum officinale	1	1.75	0.10	0.10	1.86	0.32
Triglochin maritima	2	3.51	0.20	0.21	3.72	0.42

Table 106. Transect 22AB (Cont.) Dutchman Property 22AB

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Zigadenus elegans	1	1.75	0.10	0.10	1.86	0.32
Agrostis stolonifera	2	3.51	0.80	0.83	4.34	1.75
Cirsium arvense	1	1.75	0.10	0.10	1.86	0.32
Dodecatheon pulchellum	2	3.51	0.30	0.31	3.82	0.67
Deschampsia cespitosa	2	3.51	0.40	0.42	3.93	0.97
Salix bebbiana	1	1.75	3.00	3.13	4.88	9.49
Aster falcatus	2	3.51	0.30	0.31	3.82	0.67
Salix candida	2	3.51	0.40	0.42	3.93	0.97
Muhlenbergia sp.	1	1.75	0.10	0.10	1.86	0.32
Totals	57	100.00	96.00	100.00	200.00	

Table 107. Transect 22AC Dutchman Property 22AC

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	11.76	29.50	31.18	42.95	13.83
Thalictrum alpinum	9	10.59	27.80	29.39	39.98	19.88
Potentilla anserina	4	4.71	0.50	0.53	5.23	0.71
Dodecatheon pulchellum	7	8.24	1.70	1.80	10.03	1.95
Salix candida	7	8.24	5.30	5.60	13.84	6.78
Salix boothii	4	4.71	3.40	3.59	8.30	6.38
Zigadenus elegans	7	8.24	1.50	1.59	9.82	1.51
Equisetum laevigatum	2	2.35	0.30	0.32	2.67	0.67
Helianthella uniflorus	2	2.35	0.30	0.32	2.67	0.67
Carex sp.	4	4.71	4.40	4.65	9.36	8.26
Triglochin maritima	7	8.24	1.00	1.06	9.29	0.82
Salix lutea	3	3.53	2.50	2.64	6.17	5.06
Taraxacum officinale	3	3.53	0.40	0.42	3.95	0.70
Juncus sp.	1	1.18	0.40	0.42	1.60	1.26
Carex lanuginosa	4	4.71	9.80	10.36	15.07	21.79
Deschampsia cespitosa	2	2.35	0.40	0.42	2.78	0.84
Carex nebrascensis	1	1.18	0.20	0.21	1.39	0.63
Juncus longistylis	2	2.35	0.40	0.42	2.78	0.84
Triglochin palustris	2	2.35	0.40	0.42	2.78	0.84
Agropyron sp.	1	1.18	0.10	0.11	1.28	0.32
Distichlis stricta	1	1.18	4.00	4.23	5.40	12.65
Haplopappus uniflorus	1	1.18	0.10	0.11	1.28	0.32
Plantago eriopoda	1	1.18	0.20	0.21	1.39	0.63
Totals	85	100.00	94.60	100.00	200.00	

Table 108. Transect 22AD Dutchman Property 22AD

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	9.17	38.00	34.99	44.17	9.19
Zigadenus elegans	10	9.17	3.90	3.59	12.77	3.00
Potentilla anserina	10	9.17	9.80	9.02	18.20	7.86
Agrostis stolonifera	10	9.17	23.00	21.18	30.35	11.35
Deschampsia cespitosa	2	1.83	0.40	0.37	2.20	0.84

Table 108. Transect 22AD (Cont.) Dutchman Property 22AD

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Aster falcatus	7	6.42	2.10	1.93	8.36	1.91
Aster sp.	5	4.59	5.10	4.70	9.28	7.32
Sonchus arvensis	1	0.92	0.10	0.09	1.01	0.32
Equisetum laevigatum	5	4.59	0.60	0.55	5.14	0.70
Helianthella uniflorus	2	1.83	0.20	0.18	2.02	0.42
Cirsium arvense	3	2.75	0.40	0.37	3.12	0.70
Dodecatheon pulchellum	7	6.42	7.00	6.45	12.87	13.05
Smilacina stellata	8	7.34	2.10	1.93	9.27	1.60
Taraxacum officinale	6	5.50	0.80	0.74	6.24	0.79
Calamagrostis stricta	3	2.75	5.00	4.60	7.36	9.72
Agropyron sp.	6	5.50	1.40	1.29	6.79	1.26
Salix bebbiana	1	0.92	0.20	0.18	1.10	0.63
Carex nebrascensis	1	0.92	0.10	0.09	1.01	0.32
Salix candida	1	0.92	0.30	0.28	1.19	0.95
Salix lutea	2	1.83	2.80	2.58	4.41	7.86
Solidago sp.	2	1.83	0.80	0.74	2.57	1.93
Helianthella uniflorus	1	0.92	0.30	0.28	1.19	0.95
Distichlis stricta	1	0.92	1.00	0.92	1.84	3.16
Plantago eriopoda	5	4.59	1.80	1.66	6.24	2.70
Triglochin maritima	1	0.92	0.10	0.09	1.01	0.32
Carex sp.	2	1.83	0.90	0.83	2.66	2.51
Allium schoenoprasum	2	1.83	0.40	0.37	2.20	0.84
Totals	109	104.59	108.60	100.00	204.59	

Table 109. Transect 22BE Dutchman Property 22BE

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Agrostis stolonifera	6	11.11	14.20	16.78	27.90	23.42
Salix boothii	9	16.67	13.10	15.48	32.15	11.34
Helianthella uniflorus	7	12.96	3.60	4.26	17.22	3.13
Salix candida	2	3.70	0.50	0.59	4.29	1.08
Potentilla anserina	8	14.81	2.70	3.19	18.01	2.83
Juncus balticus littoralis	10	18.52	47.50	56.15	74.67	30.02
Taraxacum officinale	2	3.70	0.30	0.35	4.06	0.67
Triglochin maritima	1	1.85	0.20	0.24	2.09	0.63
Deschampsia cespitosa	3	5.56	1.20	1.42	6.97	2.10
Calamagrostis stricta	1	1.85	0.50	0.59	2.44	1.58
Carex nebrascensis	3	5.56	0.60	0.71	6.26	1.07
Solidago gigantea	1	1.85	0.10	0.12	1.97	0.32
Agropyron sp.	1	1.85	0.10	0.12	1.97	0.32
Totals	54	100.00	84.60	100.00	200.00	

Table 110. Transect 22BF Dutchman Property 22BF

Dutchman Property			AVG	10		
SPECIES	AF	RF	AC	RC	IV	STD
Salix candida	5	7.14	2.60	3.25	10.39	2.99
Salix lutea	9	12.86	12.90	16.10	28.96	14.70

Table 110. Transect 22BF (Cont.) Dutchman Property 22BF

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	14.29	52.00	64.92	79.20	13.17
Aster falcatus	8	11.43	2.40	3.00	14.42	1.90
Potentilla anserina	8	11.43	1.80	2.25	13.68	1.48
Agrostis stolonifera	5	7.14	0.50	0.62	7.77	0.53
Sonchus arvensis	4	5.71	1.30	1.62	7.34	3.09
Calamagrostis stricta	5	7.14	2.20	2.75	9.89	3.29
Deschampsia cespitosa	3	4.29	0.90	1.12	5.41	1.66
Carex nebrascensis	4	5.71	0.80	1.00	6.71	1.32
Salix sp.	1	1.43	1.00	1.25	2.68	3.16
Eriophorum gracile	1	1.43	0.50	0.62	2.05	1.58
Distichlis stricta	1	1.43	0.10	0.12	1.55	0.32
Triglochin sp.	2	2.86	0.40	0.50	3.36	0.97
Smilacina stellata	1	1.43	0.20	0.25	1.68	0.63
Agropyron sp.	1	1.43	0.10	0.12	1.55	0.32
Aster sp.	2	2.86	0.40	0.50	3.36	0.97
Totals	70	100.00	80.10	100.00	200.00	

Table 111. Transect 22BG Dutchman Property 22BG

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	9	14.06	30.00	42.49	56.56	18.10
Zigadenus elegans	1	1.56	0.10	0.14	1.70	0.32
Smilacina stellata	4	6.25	1.20	1.70	7.95	1.75
Potentilla anserina	7	10.94	5.20	7.37	18.30	5.51
Equisetum laevigatum	2	3.13	0.20	0.28	3.41	0.42
Aster sp.	7	10.94	4.20	5.95	16.89	5.81
Carex sp.	3	4.69	0.60	0.85	5.54	0.97
Dodecatheon pulchellum	1	1.56	0.20	0.28	1.85	0.63
Carex nebrascensis	2	3.13	1.50	2.12	5.25	3.37
Salix boothii	5	7.81	10.50	14.87	22.69	12.79
Agrostis stolonifera	7	10.94	11.20	15.86	26.80	15.27
Agropyron sp.	1	1.56	0.20	0.28	1.85	0.63
Cirsium arvense	3	4.69	1.50	2.12	6.81	2.42
Salix candida	2	3.13	1.20	1.70	4.82	3.16
Solidago gigantea	1	1.56	0.20	0.28	1.85	0.63
Calamagrostis stricta	1	1.56	0.20	0.28	1.85	0.63
Viola sp.	1	1.56	0.10	0.14	1.70	0.32
Salix lutea	1	1.56	0.20	0.28	1.85	0.63
Haplopappus uniflorus	3	4.69	0.60	0.85	5.54	0.97
Taraxacum officinale	2	3.13	1.20	1.70	4.82	3.16
Plantago eriopoda	1	1.56	0.30	0.42	1.99	0.95
Totals	64	100.00	70.60	100.00	200.00	

Table 112. Transect 22BH Dutchman Property 22BH

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix lutea	0	0.00	0.00	0.00	0.00	0.00
Juncus balticus littoralis	4	7.27	7.50	10.50	17.78	12.53
Helianthella uniflorus	10	18.18	37.50	52.52	70.70	17.68
Salix bebbiana	5	9.09	1.10	1.54	10.63	1.20
Salix boothii	2	3.64	1.00	1.40	5.04	2.11
Potentilla anserina	7	12.73	9.60	13.45	26.17	11.82
Smilacina stellata	3	5.45	0.90	1.26	6.72	1.73
Agrostis stolonifera	3	5.45	8.30	11.62	17.08	16.73
Zigadenus elegans	3	5.45	0.60	0.84	6.29	1.07
Equisetum arvense	1	1.82	0.10	0.14	1.96	0.32
Taraxacum officinale	3	5.45	0.90	1.26	6.72	1.66
Carex nebrascensis	1	1.82	0.20	0.28	2.10	0.63
Salix candida	1	1.82	0.50	0.70	2.52	1.58
Pedicularis groenlandica	2	3.64	0.60	0.84	4.48	1.26
Dodecatheon pulchellum	3	5.45	0.70	0.98	6.43	1.57
Schoenoplectus tabernaemontani	1	1.82	0.30	0.42	2.24	0.95
Deschampsia cespitosa	1	1.82	0.20	0.28	2.10	0.63
Agropyron sp.	1	1.82	0.50	0.70	2.52	1.58
Haplopappus uniflorus	1	1.82	0.50	0.70	2.52	1.58
Triglochin palustris	1	1.82	0.10	0.14	1.96	0.32
Equisetum laevigatum	1	1.82	0.10	0.14	1.96	0.32
Carex sp. dark	1	1.82	0.20	0.28	2.10	0.63
Totals	55	100.00	71.40	100.00	200.00	

Table 113. Transect 23AA Dutchman Property 23AA

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix candida	5	9.62	2.90	8.24	17.85	4.48
Salix planifolia	10	19.23	16.30	46.31	65.54	15.10
Typha latifolia	10	19.23	7.60	21.59	40.82	3.66
Carex sp.	5	9.62	1.60	4.55	14.16	3.10
Carex utriculata	1	1.92	0.10	0.28	2.21	0.32
Sium suave	1	1.92	0.10	0.28	2.21	0.32
Juncus balticus littoralis	3	5.77	1.10	3.13	8.89	1.85
Carex lanuginosa	2	3.85	0.40	1.14	4.98	0.97
Mentha arvensis	3	5.77	0.60	1.70	7.47	1.07
Unidentified Poaceae	2	3.85	0.20	0.57	4.41	0.42
Carex aquatilis altior	1	1.92	2.00	5.68	7.60	6.32
Carex nebrascensis	2	3.85	0.20	0.57	4.41	0.42
Potentilla fruticosa	1	1.92	0.10	0.28	2.21	0.32
Unidentified Forb	3	5.77	0.40	1.14	6.91	0.70
Agrostis stolonifera	1	1.92	0.10	0.28	2.21	0.32
Carex sp.	1	1.92	1.00	2.84	4.76	3.16
Triglochin palustris	1	1.92	0.50	1.42	3.34	1.58
Totals	52	100.00	35.20	100.00	200.00	

Table 114. Transect 23AB Dutchman Wetland 23AB

Dutchman Wetland SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix candida	7	12.07	6.00	12.99	25.06	6.45
Salix boothii	5	8.62	3.10	6.71	15.33	4.07
Carex aquatilis altior	7	12.07	15.80	34.20	46.27	21.70
Potentilla anserina	1	1.72	0.20	0.43	2.16	0.63
Solidago gigantea	3	5.17	0.40	0.87	6.04	0.70
Agrostis stolonifera	1	1.72	0.20	0.43	2.16	0.63
Deschampsia cespitosa	2	3.45	0.40	0.87	4.31	0.84
Parnassia parviflora	1	1.72	0.10	0.22	1.94	0.32
Juncus balticus littoralis	2	3.45	0.60	1.30	4.75	1.58
Triglochin maritima	6	10.34	2.50	5.41	15.76	3.27
Schoenoplectus tabernaemontani	6	10.34	5.70	12.34	22.68	5.81
Triglochin palustris	4	6.90	0.80	1.73	8.63	1.14
Eleocharis palustris	2	3.45	3.00	6.49	9.94	6.75
Juncus alpinus	2	3.45	0.30	0.65	4.10	0.67
Muhlenbergia glomerata	4	6.90	5.70	12.34	19.23	9.31
Potamogeton sp	1	1.72	0.20	0.43	2.16	0.63
Sium suave	1	1.72	0.20	0.43	2.16	0.63
Betula glandulosa	1	1.72	0.50	1.08	2.81	1.58
Salix drummondii	1	1.72	0.40	0.87	2.59	1.26
Pedicularis groenlandica	1	1.72	0.10	0.22	1.94	0.32
Totals	58	100.00	46.20	100.00	200.00	

Table 115. Transect 23AC Dutchman Property 23AC

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	12.50	64.00	53.65	66.15	14.10
Dodecatheon pulchellum	7	8.75	6.90	5.78	14.53	7.88
Potentilla anserina	3	3.75	0.80	0.67	4.42	1.32
Salix candida	7	8.75	8.70	7.29	16.04	9.57
Deschampsia cespitosa	10	12.50	3.50	2.93	15.43	4.14
Calamagrostis stricta	6	7.50	8.60	7.21	14.71	10.20
Carex sp.	2	2.50	1.20	1.01	3.51	3.16
Salix bebbiana	4	5.00	6.10	5.11	10.11	15.53
Zigadenus elegans	5	6.25	1.80	1.51	7.76	2.15
Muhlenbergia sp.	1	1.25	1.00	0.84	2.09	3.16
Thalictrum alpinum	3	3.75	7.50	6.29	10.04	12.30
Pedicularis groenlandica	3	3.75	0.70	0.59	4.34	1.16
Juncus longistylis	2	2.50	0.20	0.17	2.67	0.42
Carex sp.	4	5.00	6.00	5.03	10.03	8.10
Aster sp.	1	1.25	0.20	0.17	1.42	0.63
Solidago gigantea	4	5.00	0.70	0.59	5.59	1.06
Triglochin maritima	1	1.25	0.10	0.08	1.33	0.32
Allium schoenoprasum	1	1.25	0.20	0.17	1.42	0.63
Agrostis stolonifera	1	1.25	0.20	0.17	1.42	0.63
Carex sp.	1	1.25	0.30	0.25	1.50	0.95
Potentilla fruticosa	1	1.25	0.30	0.25	1.50	0.95
Agropyron sp.	2	2.50	0.20	0.17	2.67	0.42
Carex nebrascensis	1	1.25	0.10	0.08	1.33	0.32
Totals	80	100.00	119.30	100.00	200.00	

Table 116. Transect 23AD Dutchman Property 23AD

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix candida	9	12.68	9.00	12.78	25.46	9.88
Salix planifolia	6	8.45	2.00	2.84	11.29	2.26
Thalictrum alpinum	5	7.04	1.80	2.56	9.60	2.62
Carex sp.(1)	8	11.27	4.10	5.82	17.09	3.87
Solidago canadensis	1	1.41	0.10	0.14	1.55	0.32
Juncus balticus littoralis	10	14.08	43.50	61.79	75.87	14.73
Triglochin maritima	4	5.63	1.60	2.27	7.91	3.13
Carex nebrascensis	4	5.63	0.60	0.85	6.49	0.84
Zigadenus elegans	1	1.41	0.10	0.14	1.55	0.32
Deschampsia cespitosa	7	9.86	1.50	2.13	11.99	1.65
Glyceria striata	2	2.82	0.30	0.43	3.24	0.67
Eriophorum gracile	1	1.41	0.10	0.14	1.55	0.32
Calamagrostis stricta	6	8.45	2.70	3.84	12.29	3.27
Pedicularis groenlandica	1	1.41	0.10	0.14	1.55	0.32
Dodecatheon pulchellum	1	1.41	0.30	0.43	1.83	0.95
Carex sp.(2)	4	5.63	2.50	3.55	9.18	4.09
Sium suave	1	1.41	0.10	0.14	1.55	0.32
Totals	71	100.00	70.40	100.00	200.00	

Table 117. Transect 23BF Dutchman Property 23BF

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex sp.	5	7.35	1.20	1.35	8.71	1.69
Poa nevadensis	4	5.88	10.50	11.85	17.73	21.92
Juncus balticus littoralis	10	14.71	42.50	47.97	62.67	16.54
Salix candida	10	14.71	5.30	5.98	20.69	5.72
Aster falcatus	6	8.82	1.30	1.47	10.29	1.42
Salix planifolia	1	1.47	0.30	0.34	1.81	0.95
Calamagrostis stricta	3	4.41	0.40	0.45	4.86	0.70
Iris missouriensis	0	0.00	0.00	0.00	0.00	0.00
Triglochin maritima	1	1.47	0.20	0.23	1.70	0.63
Pedicularis groenlandica	1	1.47	0.60	0.68	2.15	1.90
Viola sp.	3	4.41	2.00	2.26	6.67	4.69
Carex sp.	3	4.41	1.30	1.47	5.88	3.13
Primula incana	1	1.47	0.10	0.11	1.58	0.32
Betula glandulosa	1	1.47	2.00	2.26	3.73	6.32
Zigadenus elegans	1	1.47	0.20	0.23	1.70	0.63
Dodecatheon pulchellum	7	10.29	6.30	7.11	17.40	6.11
Castilleja sulphurea	1	1.47	0.10	0.11	1.58	0.32
Agrostis stolonifera	2	2.94	3.00	3.39	6.33	6.75
Potentilla anserina	2	2.94	0.30	0.34	3.28	0.67
Thalictrum alpinum	1	1.47	0.60	0.68	2.15	1.90
Sonchus arvensis	1	1.47	0.30	0.34	1.81	0.95
Poa nevadensis	2	2.94	1.50	1.69	4.63	3.37
Salix lutea	1	1.47	0.30	0.34	1.81	0.95
Thalictrum sp.	1	1.47	5.00	5.64	7.11	15.81
Potentilla fruticosa	1	1.47	3.00	3.39	4.86	9.49

Table 117. Transect 23BF (Cont.) Dutchman Property 23BF

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Solidago sp.	1	1.47	0.20	0.23	1.70	0.63
Smilacina stellata	1	1.47	0.10	0.11	1.58	0.32
Totals	68	104.41	88.60	100.00	204.41	

Table 118. Transect 23BG Dutchman Property 23BG

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	18.52	16.70	26.22	44.74	11.97
Carex sp.	10	18.52	29.50	46.31	64.83	18.33
Salix candida	9	16.67	12.00	18.84	35.50	8.88
Potentilla anserina	2	3.70	0.60	0.94	4.65	1.58
Solidago gigantea	1	1.85	0.20	0.31	2.17	0.63
Triglochin maritima	7	12.96	1.40	2.20	15.16	1.26
Eriophorum gracile.	3	5.56	0.50	0.78	6.34	0.97
Dodecatheon pulchellum	2	3.70	0.30	0.47	4.17	0.67
Juncus alpinus	3	5.56	1.00	1.57	7.13	1.76
Lysimachia sp.	1	1.85	0.10	0.16	2.01	0.32
Salix boothii	1	1.85	0.20	0.31	2.17	0.63
Calamagrostis stricta	3	5.56	0.90	1.41	6.97	1.66
Salix drummondii	2	3.70	0.30	0.47	4.17	0.67
Totals	54	100.00	63.70	100.00	200.00	

Table 119. Transect 23 BH Dutchman Property 23BH

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	9	16.07	31.00	51.50	67.57	26.44
Salix lutea	3	5.36	1.60	2.66	8.01	2.84
Salix candida	10	17.86	13.30	22.09	39.95	12.09
Aster falcatus	3	5.36	0.40	0.66	6.02	0.70
Deschampsia cespitosa	6	10.71	0.90	1.50	12.21	0.88
Juncus longistylis	3	5.36	0.30	0.50	5.86	0.48
Dodecatheon pulchellum	3	5.36	2.30	3.82	9.18	4.85
Betula occidentalis	1	1.79	0.10	0.17	1.95	0.32
Potentilla anserina	2	3.57	0.20	0.33	3.90	0.42
Carex aquatilis altior	4	7.14	3.80	6.31	13.46	7.35
Carex sp.(1)	2	3.57	1.50	2.49	6.06	3.37
Triglochin maritima	2	3.57	0.30	0.50	4.07	0.67
Calamagrostis stricta	2	3.57	0.50	0.83	4.40	1.08
Carex nebraskensis	1	1.79	0.10	0.17	1.95	0.32
Salix planifolia	2	3.57	0.30	0.50	4.07	0.67
Carex sp.(2)	2	3.57	3.50	5.81	9.39	7.47
Eriophorum gracile	1	1.79	0.10	0.17	1.95	0.32
Totals	56	100.00	60.20	100.00	200.00	

Table 120. Transect 24AA Dutchman Property 24AA

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	21.28	52.00	56.96	78.23	20.44
Agrostis stolonifera	1	2.13	0.10	0.11	2.24	0.32
Calamagrostis stricta	9	19.15	20.10	22.02	41.16	16.87
Salix candida	6	12.77	5.10	5.59	18.35	6.52
Salix lutea	1	2.13	0.30	0.33	2.46	0.95
Triglochin maritima	3	6.38	0.30	0.33	6.71	0.48
Salix boothii	5	10.64	8.50	9.31	19.95	15.95
Carex sp.	4	8.51	0.80	0.88	9.39	1.14
Carex nebrascensis	6	12.77	3.70	4.05	16.82	7.66
Potentilla fruticosa	1	2.13	0.30	0.33	2.46	0.95
Pedicularis groenlandica	1	2.13	0.10	0.11	2.24	0.32
Totals	47	100.00	91.30	100.00	200.00	

Table 121. Transect 24AB Dutchman Property 24AB

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	19.23	51.50	47.16	66.39	25.17
Agrostis stolonifera	1	1.92	0.20	0.18	2.11	0.63
Calamagrostis stricta	8	15.38	24.00	21.98	37.36	21.32
Agropyron sp.	1	1.92	0.10	0.09	2.01	0.32
Salix candida	9	17.31	7.90	7.23	24.54	9.00
Salix boothii	8	15.38	19.30	17.67	33.06	19.76
Aster falcatus	1	1.92	0.10	0.09	2.01	0.32
Carex sp.	5	9.62	1.90	1.74	11.36	2.56
Thalictrum sp.	1	1.92	2.00	1.83	3.75	6.32
Triglochin maritima	2	3.85	0.30	0.27	4.12	0.67
Salix lutea	1	1.92	0.20	0.18	2.11	0.63
Zigadenus elegans	2	3.85	0.30	0.27	4.12	0.67
Carex nebraskensis	3	5.77	1.40	1.28	7.05	3.13
Totals	52	100.00	109.20	100.00	200.00	

Table 122. Transect 24AC Dutchman Property 24AC

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	20.83	92.50	85.65	106.48	7.17
Deschampsia cespitosa	3	6.25	0.50	0.46	6.71	0.85
Calamagrostis stricta	6	12.50	3.20	2.96	15.46	6.03
Salix candida	2	4.17	1.00	0.93	5.09	2.11
Triglochin maritima	3	6.25	0.30	0.28	6.53	0.48
Carex nebrascensis	5	10.42	0.70	0.65	11.06	0.82
Salix lutea	6	12.50	2.40	2.22	14.72	3.13
Salix sp.	5	10.42	4.70	4.35	14.77	6.73
Potentilla anserina	2	4.17	0.20	0.19	4.35	0.42
Aster sp.	1	2.08	0.10	0.09	2.18	0.32
Smilacina stellata	1	2.08	0.20	0.19	2.27	0.63
Rumex sp.	1	2.08	0.20	0.19	2.27	0.63
Agrostis stolonifera	1	2.08	0.50	0.46	2.55	1.58

Table 122. Transect 24AC (Cont.) Dutchman Property 24AC

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex sp.	1	2.08	0.50	0.46	2.55	1.58
Festuca idahoensis	1	2.08	1.00	0.93	3.01	3.16
Totals	48	100.00	108.00	100.00	200.00	

Table 123. Transect 24AD Dutchman Property 24AD

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron sp.	3	6.12	0.60	2.18	8.30	1.07
Festuca idahoensis	7	14.29	3.00	10.91	25.19	3.27
Plantago eriopoda	10	20.41	9.90	36.00	56.41	5.34
Aster sp.	3	6.12	0.80	2.91	9.03	1.32
Phlox kelseyi	4	8.16	0.90	3.27	11.44	1.37
Aster falcatus	6	12.24	1.10	4.00	16.24	1.29
Potentilla fruticosa	1	2.04	0.20	0.73	2.77	0.63
Agrostis stolonifera	7	14.29	7.10	25.82	40.10	6.66
Rosa woodsii	3	6.12	2.70	9.82	15.94	5.33
Equisetum laevigatum	2	4.08	0.20	0.73	4.81	0.42
Aster sp.	1	2.04	0.50	1.82	3.86	1.58
Glyceria striata	1	2.04	0.10	0.36	2.40	0.32
Smilacina stellata	1	2.04	0.40	1.45	3.50	1.26
Totals	49	100.00	27.50	100.00	200.00	

Table 124. Transect 24BE Dutchman Property 24BE

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	20.41	73.00	76.84	97.25	13.37
Calamagrostis stricta	7	14.29	4.50	4.74	19.02	9.07
Salix candida	5	10.20	3.00	3.16	13.36	6.15
Triglochin maritima	3	6.12	0.30	0.32	6.44	0.48
Carex sp.	2	4.08	0.80	0.84	4.92	1.75
Salix boothii	7	14.29	10.20	10.74	25.02	12.83
Dodecatheon pulchellum	3	6.12	0.50	0.53	6.65	0.97
Aster sp.	2	4.08	0.20	0.21	4.29	0.42
Potentilla anserina	2	4.08	0.20	0.21	4.29	0.42
Smilacina stellata	2	4.08	0.30	0.32	4.40	0.67
Agrostis stolonifera	1	2.04	1.00	1.05	3.09	3.16
Agropyron sp.	2	4.08	0.30	0.32	4.40	0.67
Salix lutea	1	2.04	0.30	0.32	2.36	0.95
Pedicularis groenlandica	1	2.04	0.30	0.32	2.36	0.95
Carex nebrascensis	1	2.04	0.10	0.11	2.15	0.32
Totals	49	100.00	95.00	100.00	200.00	

Table 125. Transect 24BF Dutchman Property24BF

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	14.49	73.00	72.93	87.42	8.23
Dodecatheon pulchellum	13	18.84	0.40	0.40	19.24	0.70
Salix candida	10	14.49	4.40	4.40	18.89	3.92
Pedicularis groenlandica	6	8.70	3.00	3.00	11.69	3.27
Carex nebrascensis	3	4.35	0.40	0.40	4.75	0.70
Carex aquatilis altior	4	5.80	0.90	0.90	6.70	1.37
Scirpus acutus	2	2.90	0.20	0.20	3.10	0.42
Salix lutea	6	8.70	8.50	8.49	17.19	15.94
Juncus longistylis	1	1.45	0.10	0.10	1.55	0.32
Calamagrostis stricta	9	13.04	8.50	8.49	21.53	5.64
Triglochin maritima	2	2.90	0.20	0.20	3.10	0.42
Aster falcatus	1	1.45	0.10	0.10	1.55	0.32
Zigadenus elegans	1	1.45	0.20	0.20	1.65	0.63
Rumex sp.	1	1.45	0.20	0.20	1.65	0.63
Totals	69	100.00	100.10	100.00	200.00	

Table 126. Transect 24BG Dutchman Property 24BG

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	4	7.14	10.50	13.53	20.67	21.92
Agropyron sp.	3	5.36	0.90	1.16	6.52	1.66
Festuca occidentalis	1	1.79	0.30	0.39	2.17	0.95
Plantago eriopoda	1	1.79	0.50	0.64	2.43	1.58
Potentilla anserina	3	5.36	1.30	1.68	7.03	2.58
Smilacina stellata	2	3.57	0.40	0.52	4.09	0.84
Aster falcatus	2	3.57	0.70	0.90	4.47	1.64
Distichlis stricta	1	1.79	0.50	0.64	2.43	1.58
Dodecatheon pulchellum	1	1.79	0.10	0.13	1.91	0.32
Helianthus sp.	1	1.79	0.30	0.39	2.17	0.95
Calamagrostis stricta	7	12.50	8.40	10.82	23.32	10.29
Juncus balticus littoralis	5	8.93	15.00	19.33	28.26	20.68
Deschampsia cespitosa	1	1.79	0.20	0.26	2.04	0.63
Galium boreale	1	1.79	0.80	1.03	2.82	2.53
Salix candida	3	5.36	5.80	7.47	12.83	12.90
Carex nebrascensis	5	8.93	5.20	6.70	15.63	12.35
Carex sp. dark	6	10.71	14.50	18.69	29.40	20.47
Carex aquatilis altior	3	5.36	3.00	3.87	9.22	6.32
Sium suave	1	1.79	0.20	0.26	2.04	0.63
Salix planifolia	2	3.57	8.50	10.95	14.53	25.17
Triglochin maritima	1	1.79	0.10	0.13	1.91	0.32
Juncus alpinus	1	1.79	0.20	0.26	2.04	0.63
Pedicularis groenlandica	1	1.79	0.20	0.26	2.04	0.63
Totals	56	100.00	77.60	100.00	200.00	

Table 127. Transect 24BH Dutchman Property 24BH

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	7	11.11	12.30	20.16	31.28	12.37
Plantago eriopoda	5	7.94	3.50	5.74	13.67	5.17
Phlox kelseyi	4	6.35	5.50	9.02	15.37	9.37
Festuca occidentalis	5	7.94	3.20	5.25	13.18	4.10
Aster falcatus	6	9.52	1.70	2.79	12.31	1.70
Agropyron sp.	3	4.76	0.60	0.98	5.75	0.97
Dodecatheon pulchellum	3	4.76	1.20	1.97	6.73	2.57
Zigadenus elegans	2	3.17	0.30	0.49	3.67	0.67
Helianthus - linear	5	7.94	3.40	5.57	13.51	5.13
Gentiana sp.	1	1.59	0.10	0.16	1.75	0.32
Dodecatheon pulchellum	1	1.59	0.20	0.33	1.92	0.63
Composite - red-vein rosette	1	1.59	0.20	0.33	1.92	0.63
Juncus balticus littoralis	4	6.35	21.50	35.25	41.60	30.92
Sisyrinchium montanum	1	1.59	0.10	0.16	1.75	0.32
Calamagrostis canadensis	1	1.59	1.50	2.46	4.05	4.74
Pedicularis	1	1.59	1.00	1.64	3.23	3.16
Salix boothii	2	3.17	1.30	2.13	5.31	3.20
Triglochin maritima	1	1.59	0.20	0.33	1.92	0.63
Juncus alpinus	1	1.59	0.50	0.82	2.41	1.58
Potentilla anserina	2	3.17	0.30	0.49	3.67	0.67
Primula incana	1	1.59	0.10	0.16	1.75	0.32
Deschampsia cespitosa	1	1.59	1.00	1.64	3.23	3.16
Lysimachia sp.	1	1.59	0.10	0.16	1.75	0.32
Calamagrostis stricta	1	1.59	0.20	0.33	1.92	0.63
Galium boreale	1	1.59	0.30	0.49	2.08	0.95
Thalictrum sp.	1	1.59	0.30	0.49	2.08	0.95
Composite - unk. Branched	1	1.59	0.40	0.66	2.24	1.26
Totals	63	100.00	61.00	100.00	200.00	

Table 128. Transect 25A Dutchman Property 25A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Typha latifolia	8	8.11	16.96	9.83	17.94	7.72
Carex sp.	7	7.66	63.79	36.98	44.63	12.11
Muhlenbergia glomerata	3	5.86	6.47	3.75	9.61	13.03
Scirpus acutus	3	5.86	6.52	3.78	9.64	7.98
Salix lutea	5	6.76	13.91	8.07	14.82	14.88
Carex nebrascensis	2	5.41	3.91	2.27	7.67	6.15
Carex aquatilis altior	4	6.31	3.66	2.12	8.43	3.11
Juncus balticus littoralis	7	7.66	51.45	29.83	37.48	5.91
Potentilla anserina	1	4.95	0.20	0.12	5.07	0.42
Salix candida	4	6.31	2.59	1.50	7.81	2.78
Aster sp.	1	4.95	0.33	0.19	5.14	0.75
Deschampsia cespitosa	1	4.95	0.20	0.12	5.07	0.42
Pedicularis groenlandica	1	4.95	0.21	0.12	5.08	0.45
Triglochin palustris	2	5.41	1.36	0.79	6.20	2.32
Angelica arguta	1	4.95	0.49	0.28	5.24	1.04
Triglochin maritima	1	4.95	0.23	0.13	5.09	0.48

Table 128. Transect 25A (Cont.) Dutchman Property 25A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Calamagrostis stricta	1	4.95	0.23	0.13	5.09	0.48
Totals	52	100.00	172.50	100.00	200.00	

Table 129. Transect 25B Dutchman Property 25B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Salix candida	9	10.38	7.38	4.02	14.40	2.76
Scirpus acutus	5	8.20	4.85	2.64	10.84	2.39
Juncus balticus littoralis	4	7.65	15.54	8.47	16.12	15.55
Carex sp.	9	10.38	126.84	69.12	79.50	26.06
Muhlenbergia glomerata	3	7.10	3.63	1.98	9.08	3.33
Dodecatheon pulchellum	4	7.65	10.01	5.46	13.11	8.22
Juncus longistylis	2	6.56	1.72	0.94	7.50	1.75
Salix boothii	5	8.20	8.59	4.68	12.88	6.33
Triglochin maritima	7	9.29	2.62	1.43	10.72	0.92
Solidago gigantea	2	6.56	0.87	0.48	7.03	0.97
Carex nebrascensis	1	6.01	0.80	0.44	6.45	0.95
Pedicularis groenlandica	1	6.01	0.40	0.22	6.23	0.63
Zigadenus elegans	1	6.01	0.24	0.13	6.14	0.32
Totals	53	100.00	183.50	100.00	200.00	

Table 130. Transect 25C Dutchman Property 25C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	18.52	90.50	68.46	86.98	23.86
Carex utriculata	3	5.56	4.20	3.18	8.73	8.68
Betula glandulosa	4	7.41	10.00	7.56	14.97	16.50
Potentilla fruticosa	4	7.41	1.40	1.06	8.47	2.07
Solidago canadensis	4	7.41	3.50	2.65	10.05	4.74
Viola sp.	5	9.26	2.40	1.82	11.07	3.34
Deschampsia cespitosa	3	5.56	0.90	0.68	6.24	1.66
Aster falcatus	2	3.70	1.30	0.98	4.69	3.20
Potentilla anserina	1	1.85	0.30	0.23	2.08	0.95
Salix boothii	3	5.56	5.30	4.01	9.56	10.42
Muhlenbergia glomerata	5	9.26	1.60	1.21	10.47	2.01
Salix boothii	1	1.85	6.00	4.54	6.39	18.97
Triglochin maritima	1	1.85	0.20	0.15	2.00	0.63
Mentha arvensis	1	1.85	0.20	0.15	2.00	0.63
Lepidium chalepense	1	1.85	1.50	1.13	2.99	4.74
Salix wolfii	1	1.85	1.00	0.76	2.61	3.16
Pedicularis groenlandicum	1	1.85	0.50	0.38	2.23	1.58
Utricularia sp.	1	1.85	0.50	0.38	2.23	1.58
Dodecatheon pulchellum	1	1.85	0.50	0.38	2.23	1.58
Distichlis stricta	2	3.70	0.40	0.30	4.01	0.84
Totals	54	100.00	132.20	100.00	200.00	

Table 131. Transect 25D Dutchman Property 25D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Carex sp.	10	15.63	42.00	57.14	72.77	26.58
Scirpus acutus	7	10.94	7.20	9.80	20.73	8.73
Salix boothii	5	7.81	1.90	2.59	10.40	2.73
Triglochin maritima	7	10.94	2.30	3.13	14.07	3.09
Salix candida	8	12.50	5.20	7.07	19.57	5.01
Potentilla anserina	2	3.13	0.80	1.09	4.21	1.75
Pedicularis groenlandica	7	10.94	3.70	5.03	15.97	3.80
Calamagrostis stricta	1	1.56	0.20	0.27	1.83	0.63
Dodecatheon pulchellum	3	4.69	1.80	2.45	7.14	3.36
Juncus longistylis	4	6.25	1.90	2.59	8.84	3.28
Deschampsia cespitosa	2	3.13	0.40	0.54	3.67	0.84
Juncus balticus littoralis	3	4.69	3.30	4.49	9.18	6.67
Gentiana sp.	1	1.56	0.10	0.14	1.70	0.32
Solidago gigantea	1	1.56	0.20	0.27	1.83	0.63
Eleocharis palustris	1	1.56	0.50	0.68	2.24	1.58
Eriophorum gracile	2	3.13	2.00	2.72	5.85	4.83
Totals	64	100.00	73.50	100.00	200.00	

Table 132. Transect 25E Dutchman Property 25E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	8	12.50	25.40	16.08	28.58	37.57
Scirpus acutus	9	14.06	74.00	46.84	60.90	35.34
Dodecatheon pulchellum	1	1.56	2.50	1.58	3.14	7.91
Salix wolfii	10	15.63	10.30	6.52	22.14	9.31
Carex praegracilis	7	10.94	19.20	12.15	23.09	26.81
Chara vulgaris	3	4.69	0.70	0.44	5.13	1.16
Muhlenbergia glomerata	9	14.06	12.20	7.72	21.78	12.76
Deschampsia cespitosa	2	3.13	0.40	0.25	3.38	0.84
Triglochin maritima	3	4.69	1.20	0.76	5.45	2.10
Thalictrum venulosum	1	1.56	2.00	1.27	2.83	6.32
Agrostis stolonifera	1	1.56	2.50	1.58	3.14	7.91
Pedicularis groenlandica	1	1.56	0.50	0.32	1.88	1.58
Eleocharis sp.	5	7.81	1.90	1.20	9.02	3.25
Potentilla anserina	1	1.56	0.20	0.13	1.69	0.63
Salix boothii	2	3.13	4.50	2.85	5.97	10.12
Carex spp.	1	1.56	0.50	0.32	1.88	1.58
Totals	64	100.00	158.00	100.00	200.00	

Table 133. Transect 25F Dutchman Property 25F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Scirpus acutus	8	10.53	11.30	14.36	24.88	12.37
Triglochin maritima	5	6.58	0.60	0.76	7.34	0.70
Salix candida	8	10.53	2.70	3.43	13.96	1.77
Salix lutea	6	7.89	5.10	6.48	14.38	7.29
Juncus balticus littoralis	6	7.89	20.50	26.05	33.94	19.50
Pedicularis groenlandica	7	9.21	1.50	1.91	11.12	1.27
Potentilla anserina	4	5.26	1.00	1.27	6.53	1.63

Table 133. Transect 25F (Cont.) Dutchman Property 25F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Angelica arguta	1	1.32	0.10	0.13	1.44	0.32
Agrostis stolonifera	1	1.32	1.60	2.03	3.35	5.06
Aster sp.	3	3.95	2.30	2.92	6.87	6.25
Taraxacum officinale	1	1.32	0.20	0.25	1.57	0.63
Equisetum laevigatum	1	1.32	0.10	0.13	1.44	0.32
Solidago sp.	1	1.32	1.50	1.91	3.22	4.74
Carex sp.	7	9.21	24.20	30.75	39.96	26.70
Plantago eriopoda	1	1.32	0.10	0.13	1.44	0.32
Juncus torreyi	2	2.63	0.30	0.38	3.01	0.67
Unidentified Dicot	2	2.63	0.20	0.25	2.89	0.42
Parnassia parviflora	6	7.89	0.70	0.89	8.78	0.67
Juncus nodosus	3	3.95	0.60	0.76	4.71	0.97
Muhlenbergia glomerata	2	2.63	4.00	5.08	7.71	8.76
Triglochin palustris	1	1.32	0.10	0.13	1.44	0.32
Totals	76	100.00	78.70	100.00	200.00	

Table 134. Transect 26A Dutchman Property 26A

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	15.87	67.00	38.51	54.38	29.83
Chara vulgaris	1	1.59	1.00	0.57	2.16	3.16
Carex spp.	6	9.52	5.90	3.39	12.91	8.06
Agrostis stolonifera	3	4.76	1.80	1.03	5.80	4.69
Potentilla anserina	5	7.94	0.80	0.46	8.40	0.92
Carex nebraskensis	3	4.76	1.40	0.80	5.57	3.13
Carex utriculata	1	1.59	0.50	0.29	1.87	1.58
Festuca idahoensis	1	1.59	0.20	0.11	1.70	0.63
Salix boothii	9	14.29	24.50	14.08	28.37	18.17
Salix wolfii	2	3.17	1.20	0.69	3.86	3.16
Eleocharis sp.	1	1.59	0.40	0.23	1.82	1.26
Typha latifolia	2	3.17	12.00	6.90	10.07	27.00
Carex praegracilis	9	14.29	48.00	27.59	41.87	34.90
Betula glandulosa	4	6.35	7.00	4.02	10.37	11.35
Triglochin maritima	3	4.76	0.60	0.34	5.11	0.97
Dodecatheon pulchellum	1	1.59	0.20	0.11	1.70	0.63
Pedicularis groenlandica	2	3.17	1.50	0.86	4.04	3.37
Totals	63	100.00	174.00	100.00	200.00	

Table 135. Transect 26B Dutchman Property 26B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agrostis stolonifera	7	7.78	6.50	6.33	14.11	8.77
Juncus balticus littoralis	10	11.11	60.50	58.91	70.02	16.06
Plantago eriopoda	4	4.44	2.10	2.04	6.49	4.65
Smilacina stellata	6	6.67	2.80	2.73	9.39	3.58
Dodecatheon pulchellum	9	10.00	4.70	4.58	14.58	3.86
Solidago sp.	6	6.67	2.70	2.63	9.30	3.20
Potentilla anserina	9	10.00	5.50	5.36	15.36	7.01

Table 135. Transect 26B (Cont.) Dutchman Property 26B

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Cirsium arvense	1	1.11	0.10	0.10	1.21	0.32
Aster sp.	6	6.67	1.00	0.97	7.64	0.94
Salix lutea	7	7.78	9.40	9.15	16.93	11.30
Cirsium arvense	1	1.11	0.10	0.10	1.21	0.32
Betula glandulosa	5	5.56	3.40	3.31	8.87	5.27
Taraxacum officinale	1	1.11	0.10	0.10	1.21	0.32
Pedicularis groenlandica	1	1.11	0.20	0.19	1.31	0.63
Salix candida	1	1.11	0.10	0.10	1.21	0.32
Zigadenus elegans	3	3.33	0.50	0.49	3.82	0.97
Agropyron sp.	1	1.11	0.10	0.10	1.21	0.32
Equisetum laevigatum	2	2.22	0.30	0.29	2.51	0.67
Carex sp.	1	1.11	0.20	0.19	1.31	0.63
Triglochin maritima	1	1.11	0.20	0.19	1.31	0.63
Carex rossii	0	0.00	0.00	0.00	0.00	0.00
Deschampsia cespitosa	5	5.56	1.50	1.46	7.02	2.12
Juncus torreyi	1	1.11	0.10	0.10	1.21	0.32
Carex nebraskensis	1	1.11	0.40	0.39	1.50	1.26
Salix boothii	1	1.11	0.20	0.19	1.31	0.63
Totals	90	100.00	102.70	100.00	200.00	

Table 136. Transect 26C Dutchman Property 26C

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	10	22.22	54.00	68.10	90.32	29.80
Salix candida	1	2.22	1.00	1.26	3.48	3.16
Salix boothii	6	13.33	7.20	9.08	22.41	11.07
Potentilla anserina	4	8.89	1.20	1.51	10.40	1.75
Solidago gigantea	5	11.11	0.60	0.76	11.87	0.70
Deschampsia cespitosa	3	6.67	0.90	1.13	7.80	1.66
Calamagrostis stricta	2	4.44	2.30	2.90	7.34	5.12
Carex nebraskensis	4	8.89	8.60	10.84	19.73	18.82
Carex sp.	1	2.22	0.30	0.38	2.60	0.95
Populus tremuloides	1	2.22	0.20	0.25	2.47	0.63
Agrostis stolonifera	1	2.22	0.30	0.38	2.60	0.95
Equisetum laevigatum	2	4.44	0.30	0.38	4.82	0.67
Carex utriculata	2	4.44	1.80	2.27	6.71	3.82
Taraxacum officinale	1	2.22	0.10	0.13	2.35	0.32
Dodecatheon pulchellum	1	2.22	0.30	0.38	2.60	0.95
Pedicularis groenlandica	1	2.22	0.20	0.25	2.47	0.63
Totals	45	100.00	79.30	100.00	200.00	

Table 137. Transect 26D Dutchman Property 26D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Festuca idahoensis	10	18.18	22.50	30.41	48.59	11.37
Plantago eriopoda	10	18.18	19.30	26.08	44.26	7.92
Equisetum laevigatum	7	12.73	1.70	2.30	15.02	1.49

Table 137. Transect 26D (Cont.) Dutchman Property 26D

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Agropyron sp.	5	9.09	3.10	4.19	13.28	4.15
Aster sp.	7	12.73	3.40	4.59	17.32	3.20
Spartina gracilis	4	7.27	0.60	0.81	8.08	0.84
Juncus balticus littoralis	6	10.91	2.40	3.24	14.15	3.31
Agrostis stolonifera	3	5.45	14.50	19.59	25.05	25.22
Potentilla fruticosa	3	5.45	6.50	8.78	14.24	11.56
Totals	55	100.00	74.00	100.00	200.00	

Table 138. Transect 26E Dutchman Property26E

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Juncus balticus littoralis	8	14.55	14.90	16.57	31.12	23.10
Plantago eriopoda	10	18.18	26.20	29.14	47.33	11.69
Equisetum laevigatum	7	12.73	0.80	0.89	13.62	0.63
Spartina gracilis	9	16.36	38.60	42.94	59.30	27.74
Aster sp.	6	10.91	1.00	1.11	12.02	1.05
Phleum sp.	1	1.82	0.10	0.11	1.93	0.32
Tragopogon sp.	5	9.09	0.50	0.56	9.65	0.53
Agropyron sp.	3	5.45	0.60	0.67	6.12	1.07
Solidago sp.	2	3.64	0.80	0.89	4.53	1.75
Smilacina stellata	1	1.82	0.10	0.11	1.93	0.32
Agropyron sp.	1	1.82	1.00	1.11	2.93	3.16
Festuca ovina	1	1.82	5.00	5.56	7.38	15.81
Rosa woodsii	1	1.82	0.30	0.33	2.15	0.95
Totals	55	100.00	89.90	100.00	200.00	

Table 139. Transect 26F Dutchman Property26F

Dutchman Property SPECIES	AF	RF	AVG AC	10 RC	IV	STD
Plantago eriopoda	10	20.41	16.70	23.86	44.27	6.50
Festuca idahoensis	10	20.41	43.00	61.43	81.84	29.19
Agropyron sp.	4	8.16	1.90	2.71	10.88	2.85
Phlox kelseyi	2	4.08	2.50	3.57	7.65	5.40
Equisetum laevigatum	7	14.29	1.20	1.71	16.00	0.92
Aster falcatus	6	12.24	1.20	1.71	13.96	1.55
Lepidium chalepense	1	2.04	0.50	0.71	2.76	1.58
Helianthella uniflorus	4	8.16	1.60	2.29	10.45	3.13
Smilacina stellata	2	4.08	0.20	0.29	4.37	0.42
Distichlis stricta	1	2.04	0.20	0.29	2.33	0.63
Juncus balticus littoralis	1	2.04	0.80	1.14	3.18	2.53
Plantago aristata	1	2.04	0.20	0.29	2.33	0.63
Totals	49	100.00	70.00	100.00	200.00	

APPENDIX 2. Shrub Density Data

Table 140. Shrub Density	The Dutchman Property	
June 6-18, 2011		
		Shrubs
Transect	Species	<2in Dia.
1D	*Salix boothii*	111
	Salix exigua	145
	Salix geyeriana	36
	Total	**292**
	Total Stems/ ha	**29,200**
1E	*Salix boothii*	239
	Salix exigua	26
	Total	**265**
	Total Stems/ ha	**26,500**
2A	*Salix lutea*	3
	Rosa woodsii	4
	Salix boothii	3
	Total	**10**
	Total Stems/ ha	**1,000**
3C	*Potentilla fruticosa*	2
	Total	**2**
	Total Stems/ ha	**200**
3G	*Potentilla fruticosa*	12
	Total	**12**
	Total Stems/ ha	**1,200**
4A	*Salix boothii*	76
	Salix sp	13
	Salix bebbiana	13
	Salix wolfii	2
	Total	**104**
	Total Stems/ ha	**10,400**
4B	*Salix boothii*	24
	Salix sp	8
	Salix geyeriana	1
	Total	**33**
	Total Stems/ ha	**3,300**
4C	*Salix bebbiana*	16
	Salix boothii	26
	Salix geyeriana	4
	Salix sp	8

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
4C (Cont.)	**Total**	**54**
	Total Stems/ ha	**5,400**
5A	*Salix boothii*	431
	Salix exigua	128
	Total	**559**
	Total Stems/ ha	**55,900**
5B	*Salix boothii*	185
	Salix exigua	25
	Salix geyeriana	4
	Salix wolfii	2
	Total	**216**
	Total Stems/ ha	**21,600**
5C	*Salix exigua*	138
	Salix boothii	44
	Salix sp	4
	Salix geyeriana	1
	Total	**187**
	Total Stems/ ha	**18,700**
5F	*Salix exigua*	55
	Total	**55**
	Total Stems/ ha	**5,500**
6AA	*Salix boothii*	34
	Potentilla fruticosa	1
	Ribes lacustre	5
	Salix lutea	17
	Total	**57**
	Total Stems/ ha	**5,700**
6A	*Salix lutea*	18
	Salix boothii	40
	Potentilla fruticosa	1
	Total	**59**
	Total Stems/ ha	**5,900**
6B	*Potentilla fruticosa*	2
	Cornus stolonifera	1
	Salix boothii	18
	Salix candida	4
	Total	**25**
	Total Stems/ ha	**2,500**
6C	*Potentilla fruticosa*	5

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
6C (Cont.)	*Salix lutea*	1
	Total	**6**
	Total Stems/ ha	**600**
6D	*Potentilla fruticosa*	9
	Rosa woodsii	3
	Total	**12**
	Total Stems/ ha	**1,200**
	Potentilla fruticosa	2
6E	*Rosa woodsii*	1
	Total	**3**
	Total Stems/ ha	**300**
7A	*Salix exigua*	93
	Total	**93**
	Total Stems/ ha	**9,300**
7D	*Rosa woodsii*	1
	Total	**1**
	Total Stems/ ha	**100**
8A	*Shepherdia argentea*	11
	Total	**11**
	Total Stems/ ha	**1,100**
8B	*Shepherdia argentea*	5
	Total	**5**
	Total Stems/ ha	**500**
8C	*Shepherdia argentea*	6
	Total	**6**
	Total Stems/ ha	**600**
8D	*Shepherdia argentea*	11
	Elaeagnus angustifolia	1
	Total	**12**
	Total Stems/ ha	**1,200**
8E	*Shepherdia argentea*	12
	Total	**12**
	Total Stems/ ha	**1,200**
9BF	*Salix bebbiana*	17
	Salix boothii	80
	Total	**97**
	Total Stems/ ha	**9,700**
9BG	*Salix lutea*	22
	Salix geyeriana	3

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
9BG (Cont.)	**Total**	**25**
	Total Stems/ ha	**2,500**
	Salix boothii	171
10AA	*Populus tremuloides*	17
	Salix sp	51
	Salix bebbiana	17
	Salix exigua	3
	Rosa woodsii	2
	Salix geyeriana	14
	Total	**275**
	Total Stems/ ha	**27,500**
10AB	*Salix* sp	1
	Total	**1**
	Total Stems/ ha	**100**
10AC	*Salix bebbiana*	5
	Salix boothii	52
	Salix sp	26
	Salix geyeriana	2
	Rosa woodsii	3
	Total	**88**
	Total Stems/ ha	**8,800**
10AD	*Salix geyeriana*	5
	Salix boothii	18
	Salix bebbiana	5
	Total	**28**
	Total Stems/ ha	**2,800**
10BE	*Salix boothii*	79
	Salix bebbiana	16
	Salix sp	25
	Populus tremuloides	1
	Salix geyeriana	19
	Total	**140**
	Total Stems/ ha	**14,000**
10BF	*Salix boothii*	1
	Total	**1**
	Total Stems/ ha	**100**
10BG	*Salix boothii*	59
	Rosa woodsii	2
	Salix bebbiana	3

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
10BG (Cont.)	*Salix* sp	6
	Populus tremuloides	1
	Salix geyeriana	7
	Total	**78**
	Total Stems/ ha	**7,800**
10BH	*Salix boothii*	24
	Salix sp	4
	Salix geyeriana	1
	Salix bebbiana	3
	Rosa woodsii	1
	Betula glandulosa	8
	Total	**41**
	Total Stems/ ha	**4,100**
12B	*Salix boothii*	25
	Salix lutea	25
	Salix candida	1
	Total	**51**
	Total Stems/ ha	**5,100**
12C	*Betula occidentalis*	14
	Salix lutea	12
	Total	**26**
	Total Stems/ ha	**2,600**
12D	*Salix boothii*	200
	Ribes setosum	20
	Salix lutea	75
	Total	**295**
	Total Stems/ ha	**29,500**
12E	*Salix lutea*	55
	Salix boothii	151
	Cornus stolonifera	3
	Ribes lacustre	1
	Rosa woodsii	2
	Total	**212**
	Total Stems/ ha	**21,200**
13A	*Salix boothii*	38
	Ribes lacustre	2
	Salix lutea	2
	Total	**42**
	Total Stems/ ha	**4,200**

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
13B	*Salix candida*	7
(91m)	*Salix boothii*	65
	Salix lutea	25
	Salix bebbiana	3
	Total	**100**
	Total Stems/ ha	**10,000**
13C	*Salix lutea*	6
	Total	**6**
	Total Stems/ ha	**600**
13D	*Potentilla fruticosa*	17
	Total	**17**
	Total Stems/ ha	**1,700**
13E	*Populus tremuloides*	16
	Potentilla fruticosa	4
	Salix lutea	5
	Salix candida	1
	Total	**26**
	Total Stems/ ha	**2,600**
13F	*Potentilla fruticosa*	10
	Total	**10**
	Total Stems/ ha	**1,000**
14A	*Potentilla fruticosa*	16
	Ribes lacustre	5
	Betula glandulosa	251
	Salix candida	5
	Total	**277**
	Total Stems/ ha	**27,700**
14B	*Betula glandulosa*	1
	Total	**1**
	Total Stems/ ha	**100**
16AB	*Salix boothii*	50
	Salix bebbiana	2
	Salix lutea	16
	Salix candida	2
	Total	**70**
	Total Stems/ ha	**7,000**
20A	*Betula occidentalis*	20
	Salix lutea	79
	Salix bebbiana	1

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
20A (Cont.)	*Ribes lacustre*	4
	Salix boothii	23
	Total	**127**
	Total Stems/ ha	**12,700**
20B	*Salix lutea*	76
	Betula glandulosa	17
	Salix boothii	9
	Salix candida	3
	Total	**105**
	Total Stems/ ha	**10,500**
20C	*Salix lutea*	118
	Salix candida	9
	Salix boothii	3
	Total	**130**
	Total Stems/ ha	**13,000**
20D	*Potentilla fruticosa*	6
	Total	**6**
	Total Stems/ ha	**600**
20E	*Potentilla fruticosa*	1
	Salix bebbiana	3
	Salix boothii	9
	Total	**13**
	Total Stems/ ha	**1,300**
21A		
	Populus tremuloides	134
	Ribes sp	2
	Rosa woodsii	1
	Total	**137**
	Total Stems/ ha	**13,700**
21B	*Populus tremuloides*	25
	Salix sp	36
	Salix boothii	1
	Total	**62**
	Total Stems/ ha	**6,200**
21C	*Salix bebbiana*	25
	Salix sp	100
	Salix boothii	49
	Salix geyeriana	6
	Salix wolfii	1

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
21C (Cont.)	*Betula glandulosa*	37
	Total	**218**
	Total Stems/ ha	**21,800**
21E	*Betula occidentalis*	1
	Salix boothii	1
	Total	**2**
	Total Stems/ ha	**200**
22AA	*Salix candida*	1
	Salix lutea	25
	Salix boothii	40
	Salix bebbiana	28
	Total	**94**
	Total Stems/ ha	**9,400**
22AB	*Salix boothii*	17
	Salix bebbiana	6
	Salix lutea	6
	Total	**29**
	Total Stems/ ha	**2,900**
22BE	*Salix lutea*	46
	Salix boothii	17
	Salix geyeriana	1
	Ribes lacustre	5
	Total	**69**
	Total Stems/ ha	**6,900**
22BF	*Salix boothii*	6
	Salix lutea	14
	Betula glandulosa	3
	Salix bebbiana	3
	Total	**26**
	Total Stems/ ha	**2,600**
22BH	*Salix lutea*	70
	Salix boothii	9
	Salix geyeriana	7
	Salix bebbiana	7
	Salix candida	2
	Total	**95**
	Total Stems/ ha	**9,500**
23AA	*Salix boothii*	323
	Salix candida	19

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
23AA (Cont.)	*Salix lutea*	34
	Betula occidentalis	1
	Total	**377**
	Total Stems/ ha	**37,700**
23AB	*Salix candida*	4
	Salix boothii	16
	Total	**20**
	Total Stems/ ha	**2,000**
23AC	*Salix bebbiana*	1
	Salix lutea	1
	Total	**2**
	Total Stems/ ha	**200**
23AD	*Salix candida*	3
	Salix lutea	20
	Salix boothii	16
	Total	**39**
	Total Stems/ ha	**3,900**
23BE	*Salix boothii*	19
	Salix candida	34
	Total	**53**
	Total Stems/ ha	**5,300**
24AA	*Salix boothii*	23
	Salix lutea	11
	Salix candida	7
	Total	**41**
	Total Stems/ ha	**4,100**
24AB	*Salix bebbiana*	3
	Salix candida	4
	Salix lutea	3
	Salix boothii	14
	Total	**24**
	Total Stems/ ha	**2,400**
24AC	*Salix lutea*	10
	Total	**10**
	Total Stems/ ha	**1,000**
24AD	*Potentilla fruticosa*	9
	Rosa woodsii	2
	Total	**11**
	Total Stems/ ha	**1,100**

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
24BE	*Salix lutea*	6
	Salix boothii	15
	Total	**21**
	Total Stems/ ha	**2,100**
24BG	*Salix candida*	9
	Salix lutea	39
	Total	**48**
	Total Stems/ ha	**4,800**
24BH	*Salix candida*	1
	Total	**1**
	Total Stems/ ha	**100**
25A	*Salix boothii*	36
	Ribes lacustre	1
	Salix candida	5
	Salix bebbiana	3
	Total	**45**
	Total Stems/ ha	**4,500**
25C	*Betula glandulosa*	36
	Salix boothii	18
	Total	**54**
	Total Stems/ ha	**5,400**
25F	*Betula glandulosa*	4
	Total	**4**
	Total Stems/ ha	**400**
26A	*Betula glandulosa*	84
	Salix lutea	11
	Salix boothii	33
	Salix candida	1
	Total	**129**
	Total Stems/ ha	**12,900**
26B	*Betula glandulosa*	83
	Salix bebbiana	3
	Total	**86**
	Total Stems/ ha	**8,600**
26C	*Populus tremuloides*	1
	Betula occidentalis	2
	Salix boothii	13
	Salix lutea	39
	Total	**55**

Table 140. Shrub Density (Cont.)	The Dutchman Property	
June 6-18, 2011		
26C (Cont.)	Total Stems/ ha	5,500
26D	*Potentilla fruticosa*	14
	Total	14
	Total Stems/ ha	1,400
26E	*Potentilla fruticosa*	2
	Total	2
	Total Stems/ ha	200
26F	*Potentilla fruticosa*	9
	Total	9
	Total Stems/ ha	900

APPENDIX 3. Woody Species Line Intercept Data

Table 141. Woody species line intercept, June 2011.

Transect	Species	Intercept (m)	% Rel Intercept
6A	*Salix boothii*	2.3	100%
Total		**2.3**	**100%**
6AA	*Salix lutea*	1.8	47%
	Ribes lacustre	1.0	26%
	Potentilla fruticosa	1.0	26%
Total		**3.8**	**100%**
7A	*Salix exigua*	93.00	100%
Total		**93.0**	**100%**
8B	*Shepherdia argentea*	1.0	77%
	Elaeagnus angustifolia	0.3	23%
Total		**1.3**	**100%**
8C	*Shepherdia argentea*	2.5	100%
Total		**2.5**	**100%**
8D	*Shepherdia argentea*	3.3	52%
	Elaeagnus angustifolia	3.0	48%
Total		**6.3**	**100%**
8E	*Elaeagnus angustifolia*	0.4	100%
Total		**0.4**	**100%**
9BF	*Salix boothii*	4.1	80%
	Salix bebbiana	1.0	20%
Total		**5.1**	**100%**
10AA	*Populus tremuloides*	7.2	100%
Total		**7.2**	**100%**
12D	*Salix boothii*	20.0	83%
	Ribes setosum	2.0	8%
	Salix lutea	2.2	9%
Total		**24.2**	**100%**
12E	*Salix lutea*	5.4	38%
	Salix boothii	8.6	61%
	Rosa woodsii	0.2	1%
Total		**14.2**	**100%**
13A	*Salix boothii*	0.7	78%
	Salix lutea	0.2	22%
Total		**0.9**	**100%**
13B	*Salix boothii*	1.3	6%
	Salix lutea	21.7	94%
Total		**23.0**	**100%**
13E	*Populus tremuloides*	1.4	100%
Total		**1.4**	**100%**
14A	*Betula glandulosa*	7.1	100%
Total		**7.1**	**100%**
16AB	*Salix boothii*	1.4	74%
	Salix lutea	0.4	21%
	Salix candida	0.1	5%
Total		**1.9**	**100%**

Table 141. Woody Species Line Intercept, June 2011. (Cont.)

Transect	Species	Intercept (m)	% Rel Intercept
19C	*Salix boothii*	0.3	55%
	Ribes missouriense	0.3	45%
Total		**0.6**	**100%**
20A	*Salix lutea*	3.9	97%
	Salix boothii	0.1	3%
Total		**4.0**	**100%**
20B	*Betula glandulosa*	2.1	45%
	Salix boothii	2.6	55%
Total		**4.7**	**100%**
20D	*Salix boothii*	0.5	11%
	Salix lutea	3.9	89%
Total		**4.4**	**100%**
20E	*Salix boothii*	1.0	100%
Total		**1.0**	**100%**
21A	*Populus tremuloides*	86.2	100%
Total		**86.2**	**100%**
21B	*Populus tremuloides*	10.6	100%
Total		**10.6**	**100%**
22AA	*Salix boothii*	1.1	100%
Total		**1.1**	**100%**
22AB	*Salix boothii*	1.0	100%
Total		**1.0**	**100%**
22BE	*Salix boothii*	6.6	100%
Total		**6.6**	**100%**
22BH	*Salix lutea*	2.7	93%
	Salix geyeriana	0.2	7%
Total		**2.9**	**100%**
23AA	*Salix boothii*	39.6	90%
	Salix lutea	3.8	9%
	Betula occidentalis	0.5	1%
Total		**43.9**	**100%**
23AB	*Salix boothii*	0.4	100%
Total		**0.4**	**100%**
23AD	*Salix boothii*	1.2	100%
Total		**1.2**	**100%**
24BE	*Salix lutea*	1.0	36%
	Salix boothii	1.8	64%
Total		**2.8**	**100%**
24BG	*Salix lutea*	2.1	100%
Total		**2.1**	**100%**
25A	*Salix boothii*	9.0	96%
	Ribes lacustre	0.4	4%
Total		**9.4**	**100%**
25C	*Salix boothii*	0.6	100%
Total		**0.6**	**100%**
26A	*Betula glandulosa*	1.1	39%
	Salix boothii	1.7	61%
Total		**2.8**	**100%**

Table 141. Woody species line intercept, June 2011. (Cont.)

Transcect	Species	Intercept (m)	% Rel Intercept
26B	*Betula glandulosa*	0.6	100%
Total		**0.6**	**100%**
26C	*Populus tremuloides*	15.1	86%
	Salix lutea	2.5	14%
Total		**17.6**	**100%**

APPENDIX 4. Timed Meander Search Species List Data

Table 142. Area A. Spring grazed pasture outside The Dutchman Property. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration, number of species found per minute, cumulative number of species at each minute.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Poa nevadensis	1	1	5	5
Agrostis alba	1	2	2	7
Equisetum laevigatum	1	3	2	9
Juncus balticus littoralis	1	4	2	11
Carex nebrascensis	1	5	2	13
Agropyron elongatum	2	6	2	15
Crepis runcinata	2	7	0	15
Potentilla anserina	3	8	2	17
Hordeum jubatum	3	9	1	18
Taraxacum officinale	4	10	1	19
Aster ericoides	4	11	1	20
Triglochin maritima	5	12	1	21
Distichlis stricta	5	13	0	21
Calamagrostis stricta	6	14	1	22
Helianthella uniflorus	6	15	0	22
Solidago sp.	8	16	0	22
Cirsium arvense	8	17	1	23
Erigeron lonchophyllus	9	18	1	24
Deschampsia cespitosa	10	19	0	24
Lychnis alba	11	20	0	24
Rumex crispus	12	21	0	24
Equisetum arvense	13	22	0	24
Carex aquatilis altior	14	23	1	25
Festuca spp.	17	24	0	25
Salix bebbiana	19	25	0	25
Phleum pratense	23	26	0	25

Table 143. Area B. Northwest portion of The Dutchman Property. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Scirpus acutus	1	1	6	6
Juncus balticus littoralis	1	2	4	10
Triglochin maritima	1	3	3	13
Salix candida	1	4	1	14
Unidentified species	1	5	2	16
Pedicularis groenlandica	1	6	2	18
Betula glandulosa	2	7	4	22
Parnassia parviflora	2	8	1	23
Juncus longistylis	2	9	2	25
White aster	2	10	3	28
Salix boothii	3	11	2	30
Deschampsia cespitosa	3	12	0	30
Potentilla anserina	3	13	0	30
Calamagrostis stricta	4	14	1	31
Salix bebbiana	5	15	1	32
Potentilla fruticosa	5	16	0	32
Scirpus acutus	6	17	1	33
Lobelia kalmii	6	18	1	34
Helianthella uniflorus	7	19	0	34
Purple aster	7	20	1	36
Festuca sp.	7	21	0	36
Habenaria (orchid) sp.	7	22	0	36
Crepis sp.	8	23	1	37
Erigeron lonchophyllus	9	24	1	38
Dodecatheon pulchellum	9	25	0	38
Carex sp.	10	26	0	38
Juncus nodosus	10	27	2	40
Triglochin palustris	10			
Eriophorum gracile	11			
Unidentified species	11			
Epilobium palustre	14			
Angelica sp.	15			
Typha latifolia	17			
Eleocharis sp.	18			
Juncus alpinus	20			
Chara sp.	23			
Agrostis alba	24			
Potamogeton sp.	27			
Utricularia sp.	27			

Table 144. Area C. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species, number of species found per minute, cumulative number of species at each minute.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Juncus balticus littoralis	1	1	6	6
Equisetum laevigatum	1	2	3	9
Carex nebraskensis	1	3	3	12
Salix exigua	1	4	0	12
Salix boothii	1	5	2	14
Rosa woodsii	1	6	3	17
Calamagrostis stricta	2	7	1	18
Equisetum arvense	2	8	0	18
Eleocharis palustris	2	9	2	20
Potentilla anserina	3	10	1	21
Cirsium arvense	3	11	1	22
Carex utriculata	3	12	1	23
Deschampsia cespitosa	5	13	0	23
Sium suave	5	14	2	25
Epilobium palustre	6	15	0	25
Mentha sp.	6	16	1	26
Rumex crispus	6	17	2	28
Taraxacum officinale	7	18	4	32
Hordeum jubatum	9	19	1	33
Chenopodium sp.	9	20	0	33
Salix geyeriana	10	21	1	34
Agrostis alba	11	22	0	34
Carex aquatilis altior	12	23	1	35
Typha latifolia	14	24	1	37
Carex sp.	14	25	1	38
Populus tremuloides	16	26	0	38
Crepis runcinata	17	27	2	40
Stellaria media	17	28	1	41
Triglochin maritima	18			
Eriophorum gracile	18			
Aster junciformis	18			
Solidago canadensis	18			
Angelica sp.	19			
Rumex occidentalis	21			
Salix candida	23			
Juncus alpinus	24			
Betula occidentalis	25			
Triglochin palustris	27			
Erigeron lonchophyllus	27			
Salix bebbiana B	28			

Table 145. Area D. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Agrostis alba	1	1	4	4
Unidentified species	1	2	2	6
Plantago eriopoda	1	3	2	8
Equisetum laevigatum	1	4	2	10
Unidentified species	2	5	1	11
Calamagrostis stricta	2	6	0	11
Deschampsia cespitosa	3	7	1	12
Carex nebraskensis	3	8	1	13
Juncus balticus littoralis	4	9	2	15
Aster junciformis	4	10	0	15
Lepidium chalepense	5	11	1	16
Distichlis stricta	7	12	0	16
Hordeum jubatum	8	13	0	16
Panicum miliaceum	9	14	0	16
Poa nevadensis	9	15	1	17
Festuca rubra	11	16	1	18
Crepis runcinita	15	17	0	18
Salix bebbiana	16	18	0	18
Taraxacum officinale	19	19	1	19

Table 146. Area E. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Agrostis stolonifera	1	1	10	10
Zigadenus elegans	1	2	3	13
Crepis sp.	1	3	2	15
Deschampsia cespitosa	1	4	0	15
Grass sp.	1	5	1	16
Rumex eriopoda	1	6	2	18
Agropyron sp.	1	7	3	21
Haplopappus spp.	1	8	2	23
Dodecatheon pulchellum	1	9	2	25
Haplopappus uniflorus	1	10	4	29
Aster falcatus	2	11	1	30
Juncus balticus littoralis	2	12	0	30
Poa pratensis	2	13	0	30
Helianthella uniflorus	3	14	1	31
Phlox kelseyi	3	15	1	32
Cassia sp.	5	16	1	33
Zizia aptera	6	17	1	34
Festuca idahoensis	6	18	0	34
Xyris sp.	7	19	1	35
Spartina gracilis	7	20	1	36
Iris missouriensis	7	21	1	37
Aster sp.	8			
Solidago nemoralis	8			
Smilacina stellata	9			
Equisetum laevigatum	9			
Potentilla anserina	10			
Rosa acicularis	10			
Calamagrostis stricta	10			
Potentilla fruticosa	10			
Cirsium arvense	11			
Hordeum jubatum	14			
Sisyrinchium albidum	15			
Grass sp.	16			
Crepis sp.	17			
White top.	19			

Table 147. Area F. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species), number of species found per minute, cumulative number of species at each minute.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Aster drummondii	1	1	7	7
Astragalus agrestis	1	2	2	9
Calamagrostis stricta	1	3	4	13
Juncus balticus littoralis	1	4	3	16
Zigadenus elegans	1	5	3	19
Crepis run???	1	6	5	24
Potentilla anserina	1	7	5	29
Trifolium longipes	2	8	2	31
Cirsium arvense	2	9	3	34
Carex phoeocephila	3	10	2	36
Aster falcatus	3	11	6	42
Smilacina stellata	3	12	1	43
Iris missouriensis	3	13	1	44
Poa pratensis	4	14	1	45
Poa palustris	4	15	1	46
Agrostis alba	4	16	1	47
Tragopogon dubius	5	17	1	48
Sonchus arvensis	5	18	0	48
Carex lanuginosa	5	19	3	51
Alopecurus pratensis	5	20	2	53
Salix bebbiana	6	21	1	54
Salix boothii	6	22	1	55
Helianthella uniflorus	6	23	1	56
Rosa woodsii	6			
Taraxacum officinale	6			
Eleocharis sp.	7			
Hippuris vulgaris	7			
Rumex occidentalis	7			
Salix geyeriana	7			
Deschampsia cespitosa	7			
Salix exigua	8			
Galium boreale	8			
Aster sp.	9			
Potentilla sp.	9			
Lychnis alba	9			
Stellaria sp.	10			
Polygonum amphibium	10			

Table 147. (Cont.)	MINUTE	MINUTE	SP/MIN	SP/CUM
Mentha sp.	11			
Equisetum arvense	11			
Epilobium palustre	11			
Mimulus glabratus	11			
Juncus nodosus	11			
Carex aquatilis altior	11			
Nasturtium officinale	12			
Potamogeton sp.	13			
Veronica aquatica	14			
Populus tremuloides	15			
Aster junciformis	16			
Potentilla fruticosa	17			
Rumex sp.	19			
Plantago eriopoda	19			
Ribes sp.	19			
Lepidium chalepense	20			
Poa nevadensis	20			
Lychnis sp.	21			
Juncus alpinus	22			
Carex utriculata	22			
Festuca sp.	23			

Table 148. Area G Wildlife Area. Time Meander Search (TMS) species list, with the minute each species was located, minutes of the search duration (always five minutes beyond location of the last species, number of species found per minute, cumulative number of species at each minute.

SPECIES	MINUTE	MINUTE	SP/MIN	SP(CUM)
Juncus balticus littoralis	1	1	3	3
Sonchus sp.	1	2	5	8
Agrostis alba	1	3	2	10
Poa pratensis	2	4	3	13
Iris missouriensis	2	5	3	16
Potentilla anserina	2	6	0	16
Equisetum laevigatum	2	7	3	19
Salix bebbiana	2	8	1	20
Carex nebrascensis	3	9	1	21
Carex aquatilis altior	3	10	1	22
Aster sp.	4	11	0	22
Mentha sp.	4	12	1	23
Alopecurus pratensis	4	13	2	25
Deschampsia cespitosa	5	14	1	26
Cirsium arvense	5	15	1	27
Agropyron intermedium	5	16	1	28
Unidentified Carex	7	17	1	29

Table 148. Area G Wildlife Area cont.

Salix geyeriana	7	18	2	31
Typha latifolia	7	19	0	31
Eleocharis palustris	8	20	0	31
Schoenoplectus tabernaemontani	9	21	2	33
Shepherdia argentea	10	22	1	34
Salix exigua	12	23	1	35
Salix boothii	13	24	0	35
Potentilla fruticosa	13	25	2	37
Trifolium hybridum	14	26	1	38
Poa nevadensis	15	27	2	40
Smilacina stellata	16	28	0	40
Rosa woodsii	17	29	1	41
Agropyron repens	18	30	2	43
Aster falcatus	18	31	0	43
Crepis sp.	21	32	1	44
Astragalus drummondii	21	33	2	46
Melilotus officinalis	22	34	2	48
Plantago eriopoda	23	35	1	49
Festuca ovina	25			
Helianthella uniflorus	25			
Solidago nemoralis	26			
Melilotus alba	27			
Agropyron elongatum	27			
Cirsium undulatum	29			
Chenopodium murale	30			
Valeriana edulis	30			
Haplopappus uniflorus	32			
Habenaria hyberborea	33			
Antennaria macrophylla	33			
Sisyrinchium montanum	34			
Juncus alpinus	34			
Hordeum jubatum	35			

APPENDIX 5. Litter, Bryophytes, Water and Bare Ground

Table 149. Litter, Bryophytes, Water and Bare Ground found in Quadrats in the Dutchman Property.

	Transect	1	2	3	4	5	6	7	8	9	10
	1A										
Fine Litter		100	100	100	100	100	100	98	100	100	100
Bryophytes		2	2	1			2				2
	1B										
Fine Litter		50	90	95	100	95	100	95	100	90	100
Bare Soil		10		5		5		5		10	
Bryophytes			1	2							
	1D										
Fine Litter		90	30	30	40	30	40	50	60	60	10
Bryophytes		50	90	100	100	100	50	50	30	30	
	1E										
Fine Litter		20	50	100	75	100	95	95	50	20	20
Bare Soil								5	20	15	5
Bryophytes		50			80		10	30	30	15	10
	2A										
Fine Litter		65	80	75	90	75	100	75	70	60	75
Bare Soil		2									
Water							10				
	2B										
Fine Litter		100	100	100	100	100	100	100	100	90	90
Bare Soil										10	1
Bryophytes		100	15	1	1	1	1	1	1	1	
Water			1								
	2C										
Fine Litter		75	90	100	10	75	100	80	100	75	90
Bare Soil					15	2					
Water								10	75	10	
	2D										
Fine Litter		75	80	80	70	90	60	5	25	20	70
Bare Soil		15	10	10	20	5	15	75	40	50	20
	2E										
Fine Litter		40	20	5	40	50	75	90	75	20	10
Bare Soil		10	10	40						40	25
Water		25	75	40	90	80	20	10	100		
	2F										
Fine Litter		25	20	15	35	40	30	15	50	60	30
Bare Soil		25	20	15	35	40	30	15	50	60	30

2F Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	3A										
Fine Litter		100	100	100	100	30	100	100	100	100	100
Bryophytes						90					
	3B										
Fine Litter		100	100	100	95	100	100	100	100	100	85
Bare Soil					5						15
Bryophytes		1	2	1		1		1	1	1	
	3C										
Fine Litter		95	95	85	95	70	70	60	90	70	20
Course Litter						10	4				
Bare Soil		2	3	15	5	20	60	40	10	30	80
Water							2	1	1		
	3D										
Fine Litter		10	10	5	5	75	20	10	15	10	10
Bare Soil		30	30	50	40	5	25	25	20	30	30
	3F										
Fine Litter		5	5	10	20	5	10	10	10	20	5
Bare Soil		25	40	30	30	70	25	40	30	15	60
	3G										
Fine Litter		10	10	20	25	5	5	10	5	10	5
Bare Soil		40	30	30	40	70	70	40	60	60	60
	4A										
Water								25			
	4B										
Fine Litter		100	95		90	30	100	100	70	50	30
Bare Soil						20				3	60
Bryophytes						40		1	25	75	
Water			1	30	5						10
	4C										
Fine Litter		100	90	95	100	70	95	100	100	100	100
Bryophytes				10			15		10		
	4D										
Bare Soil		20									
	5A										
Bryophytes		80	100	80	80	25	20	10	5	5	40
	5B										
Fine Litter		90	60	95	70	60	50	90	90	100	40
Course Litter										15	
Bare Soil						5	20	10	5		
Bryophytes			30	50	50	50	2	10	10	10	2

5B Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	5C										
Fine Litter		100	100	50	100	70	70	80	80	90	80
Bare Soil						10					
Bryophytes		50	50	100	20	25	90	60	30	3	70
	5F										
Fine Litter		100	100	100	100	100	100	100	95	70	60
Course Litter									20		
Bare Soil		1									
Bryophytes				2	5				5		
	6A										
Fine Litter		100	100	100	95	100	50	80	100	100	80
Course Litter							5				
Bare Soil											20
Bryophytes		25	2	70		80	50	90	30	100	
Water		100	100	100	100	100	100	10	100		
	6AA										
Fine Litter		95	90	100	100	100	100	100	100	100	100
Bryophytes		5	2	10		10	30	2			
Water		5	80	1	90	2	90	20			
	6B										
Fine Litter		50	90	75	50	5	40	100	100	100	100
Bare Soil		50	10	25	50	95	60				
Bryophytes										5	
Water											5
	6C										
Fine Litter		95	95	95	95	85	90	80	60	50	50
Bare Soil									3		
Bryophytes						2	5			5	4
Water		1	1	1		3	2	3		30	30
	6D										
Fine Litter		10	10	5	5	5	5	10	20	10	5
Bare Soil		50	70	70	70	45	70	60	40	65	65
	6E										
Fine Litter		25	80	20	5	10	2	15	5	10	5
Bare Soil				10	75	70	70	40	65	65	70
Water		75	80								
	7A										
Fine Litter		70	90	60	75	95	80	90	80	70	90
	7B										
Fine Litter		90	90	40	40	60	75	90	50	80	90
Bare Soil		10		20	5		5				

7B Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	7C										
Fine Litter		90		100	100	100	65	100	75	60	85
Bare Soil		10	85				25		25	30	15
Bryophytes							10			5	
	7D										
Fine Litter		60	10	5	25	25	15	90	95	95	10
Bare Soil		40	80	80	60	70	80	1			85
	7E										
Fine Litter		5	70	40	50	10	10	10	10	10	75
Bare Soil		70	5	15	10	20	60	10	10	10	
Water			25	20	5	20		60	75	60	75
	7F										
Fine Litter		5	20	20	5	25	20	20	5	10	25
Bare Soil		50	25	3	15		40	40	50	20	5
Water		20		40	70	60	20	10	20	40	75
	8A										
Fine Litter		100	90	100	95	50	65	70	95	100	60
Bare Soil			2			50	35	30			
Bryophytes			10								
Water											40
Rock								5			
	8B										
Fine Litter		80	90	70	95	95	80	85	95	100	50
Course Litter											50
Bare Soil		5	2	30							
	8C										
Fine Litter		100	100	100	95	100	90	70	70	90	100
Deer Scat					10						
Bare Soil							10		15	10	
Bryophytes									15		
	8D										
Fine Litter		80	90	60	99	90	30	70	60	10	99
Bare Soil			1	20			60	30	40	80	
Bryophytes							5		5	10	
	8E										
Fine Litter		90	85	90	90	50	90	60	90	99	90
Bare Soil								20			
	9BF1										
Fine Litter		80	85			100		90	90		90
Bare Soil		1					3	2			

9BF1 Cont.	Transect	1	2	3	4	5	6	7	8	9	10
Bryophytes		30		80			10	3	15		5
Water		20	15	20	100		80			100	
	9BG										
Fine Litter		100	100	100	100	100	100	100	100	100	100
	9BH										
Fine Litter				100	100	100	100	100	100	100	100
Bryophytes				5	10		30	20			
Water				20	10						
	9BI										
Fine Litter		50	10	40	80	50	100	90	40	60	90
Course Litter					3					1	
Bryophytes		10	90		80		10	10		20	60
Water		2		75		15	20	15	90	15	10
	9BJ										
Fine Litter		90	90	60	70	70	60	60	60	60	40
Bryophytes			2	20	10	40	40	60	30	40	80
Water		5	1	10	3	1				5	2
	10AA										
Fine Litter		95	100	90	95	80	100	30	95	70	50
Bryophytes			20		3	2	2	30	10	10	
	10AB										
Bare Soil		5						10	15		
Bryophytes			2								
Water		90	95	90	80	80	95	80	50	95	90
	10AC										
Fine Litter		80	90	50	100	90	100	90	40	90	60
Course Litter			5			3					
Bare Soil			5	5							5
Bryophytes									75		
	10AD										
Fine Litter		60	95	95	95	90	60	95	95	100	95
Bare Soil						5	5				5
Bryophytes		50		40	3	2		3	5	3	
	10BG										
Fine Litter		100	100	100	100	100	100	100	100	100	100
Bryophytes		2	3	2	5	1		3	1	1	1
	11A										
Fine Litter		95	95	95		99		99	99	95	99
Bare Soil									1	5	

11A Cont.	Transect	1	2	3	4	5	6	7	8	9	10
Bryophytes		1									
Water					100		100				
	11B										
Fine Litter		95	90	95	99	95	98	95	99	99	97
Bare Soil						3	1	1			2
Bryophytes							1				
Water			5	1						1	
	11C										
Fine Litter		90	40	10	25	75	25	60	25	75	75
Bare Soil			25	40	25	10	40	8	10	5	10
Water		5									
	11D										
Fine Litter		75	60	90	90	60	40	100	98	100	100
Bare Soil		25	40	10	10	40	60		2		
	12A										
Fine Litter		85	50	55	75	70	80	85	70	80	85
Bryophytes						10		10			5
Water		15	40	45	25	15	20	3	30	20	10
	12B										
Fine Litter		90	25	75	50	70	90	95	100	100	90
Bryophytes								2			
Water			5	25	50	15		10	10	10	25
	12C										
Fine Litter		90	60	85	85	90	100	60	60	80	50
Bare Soil		20	40	15	15	10		40	40	20	50
Bryophytes						1					
	12D										
Fine Litter		75	90	75	75	90	100	100	50	80	50
Water		5	10	20	5					10	40
	12E										
Fine Litter		75	99	50	95	99	95	97	85	98	95
Course Litter		20		20				2		1	
Bare Soil		2					1				
Bryophytes							2		10		3
Water		2		25	5	1		1	3	1	1
	13A										
Fine Litter			60	90	90	90	90	100			
Water			20	10	25	50	5	8			
	13B										
Fine Litter		90	100	100	100	90	100	40	90	100	100
Water					5	5	20				

13C Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	13C										
Fine Litter		100	100	95	100	100	95	100	100	100	60
Bare Soil				5			5	2			
Bryophytes		20		3	1						
Water					1						40
	13D										
Fine Litter		60	40	65	65	90	60	45	40	60	40
Bare Soil		40	50	35	35	10	40	50	60	40	60
Bryophytes								5			
	13E										
Fine Litter		100	100	100	100	100	100	100	100	100	100
Bryophytes						2	2				1
Water			80	30	50	10		40	100	100	100
Bare Soil		35		10	35	30	5	5	5	5	3
	13F										
Fine Litter		25	80	50	70	20	20	20	50	90	60
Bare Soil		25	5	20	15	40	35	50	5		15
	14A										
Fine Litter		10	10	50	50	60	25	80	40	40	15
Course Litter		10									
Bare Soil		5								5	
Bryophytes		3									2
Water			50	50	5	75	40				30
	14B										
Fine Litter		100	100	100	100	100	100	100	100	100	100
Course Litter		100	100	100	100	100	100	100	100	100	50
Bryophytes		100	100	100	100	100	100	100		100	10
	14C										
Fine Litter		100	100	100	100	100	100	100	100	100	100
Course Litter		100	100	100	100	100	100	100	100	100	100
	14D										
Fine Litter		50	15	30	20	30	20	10	20	15	25
Bare Soil		15	60	8		40	60	75	70	70	60
Water				50	40	20	3				
	14E										
Fine Litter		10	50	40	25	25	5	10	10	5	10
Bare Soil		50	25	20	20	10	60	70	60	75	40
	16AA										
Fine Litter		100	100	100	100	20					
Bare Soil						80					

16AB Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	16AB										
Fine Litter		100	90	80	75	100	90	25	75	80	100
Bryophytes							5				
Water							20	20	25	2	
	16AC										
Fine Litter		100	100	100	100	95	100	100	100	100	100
Bare Soil						5					
Bryophytes		10	15		5						
	16AD										
Fine Litter		100	100	90	100	100	100	100	100	100	90
Bare Soil				2							10
	16AE										
Fine Litter		100	100	100	100	100	100	100	100	100	100
	16BF										
Fine Litter					100	100	100	80	100	98	100
Bare Soil								20		2	
Bryophytes					2	2		1			2
	16BG										
Fine Litter		100	100	75	99	100	100	100	100	100	100
Bare Soil				25	1						
Bryophytes		2		10				1		20	100
Water									1	25	2
	16BH										
Fine Litter		95	95	95	95	95	99	99	95	95	95
Bare Soil									1		1
Bryophytes			1	1							
	16BI										
Fine Litter		80	90	90	90	95	90	95	95	95	95
	19A										
Fine Litter		95	95	90	100	100	100	100	100	100	100
Bryophytes		1	20	20							
Water		5	2	5							
	19B										
Fine Litter		90	100	20	30	90	90	75	100	100	100
Bare Soil				5	8	2					
Bryophytes		50									
Water		5									
	19C										
Fine Litter		60	95	85	55	95	95	65	85	95	90
Bare Soil										1	3
Bryophytes				4		2					

19D Cont.	Transect	1	2	3	4	5	6	7	8	9	10
Water		15	1	1	25	1		25	5		
	19D										
Fine Litter		90	80	100	100	100	100	99	95	85	100
Bryophytes		30	40	50	25	10	60	2	2	60	25
Water		40	30					1	5	15	
	19E										
Fine Litter		40	25	70	40	10	10	90	40	40	10
Bare Soil		15	8	3	20	10	20		25	10	10
	19F										
Fine Litter		40	15	40	80	100	10	10	25	80	50
Bare Soil		15	50	15			20	50	40		
Water										2	10
	20A										
Fine Litter		60	100	100	100	100	100	100	100	100	100
Bryophytes			50	30	2	2	50			40	100
Water		100		5			20	2	15	70	10
	20B										
Fine Litter		100	90	90	30	30	85	90	80	90	95
Bryophytes				5			5			5	50
Water		90	10	10	70	10	15	80	20	5	2
	20C										
Fine Litter		10	80	100	60	90	75	25	40	90	70
Fine Litter		40	100	100	50	10	60	5	10	40	5
Course Litter										3	
Bare Soil		2				60	10	50	40	30	65
	20E										
Fine Litter		100	90		90	90	90	95	50	90	90
Bare Soil					3	3					
Bryophytes								5			
Water									3		
	20F										
Fine Litter		90	100	70	100	100	100	100	100	100	100
Bare Soil		8		20							
	21A										
Fine Litter		70	80	90	90	50	70	70	70	25	15
Course Litter				5		2					
	21B										
Fine Litter		90	100	100	100	100	100	100	100	100	100
Course Litter		10									
Water								50			

21D Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	21D										
Fine Litter		100	100	98	95	95	100	100	100	100	100
Bare Soil				2	3	3					
	21E										
Fine Litter		90	100	100	90	80	100	90	90	90	90
Course Litter							2				
Bryophytes									5	10	
	22AA										
Fine Litter		100	100	80	80	100	100	100	95	100	100
Bare Soil				1							
Bryophytes				1	60		10	5	15	10	15
Water			10	20	30						2
	22AB										
Fine Litter		100	100	80	100	80	40	90	80	100	80
Bryophytes				1	5	1	30	1		1	5
Water		5	10	50		30	50	10	25	5	20
	22AC										
Fine Litter		20	40	60	80	60	50	40	15	40	15
Bare Soil										5	
Water		2	20	2	15	30	25	10			10
	22BD										
Fine Litter		100	100	100	100	100	100	100	98	100	100
Bare Soil									1		
Bryophytes		1	5	20	1	1	1	1	1		
	22BE										
Fine Litter		75	95	60	60	90	95	80	75	95	60
Bryophytes				10							
Water				10	25	30		10	3	50	3
	22BF										
Fine Litter		90	70	60	90	90	95	95	95	95	95
Bare Soil		2						2			
Bryophytes		5	2	10	3		1		2		
Water		4	25	15	5	30				1	1
	22BG										
Fine Litter		80	10	50	70	60	60	25	60	95	80
Bryophytes					5						
Water		2	70		2	10	50				
	22BH										
Fine Litter		95	100	70	25	60	90	80	90	60	40
Bryophytes					35	75		5		40	
Water					5	2	15		10	10	

23AA Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	23AA										
Fine Litter			8	25	10	60	8	60	50	40	25
Bryophytes				10			10	20	3		3
Water		98	90	80	95	30	80	30	60	50	25
	23AB										
Fine Litter		50	80	100	20	10	2	100	100	60	60
Bryophytes		10				90				75	90
Water		15	100	80	75	10	85			25	2
	23AC										
Fine Litter		100	100	100	100	80	100	100	100	100	95
Bryophytes		30	40	40		235	80	60	80	2	50
Water		40	50	30	100	60		50	20		20
	23AD										
Fine Litter		60	35	95	50	35	60	40	30	30	30
Course Litter			1								
Bryophytes								8			
Water		30	60	3	40	60	3	45	40	25	40
	23BF										
Fine Litter		100	100	70	90	100	100	100	80	100	
Bare Soil											15
Water				20	30						2
	23BG										
Fine Litter		50	25	60	60	20	25	80	40	25	75
Bare Soil		5									
Bryophytes										5	
Water		10	70	30	20	100	75	10	80	40	100
	23BH										
Fine Litter		100	95	90	90	30	50	50	40	15	90
Bryophytes				5							
Water				5	10	40	30	50	50	70	60
	24AA										
Fine Litter		100	100	100	100	100	100	100	100	100	100
Bryophytes			10		3	30	20	25	10	15	10
Water		15	90	100	100	25	40	100	80	60	90
	24AB										
Fine Litter		100	100	100	100	100	100	100	100	100	100
Bryophytes		30	20	40	30	25	10	30	30	20	10
Water		60	50	50	60	25	100	80	40	80	90
	24AC										
Fine Litter		100	100	100	100	100	100	90	100	100	100
Water		80	50	75	100		5	100	60	90	80

24AD Cont.	Transect	1	2	3	4	5	6	7	8	9	10
	24AD										
Fine Litter		10	30	20	15	10	50	10	10	20	60
Bare Soil		80	65	75	85	80	40	85	80	75	35
	24BE										
Fine Litter		100	100	100	100	100	100	100	100	100	100
Bryophytes		10				5	10	30	50	30	40
Water		90	15	10		60	10	25	10	50	30
	24BF										
Fine Litter		95	100	90	95	100	100	100	100	100	100
Bryophytes		1	5	1	1	1	2	5	1	5	10
Water		90	70	95	20	60	80	80	90	20	90
	24BG										
Fine Litter		100	100	100	100	25	100	100	50	100	100
Water					20	80	100	75	25	75	50
	24BH										
Fine Litter		10	10	5	5	5	90	5	95	100	100
Bare Soil		30	50	60	50	60		80			
Bryophytes									5		
Water									10	90	
	25A										
Fine Litter		30	100	100	40	30	95		80	80	70
Bryophytes		70		5			50		30	30	50
Water		30	1	1	80	70	2	50	30	50	30
	25B										
Fine Litter		10	25		20	40	50	40	10	25	50
Bryophytes			15		40	10	5	60	10	40	
Water		50	30	60	5	10		45	90	40	60
	25C										
Fine Litter		100	100	100	100	100	80	100	100	50	100
Course Litter							10				
Bryophytes		100	100	100	15	10	20	50		5	
Water			50			20			10	50	
	25D										
Fine Litter		10	20	5		10	75	10	2	20	10
Bryophytes		15	40	50	40	25	60	100		5	
Water		75	40	50	60	80	10	20	100	75	90
	25E										
Fine Litter		100	100	70	15	100	100	100	100	100	100
Bryophytes		10	60	30	30	30	30	30	20	50	80
Water		100	30	75	40	20	10	10	20	100	20
Rock											

	Transect	1	2	3	4	5	6	7	8	9	10
	25F										
Fine Litter		60	70	90	40	30	30	30	30	80	70
Bryophytes		25	30	20	20	60	40	5	25	40	5
Water		5	10	30	80	40	50	80	30	5	15
	26A										
Fine Litter		80	70	80	70	60	50	80	100	40	50
Course Litter			10							20	
Bare Soil		10									
Bryophytes					10	10	50			20	20
Water		20	30	20	30	40	50	50	40	40	50
	26B										
Fine Litter		80	90	95	95	90	80	90	75	60	30
Bare Soil			5		3						
Bryophytes		70	5	1	1			1	1	1	
Water		10		5	5	10	15	3	25	40	80
	26C										
Fine Litter		80	40	60	20	50	80	60	70	70	70
Bryophytes		5									
Water		80	90		82	30	50	20	90	80	80
	26D										
Fine Litter		20	90	10	20	20	10	15	10	10	15
Course Litter		5	5								
Bare Soil		10	10	75	60	40	60	60	75	75	30
Water		20									
	26E										
Fine Litter		20	60	40	40	50	75	80	80	80	95
Bare Soil		50	30	50	50	50	25	20	20	20	5
Bryophytes		3	25	1				1	1	2	1
	26F										
Fine Litter				10		10	5	5		5	5
Bare Soil		60	80	10	85	55	15	50	80	15	15
Bryophytes								2		15	

APPENDIX 6. Total Species Lists by Scientific Name (Table 150) and by Common Name (Table 151).

Table 150. Total Species List by Scientific Name for Plant Species observed at The Dutchman Property in 2011.

Scientific Name	Common Name
Achillea millefolium	Common yarrow
Agropyron trachycaulum	Slender wheatgrass
Agropyron elongatum	Tall wheatgrass
Agropyron intermedium	Intermediate wheatgrass
Agropyron repens	Quackgrass
Agropyron sp	Wheatgrass
Agrostis alba	Redtop grass
Agrostis stolonifera	Creeping bentgrass
Allium schoenoprasum	Chives
Alopecurus pratensis	Meadow foxtail
Alopecurus sp.	Foxtail spp.
Angelica arguta	Lyall's Angelica
Antennaria sp.	Pussytoes
Aster ericoides	White heath aster
Aster falcatus	White prairie aster
Aster sp.	Aster
Astragalus sp.	Milk vetch
Betula glandulosa	Swamp birch
Betula occidentalis	Spring birch
Bromus inermis	Pumpelly's brome
Calamagrostis canadensis	Bluejoint reedgrass
Calamagrostis stricta	Slimstem reed grass
Carex aquatilis altior	Water sedge
Carex lanuginosa	Woolly sedge
Carex nebrascensis	Nebraska sedge
Carex praegracilis	Clustered field sedge
Carex rossii	Short sedge
Carex spp.	Unidentified sedges
Carex utriculata	Common beaked sedge
Castilleja sp.	Paintbrush
Castilleja sulphurea	Indian paintbrush
Chara vulgaris	Common stonewort
Cirsium arvense	Canada thistle
Comandra umbellata	Bastard toadflax
Conyza canadensis	Canadian horseweed

Coronilla varia	Common crown vetch
Cyperus sp.	Flat sedge
Deschampsia cespitosa	Tufted hairgrass
Descurainia pinnata	Western tansy mustard
Distichlis stricta	Saltgrass
Dodecatheon pulchellum	Few flower shooting star
Eleocharis palustris	Creeping spikerush
Eleocharis sp.	Spike rush
Elymus cinereus	Great basin wild rye
Epilobium ciliatum	Hairy willowherb
Epilobium sp.	Willow herb
Equisetum laevigatum	Smooth scouring rush
Equisetum arvense	Field horsetail
Erigeron sp.	Fleabane
Eriophorum gracile	Slender cottongrass
Erysimum cheiranthoides	Wormseed wallflower
Festuca idahoensis	Idaho fescue
Festuca occidentalis	Western fescue
Festuca sp.	Fescue
Festuca ovina	Northern fescue
Forb composite	
Forb sp.	
Galium boreale	Northern bedstraw
Galium sp.	Bedstraw
Gentiana sp.	Gentain
Glyceria striata	Fowl manna grass
Haplopappus uniflorus	Plantain goldenweed
Helianthella uniflorus	One flower helianthella
Helianthus sp.	Sunflower
Hierochloe odorata	Northern sweet grass
Hordeum jubatum	Foxtail barley
Iris missouriensis	Western blue iris
Iva axillaris	Small flower marsh-elder
Juncus alpinus	Northern green rush
Juncus balticus	Baltic rush
Juncus dudleyi	Dudley's rush
Juncus longistylis	Long-styled rush
Juncus nodosus	Knotted rush
Juncus sp.	Rush
Juncus torreyi	Torrey's rush
Lemna minor	Leeser duckweed

Lepidium chalepense	Lenspod whitetop
Linaria sp.	Toadflax spp.
Lysimachia sp.	Loosestrife
Medicago sativa	Alfalfa
Mentha arvensis	Wild mint
Mimulus guttatus	Common large monkeyflower
Muhlenbergia glomerata	Spike muhly
Muhlenbergia richardsonis	Mat muhly
Muhlenbergia sp.	Muhly grass
Oxytropis sp.	Locoweed
Panicum capillare	Witch panic grass
Parnassia parviflora	Small flower Grass of Parnassus
Pedicularis spp.	Lousewort
Pedicularis groenlandica	Elephants-head lousewort
Phalaris arundinacea	Reed canary grass
Phleum pratense	Meadow Timothy
Phleum sp.	Timothy
Phlox kelseyi	Kelsey's phlox
Plantago aristata	Poor Joe
Plantago eriopoda	Saline plantain
Poa nevadensis	Sandberg bluegrass
Poa pratensis	Kentucky bluegrass
Polygonum amphibium	Water smartweed
Polygonum aviculare	Knotweed
Populus tremuloides	Quaking aspen
Potamogeton gramineus	Grassy pondweed
Potamogeton sp	Pondweed
Potentilla anserina	Silverweed
Potentilla fruticosa	Shrubby cinquefoil
Potentilla sp.	Cinquefoil
Primula incana	Mealy primrose
Ribes inerme	White-stem gooseberry
Ribes setosum	Bristly gooseberry
Rosa acicularis	Prickly rose
Rosa woodsii	Wood's rose
Rubus acaulis	Nagoonberry
Rumex crispus	Curly dock
Rumex occidentalis	Western dock
Rumex salicifolia	Willow dock
Rumex sp.	Dock
Salix bebbiana	Bebb's willow

Salix boothii	Booth's willow
Salix candida	Hoary willow
Salix drummondii	Drummond willow
Salix exigua	Sandbar willow
Salix geyeriana	Geyer's willow
Salix lutea	Yellow willow
Salix planifolia	Tea-leaved willow
Salix sp.	Willow
Salix wolfii	Wolf willow
Schoenoplectus tabernaemontani	Softstem bulrush
Scirpus acutus	Hardstem bulrush
Sisyrinchium montanum	Strict blue-eyed grass
Sitanion hystrix	Bottlebrush squirrel tail
Sium suave	Hemlock water-parsnip
Smilacina stellata	Starry false Solomon's seal
Solidago canadensis	Canada goldenrod
Solidago gigantea	Giant goldenrod
Solidago missouriensis	Missouri goldenrod
Solidago sp.	Goldenrod
Sonchus arvensis	Field sowthistle
Sonchus sp.	Sowthistle spp.
Spartina gracilis	Alkali cordgrass
Sphenopholis spp.	Wedge grass
Symphoricarpos occidentalis	Western snowberry
Taraxacum officinale	Common dandelion
Thalictrum alpinum	Alpine meadowrue
Thalictrum sp.	Meadowrue
Thalictrum venulosum	Veiny Meadowrue
Tragopogon sp.	Goat's-beard
Trifolium hybridum	Alsike clover
Trifolium longipes	Long-stalk clover
Trifolium sp.	Clover
Triglochin maritima	Common bog arrow-grass
Triglochin palustre	Slender bog arrow-grass
Triglochin sp.	Arrow-grass
Typha latifolia	Broadleaf cattail
Utricularia sp.	Bladderwort
Vicia sp.	Vetch
Viola sp.	Violet
Zigadenus elegans	Mountain deathcamas
Zizia aptera	Golden Alexanders

Table 151. Total Species list by Common Name for Plant Species Observed at The Dutchman Property in 2011.

Common Name	Scientific Name
Alfalfa	Medicago sativa
Alkali cordgrass	Spartina gracilis
Alpine meadow rue	Thalictrum alpinum
Alsike clover	Trifolium hybridum
Arrow-grass	Triglochin sp.
Aster	Aster sp.
Baltic rush	Juncus balticus
Bastard toadflax	Comandra umbellata
Bebb's willow	Salix bebbiana
Bedstraw	Galium sp.
Bladderwort	Utricularia sp.
Bluejoint reedgrass	Calamagrostis canadensis
Booth's willow	Salix boothii
Bottlebrush squirrel tail	Sitanion hystrix
Bristly gooseberry	Ribes setosum
Broadleaf cattail	Typha latifolia
Canada goldenrod	Solidago canadensis
Canada thistle	Cirsium arvense
Canadian horseweed	Conyza canadensis
Chives	Allium schoenoprasum
Cinquefoil	Potentilla sp.
Clover	Trifolium sp.
Clustered field sedge	Carex praegracilis
Common beaked sedge	Carex utriculata
Common bog arrow-grass	Triglochin maritima
Common crown vetch	Coronilla varia
Common dandelion	Taraxacum officinale
Common large monkey flower	Mimulus guttatus
Common stonewort	Chara vulgaris
Common yarrow	Achillea millefolium
Creeping spikerush	Eleocharis palustris
Curly dock	Rumex crispus
Dock	Rumex sp.
Drummond willow	Salix drummondii
Dudley's rush	Juncus dudleyi
Elephants-head lousewort	Pedicularis groenlandica
Fescue	Festuca sp.
Few flower shooting star	Dodecatheon pulchellum

Field horsetail	Equisetum arvense
Field sowthistle	Sonchus arvensis
Flat sedge	Cyperus sp.
Fleabane	Erigeron sp.
Fowl manna grass	Glyceria striata
Foxtail	Alopecurus sp.
Foxtail barley	Hordeum jubatum
Gentain	Gentiana sp.
Geyer's willow	Salix geyeriana
Giant goldenrod	Solidago gigantea
Goat's-beard	Tragopogon sp.
Golden Alexanders	Zizia aptera
Goldenrod	Solidago sp.
Grassy pondweed	Potamogeton gramineus
Great basin wild rye	Elymus cinereus
Hairy willowherb	Epilobium ciliatum
Hardstem bulrush	Scirpus acutus
Hemlock water-parsnip	Sium suave
Hoary willow	Salix candida
Idaho fescue	Festuca idahoensis
Indian paintbrush	Castilleja sulphurea
Intermediate wheatgrass	Agropyron intermedium
Kelsey's phlox	Phlox kelseyi
Kentucky bluegrass	Poa pratensis
Knotted rush	Juncus nodosus
Knotweed	Polygonum aviculare
Leeser duckweed	Lemna minor
Lenspod whitetop	Lepidium chalepense
Locoweed	Oxytropis sp.
Long-stalk clover	Trifolium longipes
Long-styled rush	Juncus longistylis
Loosestrife	Lysimachia sp.
Lousewort	Pedicularis spp.
Lyall's Angelica	Angelica arguta
Mat muhly	Muhlenbergia richardsonis
Meadow foxtail	Alopecurus pratensis
Meadow Timothy	Phleum pratense
Meadowrue	Thalictrum sp.
Mealy primrose	Primula incana
Milk vetch	Astragalus sp.
Missouri goldenrod	Solidago missouriensis

Mountain deathcamas	Zigadenus elegans
Muhly grass	Muhlenbergia sp.
Nagoonberry	Rubus acaulis
Nebraska sedge	Carex nebrascensis
Northern bedstraw	Galium boreale
Northern fescue	Festuca ovina
Northern green rush	Juncus alpinus
Northern sweet grass	Hierochloe odorata
One flower helianthella	Helianthella uniflorus
Paintbrush	Castilleja sp.
Plantain goldenweed	Haplopappus uniflorus
Pondweed	Potamogeton sp
Poor Joe	Plantago aristata
Prickly rose	Rosa acicularis
Pumpelly's brome	Bromus inermis
Pussy toes	Antennaria sp.
Quackgrass	Agropyron repens
Quaking aspen	Populus tremuloides
Redtop grass	Agrostis alba
Reed canary grass	Phalaris arundinacea
Rush	Juncus sp.
Saline plantain	Plantago eriopoda
Saltgrass	Distichlis stricta
Sandbar willow	Salix exigua
Sandberg bluegrass	Poa nevadensis
Short sedge	Carex rossii
Shrubby cinquefoil	Potentilla fruticosa
Silverweed	Potentilla anserina
Slender bog arrow-grass	Triglochin palustris
Slender cottongrass	Eriophorum gracile
Slender wheatgrass	Agropyron trachycaulum
Slimstem reed grass	Calamagrostis stricta
Small flower Grass of Parnassus	Parnassia parviflora
Small flower marsh-elder	Iva axillaris
Smooth scouring rush	Equisetum laevigatum
Soft-stem bulrush	Schoenoplectus tabernaemontani
Sow thistle	Sonchus sp.
Spike muhly	Muhlenbergia glomerata
Spike rush	Eleocharis sp.
Spreading bent grass	Agrostis stolonifera
Spring birch	Betula occidentalis

Starry false Solomon's seal	Smilacina stellata
Strict blue-eyed grass	Sisyrinchium montanum
Sunflower	Helianthus sp.
Swamp birch	Betula glandulosa
Tall wheatgrass	Agropyron elongatum
Tea-leaved willow	Salix planifolia
Timothy	Phleum sp.
Toadflax spp.	Linaria sp.
Torrey's rush	Juncus torreyi
Tufted hair grass	Deschampsia cespitosa
Unidentified sedges	Carex spp.
Veiny Meadowrue	Thalictrum venulosum
Vetch	Vicia sp.
Violet	Viola sp.
Water sedge	Carex aquatilis altior
Water smartweed	Polygonum amphibium
Wedge grass	Sphenopholis spp.
Western blue iris	Iris missouriensis
Western dock	Rumex occidentalis
Western fescue	Festuca occidentalis
Western snowberry	Symphoricarpos occidentalis
Western tansy mustard	Descurainia pinnata
Wheatgrass	Agropyron sp
White heath aster	Aster ericoides
White prairie aster	Aster falcatus
White-stem gooseberry	Ribes inerme
Wild mint	Mentha arvensis
Willow	Salix sp.
Willow dock	Rumex salicifolia
Willow herb	Epilobium sp.
Witch panic grass	Panicum capillare
Wolf willow	Salix wolfii
Wood's rose	Rosa woodsii
Woolly sedge	Carex lanuginosa
Wormseed wallflower	Erysimum cheiranthoides
Yellow willow	Salix lutea
Several unidentified plant species were observed:	
Unidentified Composite	
Unidentified Dicot	
Unidentified Forb	
Unidentified Seedling	

Unidentified Composite	
Unknown Poaceae	

APPENDIX 7. Biomass ANOVA Supporting Results.

The results of an ANOVA statistical test performed at 16:33 on 8-MAY-2012

Source of Variation	Sum of Squares	d.f.	Mean Squares	F
Between	2.2614E+04	6	3769.	3.309
Error	7.1767E+04	63	1139.	
Total	9.4381E+04	69		

The probability of this result, assuming the null hypothesis, is 0.007

Group A: Number of items= 10
67.1 68.9 71.7 78.9 88.0 90.7 93.4 101. 101. 130.

Mean = 89.0
95% confidence interval for Mean: 67.65 thru 110.3
Standard Deviation = 19.0
Hi = 130. Low = 67.1
Median = 89.3
Average Absolute Deviation from Median = 14.1

Group B: Number of items= 10
25.4 29.0 37.2 42.6 44.5 58.1 75.3 76.2 79.8 181.

Mean = 64.9
95% confidence interval for Mean: 43.57 thru 86.23
Standard Deviation = 45.3
Hi = 181. Low = 25.4
Median = 51.3
Average Absolute Deviation from Median = 29.2

Group C: Number of items= 10
29.0 36.3 42.6 47.2 47.2 52.6 69.9 73.5 86.2 125.

Mean = 61.0
95% confidence interval for Mean: 39.64 thru 82.30
Standard Deviation = 28.7
Hi = 125. Low = 29.0
Median = 49.9
Average Absolute Deviation from Median = 20.5

Group D: Number of items= 10
4.50 24.5 27.2 34.5 38.1 43.5 44.5 76.2 95.3 106.

Mean = 49.4
95% confidence interval for Mean: 28.11 thru 70.77
Standard Deviation = 32.6
Hi = 106. Low = 4.50
Median = 40.8
Average Absolute Deviation from Median = 23.7

Group E: Number of items= 10
13.6 14.5 15.4 26.3 28.1 32.7 38.1 39.0 46.3 49.9

Mean = 30.4
95% confidence interval for Mean: 9.061 thru 51.72
Standard Deviation = 13.1
Hi = 49.9 Low = 13.6
Median = 30.4
Average Absolute Deviation from Median = 10.8

Group F: Number of items= 10
39.0 45.5 47.2 55.3 57.2 61.7 76.2 83.5 104. 210.

Mean = 78.0
95% confidence interval for Mean: 56.71 thru 99.37
Standard Deviation = 50.6
Hi = 210. Low = 39.0
Median = 59.5
Average Absolute Deviation from Median = 29.2

Group G: Number of items= 10
12.7 25.4 28.1 39.0 43.5 43.5 57.2 65.3 72.6 121.

Mean = 50.8
95% confidence interval for Mean: 29.47 thru 72.13
Standard Deviation = 30.7
Hi = 121. Low = 12.7
Median = 43.5
Average Absolute Deviation from Median = 21.1

APPENDIX G

EXECUTED RESTRICTIVE COVENANT DEEDS

After Recording, Return to:
Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701
Attn: Rob Jordan

SPECIAL WARRANTY DEED

THIS DEED is made this ___ day of _____________, 2015, between Atlantic Richfield Company, a Delaware corporation ("Grantor"), duly authorized to do business in the State of Montana, whose address is 317 Anaconda Road, Butte, Montana 59701 and ARCO Environmental Remediation, L.L.C., a Delaware limited liability company ("Grantee"), duly authorized to do business in the State of Montana, whose address is 317 Anaconda Road, Butte, Montana 59701.

I. CONVEYANCE

Grantor, for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, by these presents does grant, bargain, sell and convey unto Grantee, its successors and assigns forever, all of Grantor's right, title and interest in the following described real property located in Township 5 North, Range 10 West, P.M.M., Deer Lodge County, Montana, to-wit ("Property"):

Tract A of Certificate of Survey No. 361-B, a tract of land located in the following sections:

Section 10, Section 11, Section 14, Section 15, Section 16, Section 20, Section 21, Section 22, Section 23, Section 26, Section 28 and Section 33.

Excluding Portions C, D and E of Certificate of Survey 420-A

Tax Parcel ID. No.: ____________________

together with all right, title and interest of the Grantor in and to (i) all improvements and fixtures on the Property as of the date hereof (including, without limitation, existing barns, corrals, fences and related improvements and fixtures), (ii) all veins, lodes or mineral deposits (including without limitation hardrock minerals, coal, oil, gas, sand and gravel or other similar substances) underneath, extending into or contained in the Property, and the right to mine such interest in the same, (iii) all rights-of-way or easements of every kind and character appurtenant to, or for the benefit of the Property, or any part thereof, or owned or used in connection therewith and the right to use same, (iv) any adjoining or adjacent streets, roads, or rights-of-way and vacated alleys appurtenant to the Property, and (v) all and singular the tenements, hereditaments, privileges, appurtenances and appropriations of every kind and nature. The foregoing grant, sale and conveyance of the Property shall be deemed to include the warranties set forth in Mont. Code Ann. § 70-20-304.

All improvements and fixtures on the Property are conveyed in their "AS IS" and "WHERE IS" condition. Grantor makes no representations or warranties of any nature concerning the physical condition of the improvements and fixtures.

II. COVENANTS

2.1 Covenants. The following covenants (the "Covenants") shall burden the Property.

2.1.1 Consent Decree. The Property is subject to the Streamside Tailings Operable Unit and Federal and Tribal Natural Resource Damages Consent Decree ("Consent Decree") that was entered on April 19, 1999 in the United States District Court for the District of Montana in Civil Action Nos. CV83-317-H-SEH and CV89-039-BU-SEH. This Consent Decree resolves certain liabilities of Grantor and Grantee under CERCLA, specifically, injury to trust resources under the Trusteeship of the United States, the State of Montana and The Confederated Salish and Kootenai Tribes of the Flathead Reservation.

2.1.2 Wildlife Management Area. The Property shall be held and managed by Grantee as a Wildlife Management Area in perpetuity where wildlife habitat conservation is of foremost importance. For purposes of this Deed Covenant, the term "Wildlife Management Area" shall mean wetland areas and other wildlife habitat areas in which all birds protected by the Migratory Bird Treaty Act, may breed and replenish.

2.1.3 Compliance with Dutchman Management Plan. The Property shall be managed in perpetuity by the Grantee in accordance with the Dutchman Management Plan dated __________, as that plan is amended from time to time (the "Dutchman Management Plan"). The Dutchman Management Plan is on file at Grantor's office located at 317 Anaconda Road, Butte, MT 59701 and at the offices of the United States Department of the Interior, Fish and Wildlife Service located at 585 Shepard Way, Helena, MT 59601-6287.

2.1.4 Prohibition on Diminishment of Wetlands Values. Grantee shall not engage in any activities that diminish the wetland values of the Property, including without limitation, altering the topography or other natural features by destroying the vegetative cover, draining or causing the draining of wetland areas or filling or causing the filling in with earth (except through natural processes) or other materials of the wetlands areas on the Property, as delineated on Exhibit A, except as authorized or permitted under the terms of the Dutchman Management Plan.

2.1.5 Prohibition on Development of the Property. Subdividing or de facto subdividing and/or developing of the Property for residential, commercial or industrial purposes is prohibited.

2.1.6 Prohibition on Structures. Erecting, constructing or placing any structures, buildings or improvement including trailers, mobile homes or other temporary living quarters is prohibited, except as authorized or permitted under the terms of the Dutchman Management Plan.

2.1.7 Prohibition on Mining. Exploration for, or development and extraction of any earthen materials (including, but not limited to minerals, hydrocarbons, sand, gravel, soil, peat or rock) by any surface or subsurface mining method is prohibited.

2.1.8 Prohibition on Game Farms. The use or development of the property for a game, fur, bird or fish farm, including the confinement, rearing, release and/or propagation of exotic or native game farm animals, birds, furbearers or fish as defined in Sections 87-2-101 and 87-4-406, Mont. Code Ann., or its successor statute is prohibited.

2.1.9 Prohibition on Commercial Feed Lots. Establishing or maintaining any commercial feedlot, defined for purposes of these Covenants as a facility used for the purpose of receiving, confining and feeding livestock for hire, is prohibited.

2.1.10 Prohibition on Dumping. Dumping or disposing of refuse and/or any material which is harmful to wildlife or considered to contaminate soil, groundwater, streams, lakes or wetlands is prohibited.

2.1.11 Prohibition on New Roads. Constructing any new roads or granting of road right-of-way easements is prohibited, except as authorized or permitted under the terms of the Dutchman Management Plan.

2.1.12 Prohibition of Energy Facilities. Erecting, constructing, developing or placing any commercial energy facility on the Property, or using the Property in support of a commercial energy facility or infrastructure is prohibited. Examples of such energy facility include, but are not limited to, wind, solar, geothermal, nuclear, and/or ethanol.

2.1.13 Prohibition on Groundwater Wells. Construction and installation of any new water wells on the Property is prohibited except as authorized or permitted under the terms of the Dutchman Management Plan.

2.2 Run With the Land. All of the foregoing covenants are covenants that run with the land that are binding on Grantee, Grantee's successors and assigns and any subsequent owners of all or any part of the Property. Atlantic Richfield Company and its respective successors and assigns are intended beneficiaries of the covenants and shall have the right to enforce the covenants to the fullest extent permitted under Montana law.

2.3 Covenants/Equitable Servitudes. All of the Covenants contained in Section 2.1 hereof are made for the direct, mutual, and reciprocal benefit of each and every portion of the Property and create an equitable servitude thereon. Each of the Covenants shall operate as a covenant running with the land for the benefit of each lot or parcel of the Property, and shall inure to the benefit of Grantee, Grantor, and any successors, assigns and any subsequent owners of the Property.

2.4 Modification of Covenants. Any proposed modification of the Covenants must be approved in writing by Grantor, Grantee, and the owner of the parcel burdened by the Covenant to be modified. In order to be effective, any modification of the Covenants must be dated after the date of this Deed and duly recorded in the Anaconda-Deer Lodge County real property records. Any modification that complies with the foregoing requirements shall be deemed duly created and enforceable from and after the effective date thereof. A modification of the Covenants may include the termination of any or all of the Covenants.

2.5 Designation of Rights. Grantor may designate any person or entity to exercise the approval rights granted under Section 2.4. Any such designation shall be in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

III. ENFORCEMENT OF RIGHTS AND REMEDIES

3.1 Enforcement of Covenants. Grantor, the United States Fish and Wildlife Service and any successor bureaus, department or agencies (an "Enforcing Party") shall have the right to enforce the Covenants. Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law.

3.2 Remedies.

3.2.1. Remedies. All remedies available at law, in equity or specifically provided in this Deed shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the Enforcing Party.

3.2.2. Specific Performance. Grantee hereby specifically agrees that in addition to all other remedies available under this Deed, at law or in equity, the remedy of "specific performance" shall be available to the Enforcing Party. Grantee hereby waives, to the fullest extent permitted by Montana law, any rights it may have to argue that specific performance is an inappropriate remedy.

3.2.3. Other Remedies. In the event that Grantee fails to comply with any of the Covenants, the Enforcing Party may notify Grantee in writing of the failure, which notice shall specify the item(s) of non-compliance. Grantee shall have 30 days following delivery of the notice to correct the items of non-compliance to the written satisfaction of the Enforcing Party that gave the notice. If Grantee does not cure the failure within 30 days following delivery of the notice, the Enforcing Party shall have the right, but not the obligation, to enter onto to cure the failure and to charge to Grantee the costs incurred by the Enforcing Party in taking any such actions. Grantee shall promptly reimburse Grantor for all such costs incurred. Further, Grantee shall indemnify, defend and hold harmless, the Enforcing Party, its agents, employees or contractors from and against all claims against the Enforcing Party, or liabilities incurred by the Enforcing Party, in taking such actions. Nothing in this Section 3.2.3 shall limit, qualify or abrogate the Enforcing Party's right to specific performance under Section 3.2.2.

3.2.4. Attorneys Fees. If the Enforcing Party is the prevailing party in any action brought by it, the Enforcing Party shall be entitled to reasonable attorneys' fees and costs incurred in bringing such action.

3.3 No Waiver. A delay or failure to enforce in any specific instance any Covenant or any violation of any Covenant shall not preclude or waive the right of any Enforcing Party to enforce such Covenant or the violation thereof in that or in any other instance.

3.4 Waiver. An Enforcing Party may waive, in a writing executed by the Enforcing Party, a violation of the Covenants. Such waiver shall relate only to the specific violation described in the waiver and shall not be effective to waive any other Covenants or any prior or subsequent violation, whether of the same or different nature. A waiver by one Enforcing Party shall not be effective against or constitute a waiver by any other Enforcing Party.

3.5 Designation of Rights. Grantor may designate any person or entity to exercise the enforcement and waiver rights granted under this Article III. Any such designation shall be in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

IV. CONVEYANCE/SUBSEQUENCE OWNERS

4.1 General. The Covenants referenced in this Deed are covenants which run with the land and shall be binding upon all subsequent owners of all or any part of the Property as covenants or agreements made for the benefit of Atlantic Richfield Company.

4.2 Provisions of Subsequent Conveyance Instruments. Grantee hereby agrees that in any subsequent conveyance of all or any part of the Property, or any interest in the Property (including without limitation any grant of an easement burdening the Property or any grant of a lease of all or any part of the Property), the Grantee shall include the following provisions in the deed or other conveyance instrument (completed appropriately to refer to this Deed and modified only so as to fit appropriately in the context of the conveyance instrument):

> Grantee hereby agrees to: (i) accept the Property subject to the Covenants set forth in that certain Special Warranty Deed dated ____________, and recorded on ____________, at Book ___, Page ___, Reception No. __________ in the real property records of the City and County of Anaconda-Deer Lodge (the "Covenant Deed"), and (ii) abide by and enforce the Covenants as the owner of the Property in accordance with the terms and conditions of the Covenant Deed.
>
> Grantee hereby also agrees that in any subsequent deed or other conveyance instrument, it shall require the grantee in such deed or conveyance instrument to either (a) execute a deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph, or (b) execute a separate acknowledgment attached to the deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph.

4.3 Binding Effect. Notwithstanding the foregoing, any person or entity who acquires any right, title or interest in all or any part of the Property shall be conclusively deemed to have consented and agreed to the provisions of Section 4.2, whether or not any reference to this Deed or these provisions is contained in the deed or other conveyance instruments by which such person or entity acquires an interest in the Property.

V. MISCELLANEOUS

Neither this Deed nor any of the terms, recitals, provisions or statements contained herein shall be construed as an admission of liability by either party in any proceeding, action or dispute under any applicable laws. In addition, Grantor may assign its rights or delegate its duties with respect to the Covenants to any person or entity. Any such assignment or delegation shall be made in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

Executed effective for all purposes as of the date first written above.

SIGNATURES ON FOLLOWING PAGE

"GRANTOR":

ATLANTIC RICHFIELD COMPANY, a Delaware corporation

By: ______________________________
Printed Name: ______________________________
Title: ______________________________

"GRANTEE":

ARCO ENVIRONMENTAL REMEDIATION, L.L.C., a Delaware limited liability company

By: ______________________________
Printed Name: ______________________________
Title: ______________________________

STATE OF ______________)
) ss.
COUNTY OF ____________)

The foregoing instrument was acknowledged before me the ___ day of ____________, 2015, by __________________, as __________________ of Atlantic Richfield Company, a Delaware corporation.

Witness my hand and official seal.

My commission expires: __________

____
Notary Public

STATE OF ______________)
) ss.
COUNTY OF ____________)

The foregoing instrument was acknowledged before me the ___ day of _____________, 2015, by_______________, as __________________ of ARCO Environmental Remediation, L.L.C., a Delaware limited liability company.

Witness my hand and official seal.

My commission expires: __________

____
Notary Public

EXHIBIT A

Map Depicting Wetlands Area

County of Deer Lodge)

183302

March, 2009 at 20 minutes past 10 o'clock A. M., and is recorded on Page ______ of Book ______ of Records of Deer Lodge County, Montana.
MARIE HATCHER County Recorder Linda K. Hogan Deputy
Fees $ 132.00

BOOK 215 PAGE 688

GARDINER DITCH AGREEMENT

This Gardiner Ditch Agreement (hereinafter referred to as ("Agreement") is made and entered into this 21st day of November, 2008, by and between ARCO Environmental Remediation, LLC, (hereinafter referred to as "AERL"), whose address is 317 Anaconda Road, Butte, Montana 59701, and Jess Eighorn (hereinafter referred to as "Eighorn"), whose addresses is 1572 Galen Lane, Deer Lodge, Montana 59722.

WITNESSETH;

WHEREAS, AERL and Eighorn, share a point of diversion, certain diversions works and measuring devices, and a ditch (hereinafter collectively referred to as the "Gardiner Ditch") that has been historically used to divert the waters of Warm Springs Creek for irrigation on their respective lands;

WHEREAS, the Gardiner Ditch diverts the waters of Warm Springs Creek at a point in the SESESE of Section 31, T5N, R10W, in Deer Lodge County, Montana;

WHEREAS, the water rights used by AERL and Eighorn down and through the Gardiner Ditch are owned separately by AERL and Eighorn;

WHEREAS, Eighorn has sold, transferred, or otherwise conveyed a portion of his water and water rights to those individuals identified on Exhibit A hereto (hereinafter referred to collectively as the "Successors-in-Interest");

WHEREAS, the Gardiner Ditch first traverses lands owned by AERL before said Ditch intersects lands of Eighorn or the Successors-in-Interest;

WHEREAS, there is a significant amount of water that seeps through the Gardiner Ditch bed and banks as said Ditch traverses the lands of AERL and others;

WHEREAS, AERL uses approximately 75% of the capacity of the Gardiner Ditch through that portion that flows across its lands, and Eighorn and the Successors-in-Interest use approximately 25% of the capacity of said Ditch over this portion;

WHEREAS, AERL intends to seek the authority of the Department of Natural Resources and Conservation ("DNRC") pursuant to MCA 85-2-402 to change the purpose of use, place of use, and/or point of diversion of the water rights it owns, inter alia, that have been historically diverted down the Gardiner Ditch;

WHEREAS, in the event that the water rights of AERL that have been historically diverted down the Gardiner Ditch are hereinafter changed under the authority of the DNRC for diversion and use at other points of diversion not involving the Gardiner Ditch, the whole amount of the seepage losses would accrue to the water rights of Jess Eighorn and the Successors-in Interest;

WHEREAS, AERL and Eighorn have cooperated with each other in measuring flows in the Gardiner Ditch and ascertaining the seepage losses therefrom;

WHEREAS, the total amount of seepage losses from the point of diversion of the Gardiner Ditch on Warms Springs Creek to the intersection of the Ditch at the Eighorn property line is approximately 25% of the total amount diverted (hereinafer the "Total Ditch Loss");

WHEREAS, 25% of the Total Ditch Loss should be attributed to the diversion and use of the water rights owned by Eighorn and the Successors-in-Interest;

WHEREAS, 75% of the Total Ditch Loss should be attributed to the diversion and use of the water rights owned by AERL;

WHEREAS, the total share of the AERL water rights to the ditch loss that accrues to the water diverted through the Gardiner Ditch from the point of diversion to the point at which the Ditch first intersects the Eighorn Property can be ascertained at any given time by assigning 19% of the total amount of water diverted under those water rights to such ditch loss (25% of total diversion as multiplied by 75% of capacity of ditch used by AERL);

WHEREAS, AERL and Eighorn, together with the Successors-in-Interest who hereafter execute the Acknowledgment set forth at Exhibit B hereto, wish to enter into an agreement providing for the change of water rights owned by AERL that have been historically diverted down the Gardiner Ditch in ways that preserve 75% of the total seepage loss in the Gardiner Ditch from its point of diversion on Warm Springs Creek down to its intersection with the lands owned by Eighorn;

WHEREAS, Eighorn, together with the Successors-in-Interest who hereafter execute the Acknowledgment set forth at Exhibit B hereto, wish to assign their rights to access the Gardiner Ditch and its banks for the inspection, maintenance, repair, improvement of the same, and any other lawful purpose, in order that AERL, its transferees, successors and assigns may design, install, emplace, measure, and otherwise implement the water saving measures permitted by this Agreement;

NOW THEREFORE, for good and valuable consideration, the receipt and adequacy of which are acknowledged, AERL and Eighorn, together with the Successors-in-Interest who hereafter execute the Acknowledgment set forth at Exhibit B hereto, agree as follows:

1. **AERL Change of Water Rights.** AERL may change the point of diversion, place of use, and/or purpose of use of each or all of its water rights, or so much thereof of them as it elects from time to time, and no such change in any water right, or any use of water under

such a change, shall be deemed to adversely affect or injure any water right or interest of Eighorn and/or the Successors-in-Interest who hereafter execute the Acknowledgment set forth at Exhibit B hereto, provided that, for those water rights of AERL that have been historically diverted and used exclusively down the Gardiner Ditch (hereinafter referred to as "AERL Gardiner Ditch Water Rights"), as evidenced by the face of the decree entered in that action styled "76G Joint Proceedings" arising under the Temporary, Preliminary Decree for the Upper Clark Fork River that names the point of diversion of said Ditch as the sole point of diversion of that water right, AERL shall make available at the point of diversion of the Gardiner Ditch out of the AERL Gardiner Ditch Water Rights, the smallest or least amount of water of the following:

a.) None, where at least 8 cfs of the AERL water rights are being diverted at the point of diversion of the Gardiner Ditch.
b.) None, where not more 5 cfs is being diverted at the point of diversion of the Gardiner Ditch through the water rights of Eighorn and/or the Successors-In-Interest.
c.) 19% of the total amounts of the AERL Gardiner Ditch Water Rights that are then in priority and actually being used under a change of water right authorization issued by the DNRC at a point of diversion other than the Gardiner Ditch, but in no event more than 7.5 cfs.

Nothing in this paragraph shall be construed to require AERL to reduce its diversions or use from the maximum amounts that may be authorized by the DNRC for a changed purpose of use, or a changed place of use, or a change in the point of diversion, provided that said amounts are made available at the designated point of diversion out of the original decreed amounts of the changed water rights, nor shall anything in this paragraph otherwise be construed to require AERL to provide said amounts of water out of volumes historically consumptively used, as this term appears in the administrative rules of the DNRC. Likewise, nothing in this paragraph shall be construed to obligate AERL to make available water out of the AERL Gardiner Ditch Water Rights at the designated point of diversion of the Gardiner Ditch, unless said water rights are then being actually used, and not simply authorized for use, for a purpose of use, at a place of use, or at a point of diversion, or for a purpose of use, authorized under the authority of the DNRC pursuant to MCA 85-2-402 that does not result in water being diverted down the Gardiner Ditch, and then only to the extent that water rights so changed under such authority are in priority. For the purposes of giving effect to the limitations set forth in this paragraph, any percentage obligations set forth in subparagraph (c) hereof shall be applied to that proportion of the total original decreed flow rate of the AERL Gardiner Ditch Water Rights that are in priority and actually used from a changed point of diversion under DNRC's authority. For example, if the original decreed right was 10 cfs, and the DNRC authorized the use of 8 cfs from or at an different point of diversion under that water right, and 8 cfs was actually being used in priority under the authorization to change, then and in that event the percentage obligation in subparagraph 1(c) would be 1.9 cfs. (10 x 19%). Likewise, if at any given time only 5 cfs was being used under the authorization to change that approved the use of 8 cfs, then and in that event the percentage obligation in subparagraph 1(c) would be 1.19 cfs. (10 cfs x 0.19) x (5 divided by 8). Finally, nothing herein shall be construed to alter or amend any existing covenant or condition heretofore agreed to in relation to that certain Special Warranty Deed recorded at Book 111, Page 362, of the records of Deer Lodge County.

2. **Maintenance of Ditch.** AERL shall have no obligation to perform any maintenance or repair of the Gardiner Ditch or its point of diversion and/or measuring devices, or incur any cost for such maintenance or repair, nor shall AERL be required to reimburse Eighorn and/or the Successors-in-Interest who hereafter execute the Acknowledgment set forth at Exhibit B hereto for any such costs incurred by Eighorn and/or such Successors-in-Interest for such maintenance or repair in any year in which AERL does not divert water down said Ditch for more than 75 days.

3. **Preservation of Ditch Rights.** Notwithstanding any term of any authorization to change an existing water right that may be issued by the DNRC for any of AERL's water rights or any term of this Agreement, AERL shall not be deemed to have waived, abandoned, or otherwise limited its rights to use the Gardiner Ditch, or its diversion structures and measuring devices, unless such waiver, abandonment, or limitation is in writing signed by AERL.

4. **Water Saving Measures.** For purposes of this Paragraph 4, AERL refers to AERL and any transferee of AERL, in whole or in part, of any ownership interest in the AERL water rights. AERL may, in its sole discretion, elect to emplace, install, or otherwise cause water-saving measures to be applied to the Gardiner Ditch to reduce or retard seepage losses, and in that event, AERL shall be entitled to reduce its obligations under Paragraph 1 hereof in accordance with the terms of this Paragraph. For the purposes of determining the amounts of water saved by any such measures, the Ditch shall be considered to consist of those discrete segments set forth on Exhibit C hereto. For each segment in which a water-saving measure has been applied, emplaced, or installed, AERL shall cause flow measurements to be taken at the upstream and downstream segment of each segment, using customary engineering methodologies, in any month of July, August, or September. Where such measurements show that less water is being lost between such measurement points by seepage than is set forth below, then and in that event such reduced seepage will be deemed to have arisen as a result of the water saving measures applied, emplaced or installed in that segment (hereinafter referred to as the "Qualifying Seepage Reduction.").

a). Point of Diversion to Station G-1a. 4.23 cfs
b). Station G-1a to Station G-3. 1.88 cfs
c). Station G-3 to Station G-4a. 3.69 cfs
d). Station G-5b to Station G-6. 1.61 cfs

In the event of such a Qualifying Seepage Reduction, AERL shall be entitled to reduce its obligations to make available water under its water rights at the point of diversion of the Gardiner Ditch as set forth in Paragraph 1 hereof by the total amount of the Qualifying

Seepage Reduction. In order to give effect to these savings, the flow rate of 8.0 cfs set forth in Paragraph 1(a) shall be reduced by the Qualifying Seepage Reduction as measured in cubic feet per second, and when that Qualifying Seepage Reduction is equal to or greater than 8.0 cfs, no water shall be required to be made available at the designated point of diversion of the Gardiner Ditch by AERL. In addition, the percentage requirement set forth in Paragraph 1(c) hereof shall be reduced by the Qualifying Seepage Reduction, as determined by the reduction in losses measured in cubic feet per second in each segment in which a water savings measures has been applied, emplace, or installed, as calculated by subtracting the Qualifying Seepage Reduction from 10.7 cfs, and then dividing this difference by 43, which quotient is then multiplied by 75%, so long as such water-saving measure remains in place and operable. In the event that a water savings measure is installed, emplaced, or applied that by its nature is temporary in effect, no additional water measurements shall be required in the event that any such measure is thereafter renewed or reapplied. Whenever a change to Paragraph 1(a) or Paragraph 1(c) arises from the terms of this paragraph, then and in that event the changed amount, as expressed in cfs or percentages depending on the context, shall thereafter be used for subsequent determinations of Qualifying Seepage Reductions attendant to further water savings measures, instead of the 8.0 cfs and 19.2% currently set forth.

5. **Assignment of Ditch Rights.** Eighorn and each of the Successors-in-Interest who hereafter execute the Acknowledgment set forth at Exhibit B hereto hereby assign their rights to access the Gardiner Ditch for any lawful purpose to AERL for all actions that may be required to implement any water savings measures contemplated under this Agreement.

6. **Acknowledgement of Successors-in-Interest** It is understood and agreed that AERL and Eighorn shall each use reasonable efforts following the execution of this Agreement to secure an executed Acknowledgement in the form attached hereto as Exhibit B from each of the Successors-in-Interest identified on Exhibit A hereto. From and after the execution of an Acknowledgement by a Successor-in-Interest, such Successor-in-interest shall be deemed a party to this Agreement and all rights and obligations of a Successor-in Interest under this Agreement shall thereafter apply to such Successor-in Interest. In the event any Successor-in-Interest fails to execute an Acknowledgement for any reason, such failure shall not effect the validity of this Agreement as between AERL, Eighorn and any Successor-in-Interest who does execute an Acknowledgement.

7. **Interpretation as Real Covenants.** This Agreement, and the obligations, duties, rights, and benefits contained herein, are intended to be construed as real covenants, running with the real property rights arising out of or related to each and all of the water rights set forth on Exhibit D and Exhibit E hereto, binding each and all of the owners thereof and anyone claiming any interest therein.

8. **Remedies.** AERL, Eighorn and each of the Successors-in-Interest who hereafter execute the Acknowledgment set forth at Exhibit B hereto shall have those remedies provided for by law or equity for the enforcement of real covenants generally, provided that,

for disputes arising out of the calculation of Qualifying Seepage Reductions as provided for in Paragraph 4 hereof, the parties' sole and exclusive remedy shall be arbitration in accordance with the terms of this Paragraph. If the parties to any dispute are unable to agree upon an arbitrator, the party against whom arbitration is elected shall provide the demanding party with 5 names of persons with professional engineering certification within Montana that are not employed by the responding party as an independent contractor or otherwise, and the demanding party shall have fifteen days thereafter to select one such persons. In the event of a failure to so elect within fifteen days, the identifying party make select any of such five persons. The arbitrator shall conduct such hearings as our required to determine the dispute. The arbitration shall be governed by the United States Arbitration Act, 9 U.S.C. 1-16, to the exclusion of any provision of the law of the State of Montana inconsistent therewith, and judgment upon the award rendered by the single arbitrator may be entered by any court having jurisdiction thereof. The award rendered by the single arbitrator shall contain specific findings of fact and conclusions of law on which the award is based and the parties shall have the right to appeal all issues of law to any court having jurisdiction. Each party shall pay their own legal fees and expenses incurred in the arbitration, including attorneys' fees, expert fees, other professional fees. The parties also agree that the costs and fees of the arbitrator shall be shared equally by the parties to the arbitration. The arbitrator is not authorized to award any amount of damages or other monetary relief.

9. Modification of Agreement. This Agreement may only be modified or amended in a writing signed by the parties. In the event any covenant, duty, obligation or other agreement contained in this Agreement should be defaulted upon by any party and thereafter waived by the other party, such waiver shall be limited to the particular default so waived and shall not be deemed to waive any other event of default hereunder.

10. Assignment and Binding Effect.. This Agreement, and all the rights, duties, obligations, and privileges hereof, shall run with the ownership of each and all of those water rights set forth on Exhibit D and E hereto, and all those claiming an interest therein. The sale or other transfer of any such water rights shall, to that extent, terminate any parties' liabilities for the duties imposed by this Agreement relating to the conveyed water rights.

11. Governing Law. This Agreement will be governed by and construed in accordance with the laws of the State of Montana.

12. Relationship of Parties. This Agreement shall not be construed to create, either expressly or by implication, the relationship of agency or partnership between the parties. No party (including the party's agent, employees or contractors) is authorized to act on behalf of another party in any manner relating to the subject matter of this Agreement. No party shall be liable for the acts, errors or omissions of the officers, agents, employees or contractors of the other party entered into, committed or performed with respect to or in performance of this Agreement.

13. **Third-Party Beneficiaries**. Each of the provisions of this Agreement is for the sole and exclusive benefit of the parties and none of the provisions of this Agreement shall be deemed to be for the benefit of any other person or entity.

14. **Captions**. The titles or captions of the provisions of this Agreement are merely for convenience or reference and are not representations of matters included or excluded from such provisions.

15. **Entire Agreement**. This Agreement and all exhibits hereto shall constitute the entire agreement and understanding between and among the parties hereto with respect to the subject matter hereof and supersedes all prior agreements and understandings relating to such subject matter. The parties expressly acknowledge and agree that, with regard to the subject matter of this Agreement and the transactions contemplated herein, (a) there are no oral agreements between the parties and (b) this Agreement, including the exhibits attached hereto, (i) embodies the final and complete agreement between the parties, (ii) supersedes all prior and contemporaneous negotiations, offers, proposals, agreements, commitments, promises, acts, conduct, course of dealing, representations, statements, assurances and understandings, whether oral or written, and (iii) may not be varied or contradicted by evidence of any such prior or contemporaneous matter or by evidence of any subsequent oral agreement of the parties.

16. **Execution Counterparts**. This Agreement may be executed in several counterparts, each of which shall be an original and all of which shall constitute but one and the same instrument.

IN WITNESS WHEREOF, the AERL and Eighorn have caused this Agreement to be executed as of the 21 day of November, 2008.

Jess Eighorn

Jess Eighorn

ARCO ENVIRONMENTAL
REMEDIATION, L.L.C.

By: Robin J. Bullock

Robin J. Bullock
Vice-President

STATE OF MONTANA)
) ss.
COUNTY OF Montana)

On this 21st day of November 2008 before me, a Notary Public for the State of Montana, personally appeared Jess Eighorn , known to me to be the person who executed the same, and acknowledged to me that he executed the foregoing instrument.

IN WITNESS WHEREOF, I have set my hand and affixed my official seal the day and year first above written.

MARILEE C. KLAUDT
NOTARIAL SEAL
STATE OF MONTANA

MARILEE C. KLAUDT
NOTARY PUBLIC-MONTANA
Residing at Missoula, Montana
My Comm. Expires Jan. 28, 2009

(SEAL)

Marilee C. Klaudt
Notary Public for the State of Montana
Printed Name: Marilee C. Klaudt
Residing at: ____________
My commission expires: ____________

STATE OFALASKA)
) ss.
COUNTY OF ____________)

On this ___ day of ______, ____, before me, a Notary Public for the State of Alaska, personally appeared Robin Bullock, known to me to be the Vice-President of ARCO Environmental Remediation, L.L.C. and acknowledged to me that she executed the foregoing instrument on behalf of the ARCO Environmental Remediation, L.L.C.

Witness my hand and official seal.

____
Notary Public for the State of Alaska
Printed Name: ____________
Residing at: ____________
My commission expires: ____________

(SEAL)

#820390.2

STATE OF MONTANA)
) ss.
COUNTY OF ______________)

On this ___ day of ______, ____, before me, a Notary Public for the State of Montana, personally appeared Jess Eighorn , known to me to be the person who executed the same, and acknowledged to me that he executed the foregoing instrument.

IN WITNESS WHEREOF, I have set my hand and affixed my official seal the day and year first above written.

____
Notary Public for the State of Montana
Printed Name: ____________________
Residing at: ____________________
My commission expires: ______________

(SEAL)

STATE OF MONTANA)
) ss.
COUNTY OF Silver Bow)

On this 12th day of January, 2009, before me, a Notary Public for the State of Montana, personally appeared Robin Bullock, known to me to be the Vice-President of ARCO Environmental Remediation, L.L.C. and acknowledged to me that she executed the foregoing instrument on behalf of the ARCO Environmental Remediation, L.L.C.

Witness my hand and official seal.

Robert Jordan
Notary Public for the State of Montana
Printed Name: Robert Jordan
Residing at: Butte
My commission expires: August 8, 2009

(SEAL) ROBERT JORDAN NOTARIAL SEAL STATE OF MONTANA

#820390.2

EXHIBIT A
(Successors-in-Interest)

The names of the Successors-in-Interest to Jess Eighorn are as follows:

1. Dennis and Sharon Demers
2. Williams and Jodi Pauley

EXHIBIT B
(Form of Acknowledgement)

ACKNOWLEDGEMENT

____________ and ________________ , whose address is _________________,
___________________, _____________________, herby acknowledge and agree to be bound as a Successor-in Interest to the terms and conditions of that certain Gardiner Ditch Agreement dated _______________, 2008, by and between ARCO Environmental Remediation, LLC and Jess Eighorn recorded in the real property records of Anaconda-Deer Lodge County at Roll ____, Card ____.

IN WITNESS WHEREOF, ____________ and ____________ have caused this Acknowledgement to be executed as of the __ day of ________, 2008.

SUCCESSORS-IN-INTEREST:

____

____

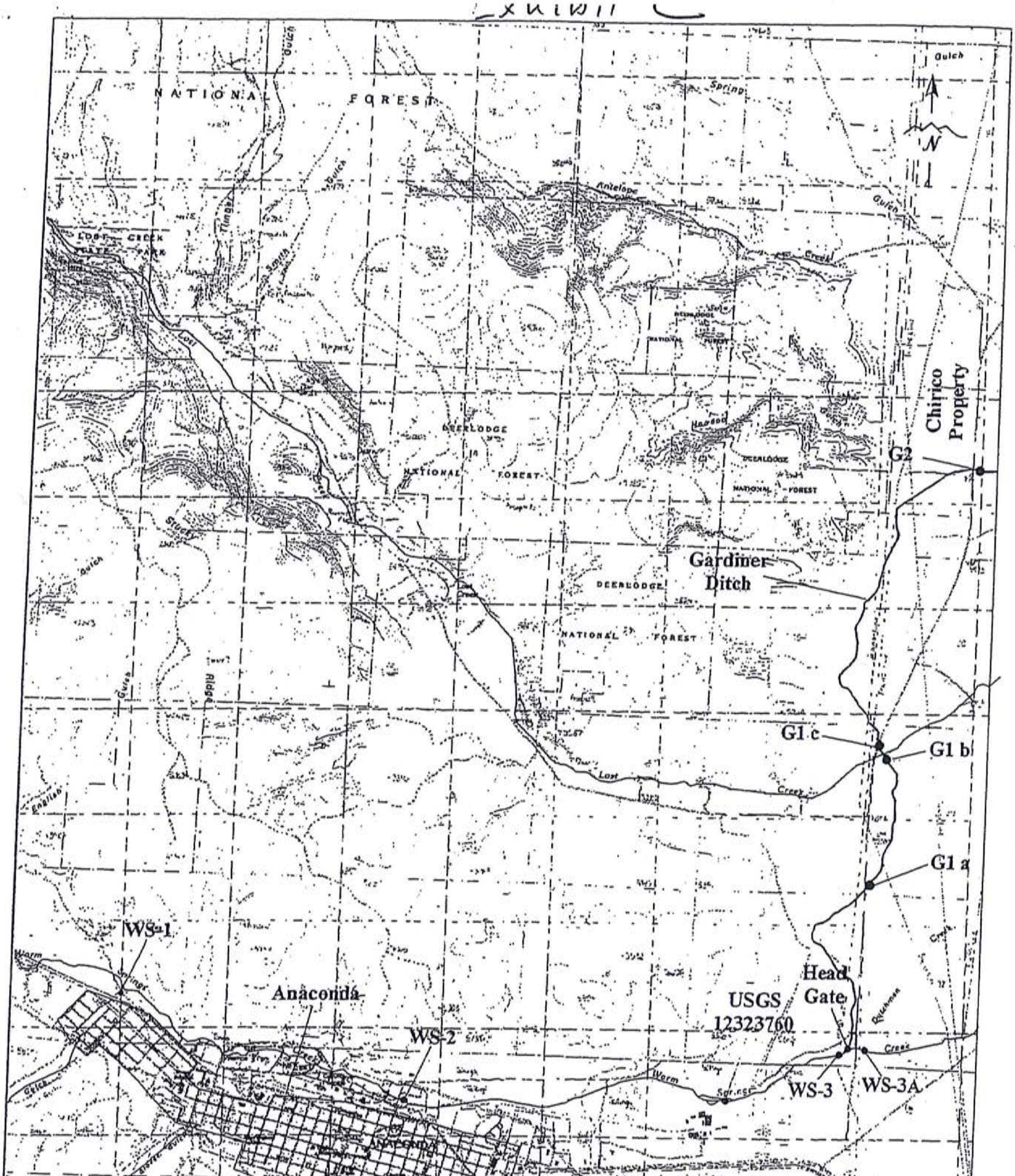
STATE OF MONTANA)
) ss.
COUNTY OF _______________)

On this ___ day of ______, ____, before me, a Notary Public for the State of Montana, personally appeared ___________________ and____________________ known to me to be the persons who executed the same, and acknowledged to me that they executed the foregoing instrument.

IN WITNESS WHEREOF, I have set my hand and affixed my official seal the day and year first above written.

____
Notary Public for the State of Montana
Printed Name: __________________________
(SEAL) Residing at:__________________________
My commission expires:______________________

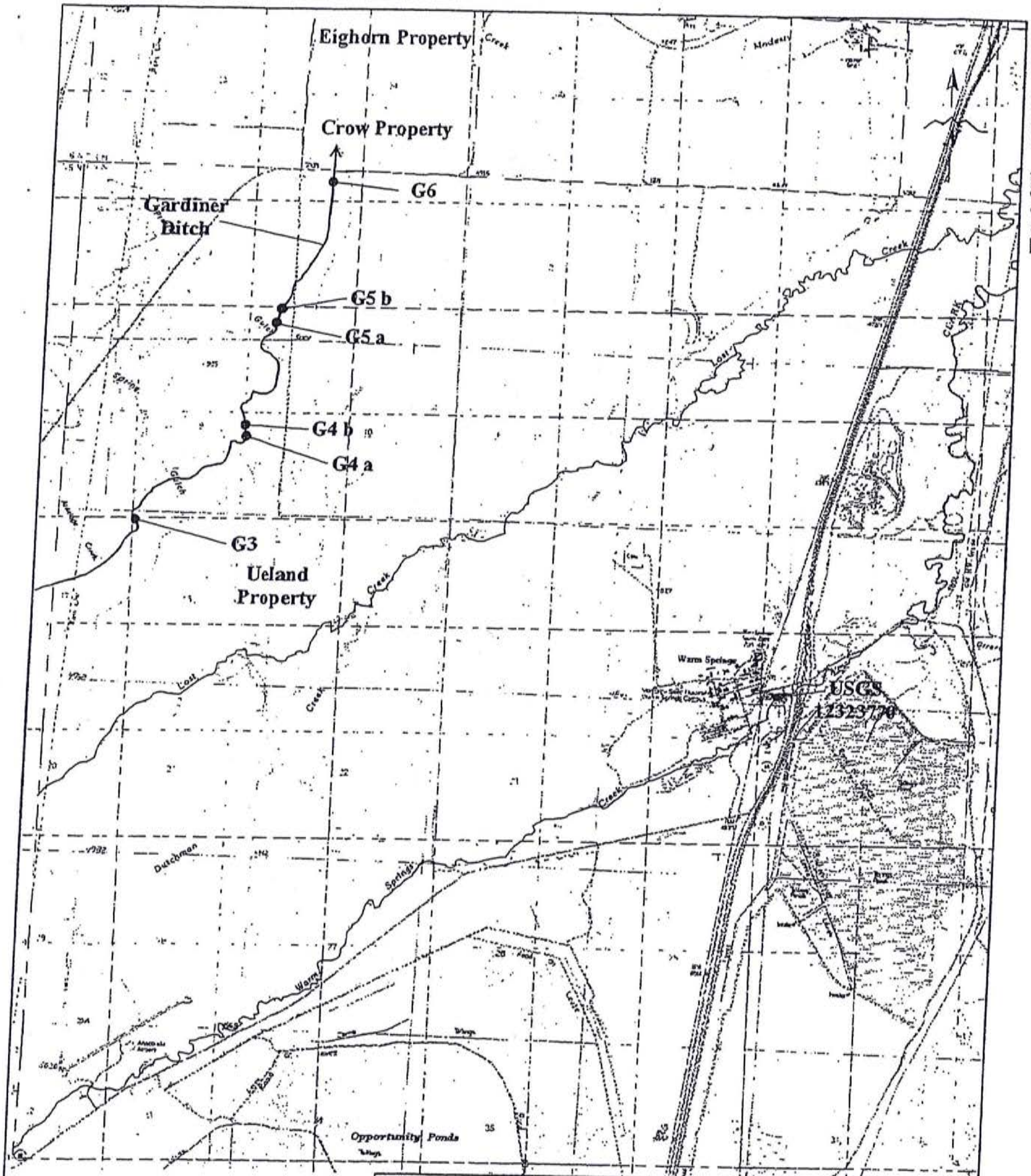
Exhibit C



PIONEER TECHNICAL SERVICES, INC.

FIGURE 1
Upper Gardiner Ditch

SCALE: NTS
DATE: 9/25/03



PIONEER TECHNICAL SERVICES, INC.

FIGURE 2
Upper Gardiner Ditch

SCALE: NTS
DATE: 9/25/03

Exhibit D

Eighorn's interest, and to the extent acknowledged by the Successors-in-Interest, the interest of the Successors-in-Interest, in and to any and all of the following water rights, or any other water right diverted out of Warm Springs Creek:

76G-126456

76G-126578
76G-126579
76G-126580
76G-126581
76G-126582
76G-126583
76G-126584
76G-126585
76G-126587
76G-126588
76G-126589
76G-126590
76G-126591
76G-126592
76G-126593
76G-126594
76G-126595
76G-126601
76G-126602
76G-126605
76G-126606
76G-126611
76G-126612
76G-126613
76G-126614
76G-126615
76G-126616
76G-126617
76G-126618
76G-126619
76G-126622
76G-126626
76G-126627
76G-126628
76G-126629
76G-126633
76G-126637
76G-126638
76G-126641

76G-126643
76G-126644
76G-126645
76G-126646
76G-126647
76G-126651
76G-126652
76G-126653
76G-126672
76G-126673
76G-126679
76G-126681
76G-126684
76G-126687
76G-126688
76G-126689
76G-127603
76G-127604
76G-127605
76G-127606
76G-127607

Exhibit E

Any of AERL's interest, if there exists such an interest, in and to any of the following water rights whose source of supply is Warm Springs Creek:,

76G-W-032342	76G-W-126464-00	76G-W-126511-00	76G-W-126551-00
76-G-W-032343-01	76G-W-126469-00	76G-W-126513-00	76G-W-126552-00
76G-W-032344-00	76G-W-126470-00	76G-W-126514-00	76G-W-126553-00
76G-W-032346-01	76G-W-126471-00	76G-W-126515-00	76G-W-126554-00
76G-W-032347-00	76G-W-126472-00	76G-W-126516-00	76G-W-126555-00
76G-W-032348-00	76G-W-126473-00	76G-W-126517-00	76G-W-126559-00
76G-W-032349-00	76G-W-126475-00	76G-W-126518-00	76G-W-126565-00
76G-W-032350-01	76G-W-126476-00	76G-W-126519-00	76G-W-126566-00
76G-W-032351-00	76G-W-126477-00	76G-W-126520-00	76G-W-126568-00
76G-W-032353-01	76G-W-126478-00	76G-W-126521-00	76G-W-126569-00
76G-W-032354-00	76G-W-126479-00	76G-W-126523-00	76G-W-126570-00
76G-W-032355-01	76G-W-126481-00	76G-W-126524-00	76G-W-126572-00
76G-W-032357-00	76G-W-126486-00	76G-W-126527-00	76G-W-126573-00
76G-W-032358-00	76G-W-126487-00	76G-W-126536-00	76G-W-126636-00
76G-W-032360-01	76G-W-126490-00	76G-W-126537-00	76G-W-127602-00
76G-W-032362-00	76G-W-126493-00	76G-W-126538-00	76G-W-127603-00
76G-W-032363-00	76G-W-126496-00	76G-W-126539-00	76G-W-127608-00
76G-W-032364-00	76G-W-126497-00	76G-W-126541-00	76G-W-127609-00
76G-W-032365-00	76G-W-126498-00	76G-W-126542-00	76G-W-91199-00
76G-W-032366-01	76G-W-126499-00	76G-W-126544-00	76G-W-91206-00
76G-W-032392-01	76G-W-126500-00	76G-W-126545-00	76G-W-91207-00
76G-W-032393-01	76G-W-126502-00	76G-W-126546-00	76G-W-91212-00
76G-W-126455-01	76G-W-126503-00	76G-W-126547-00	75G-W-91230-00
76G-W-126460-00	76G-W-126506-00	76G-W-126548-00	75G-W-91231-00
	76G-W-126507-00	76G-W-126549-00	
	76G-W-126510-00	76G-W-126550-00	

183302

Attachment 4 to AR Wetlands Plan

Form of Special Warranty Deeds

United States Department of the Interior
Fish and Wildlife Service
Ecological Services
Montana Field Office
585 Shepard Way
Helena, Montana 59601-6287
Phone: (406) 449-5225 Fax: (406) 449-5339

February 20, 2013

10,089A

Atlantic Richfield Company
Attn: Roy Thun
4 Centerpointe Drive
LaPalma, CA 90623-1066

Dear Mr. Thun:

In September of 2012, Atlantic Richfield Company (ARCO) submitted a final copy of the Dutchman Riparian Lands Wetlands Mitigation Process Step 4 -Confirmation of Response Actions report to the U.S. Fish and Wildlife Service (Service). This Dutchman Step 4 document incorporated comments that the Service and Ecological Solutions Group LLC (ESG) provided previously. The Service reviewed the final report and approves of the document becoming final.

During the review, the Service did note the following minor errors that do not affect the accuracy of the report:

- In the reference section, several references vary in the spacing after a period. The formatting should be consistent, and;
- In the meeting minutes for the June 9, 1012 meeting, in the 9th bullet on page 3 "wildlife" should be one word, and in the 10th bullet, "biomonitoring" should not be hyphenated.

Thank you for the opportunity to comment on this report and we look forward to our continued work with you on protection of the wetlands and other matters associated with compliance of the Consent Decree. Should you have any questions concerning these comments or desire

additional information please contact me at 406-449-5225 extension 215, or Ms. Karen Nelson of this office at extension 210.

Sincerely,

Brent Esmoil
Acting Field Supervisor

cc: John Sither (DOJ, DC)
Dana Jacobsen (DOI, Denver)
Kristine Edwards (USEPA, Helena)
Mary Capdeville (MT NRDP, Helena)
Paul Hansen (ESG, Stevensville)

After Recording, Return to:
Atlantic Richfield Company
317 Anaconda Road
Butte, Montana 59701
Attn: Rob Jordan

SPECIAL WARRANTY DEED

THIS DEED is made this ___ day of ______________, 2015, between Atlantic Richfield Company, a Delaware corporation ("Grantor"), duly authorized to do business in the State of Montana, whose address is 317 Anaconda Road, Butte, Montana 59701 and ARCO Environmental Remediation, L.L.C., a Delaware limited liability company ("Grantee"), duly authorized to do business in the State of Montana, whose address is 317 Anaconda Road, Butte, Montana 59701.

I. CONVEYANCE

Grantor, for and in consideration of the sum of Ten Dollars ($10.00) and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, by these presents does grant, bargain, sell and convey unto Grantee, its successors and assigns forever, all of Grantor's right, title and interest in the following described real property located in Township 5 North, Range 10 West, P.M.M., Deer Lodge County, Montana, to-wit ("Property"):

Tract A of Certificate of Survey No. 361-B, a tract of land located in the following sections:

Section 10, Section 11, Section 14, Section 15, Section 16, Section 20, Section 21, Section 22, Section 23, Section 26, Section 28 and Section 33.

Excluding Portions C, D and E of Certificate of Survey 420-A

Tax Parcel ID. No.: ____________________

together with all right, title and interest of the Grantor in and to (i) all improvements and fixtures on the Property as of the date hereof (including, without limitation, existing barns, corrals, fences and related improvements and fixtures), (ii) all veins, lodes or mineral deposits (including without limitation hardrock minerals, coal, oil, gas, sand and gravel or other similar substances) underneath, extending into or contained in the Property, and the right to mine such interest in the same, (iii) all rights-of-way or easements of every kind and character appurtenant to, or for the benefit of the Property, or any part thereof, or owned or used in connection therewith and the right to use same, (iv) any adjoining or adjacent streets, roads, or rights-of-way and vacated alleys appurtenant to the Property, and (v) all and singular the tenements, hereditaments, privileges, appurtenances and appropriations of every kind and nature. The foregoing grant, sale and conveyance of the Property shall be deemed to include the warranties set forth in Mont. Code Ann. § 70-20-304.

All improvements and fixtures on the Property are conveyed in their "AS IS" and "WHERE IS" condition. Grantor makes no representations or warranties of any nature concerning the physical condition of the improvements and fixtures.

II. COVENANTS

2.1 Covenants. The following covenants (the "Covenants") shall burden the Property.

2.1.1 Consent Decree. The Property is subject to the Streamside Tailings Operable Unit and Federal and Tribal Natural Resource Damages Consent Decree ("Consent Decree") that was entered on April 19, 1999 in the United States District Court for the District of Montana in Civil Action Nos. CV83-317-H-SEH and CV89-039-BU-SEH. This Consent Decree resolves certain liabilities of Grantor and Grantee under CERCLA, specifically, injury to trust resources under the Trusteeship of the United States, the State of Montana and The Confederated Salish and Kootenai Tribes of the Flathead Reservation.

2.1.2 Wildlife Management Area. The Property shall be held and managed by Grantee as a Wildlife Management Area in perpetuity where wildlife habitat conservation is of foremost importance. For purposes of this Deed Covenant, the term "Wildlife Management Area" shall mean wetland areas and other wildlife habitat areas in which all birds protected by the Migratory Bird Treaty Act, may breed and replenish.

2.1.3 Compliance with Dutchman Management Plan. The Property shall be managed in perpetuity by the Grantee in accordance with the Dutchman Management Plan dated __________, as that plan is amended from time to time (the "Dutchman Management Plan"). The Dutchman Management Plan is on file at Grantor's office located at 317 Anaconda Road, Butte, MT 59701 and at the offices of the United States Department of the Interior, Fish and Wildlife Service located at 585 Shepard Way, Helena, MT 59601-6287.

2.1.4 Prohibition on Diminishment of Wetlands Values. Grantee shall not engage in any activities that diminish the wetland values of the Property, including without limitation, altering the topography or other natural features by destroying the vegetative cover, draining or causing the draining of wetland areas or filling or causing the filling in with earth (except through natural processes) or other materials of the wetlands areas on the Property, as delineated on Exhibit A, except as authorized or permitted under the terms of the Dutchman Management Plan.

2.1.5 Prohibition on Development of the Property. Subdividing or de facto subdividing and/or developing of the Property for residential, commercial or industrial purposes is prohibited.

2.1.6 Prohibition on Structures. Erecting, constructing or placing any structures, buildings or improvement including trailers, mobile homes or other temporary living quarters is prohibited, except as authorized or permitted under the terms of the Dutchman Management Plan.

2.1.7 Prohibition on Mining. Exploration for, or development and extraction of any earthen materials (including, but not limited to minerals, hydrocarbons, sand, gravel, soil, peat or rock) by any surface or subsurface mining method is prohibited.

2.1.8 Prohibition on Game Farms. The use or development of the property for a game, fur, bird or fish farm, including the confinement, rearing, release and/or propagation of exotic or native game farm animals, birds, furbearers or fish as defined in Sections 87-2-101 and 87-4-406, Mont. Code Ann., or its successor statute is prohibited.

2.1.9 Prohibition on Commercial Feed Lots. Establishing or maintaining any commercial feedlot, defined for purposes of these Covenants as a facility used for the purpose of receiving, confining and feeding livestock for hire, is prohibited.

2.1.10 Prohibition on Dumping. Dumping or disposing of refuse and/or any material which is harmful to wildlife or considered to contaminate soil, groundwater, streams, lakes or wetlands is prohibited.

2.1.11 Prohibition on New Roads. Constructing any new roads or granting of road right-of-way easements is prohibited, except as authorized or permitted under the terms of the Dutchman Management Plan.

2.1.12 Prohibition of Energy Facilities. Erecting, constructing, developing or placing any commercial energy facility on the Property, or using the Property in support of a commercial energy facility or infrastructure is prohibited. Examples of such energy facility include, but are not limited to, wind, solar, geothermal, nuclear, and/or ethanol.

2.1.13 Prohibition on Groundwater Wells. Construction and installation of any new water wells on the Property is prohibited except as authorized or permitted under the terms of the Dutchman Management Plan.

2.2 Run With the Land. All of the foregoing covenants are covenants that run with the land that are binding on Grantee, Grantee's successors and assigns and any subsequent owners of all or any part of the Property. Atlantic Richfield Company and its respective successors and assigns are intended beneficiaries of the covenants and shall have the right to enforce the covenants to the fullest extent permitted under Montana law.

2.3 Covenants/Equitable Servitudes. All of the Covenants contained in Section 2.1 hereof are made for the direct, mutual, and reciprocal benefit of each and every portion of the Property and create an equitable servitude thereon. Each of the Covenants shall operate as a covenant running with the land for the benefit of each lot or parcel of the Property, and shall inure to the benefit of Grantee, Grantor, and any successors, assigns and any subsequent owners of the Property.

2.4 Modification of Covenants. Any proposed modification of the Covenants must be approved in writing by Grantor, Grantee, and the owner of the parcel burdened by the Covenant to be modified. In order to be effective, any modification of the Covenants must be dated after the date of this Deed and duly recorded in the Anaconda-Deer Lodge County real property records. Any modification that complies with the foregoing requirements shall be deemed duly created and enforceable from and after the effective date thereof. A modification of the Covenants may include the termination of any or all of the Covenants.

2.5 Designation of Rights. Grantor may designate any person or entity to exercise the approval rights granted under Section 2.4. Any such designation shall be in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

III. ENFORCEMENT OF RIGHTS AND REMEDIES

3.1 Enforcement of Covenants. Grantor, the United States Fish and Wildlife Service and any successor bureaus, department or agencies (an "Enforcing Party") shall have the right to enforce the Covenants. Each Covenant shall be enforceable, in perpetuity, to the fullest extent permitted by Montana law.

3.2 Remedies.

3.2.1. Remedies. All remedies available at law, in equity or specifically provided in this Deed shall be available for the enforcement of the Covenants. The selection of remedies shall be within the sole discretion of the Enforcing Party.

3.2.2. Specific Performance. Grantee hereby specifically agrees that in addition to all other remedies available under this Deed, at law or in equity, the remedy of "specific performance" shall be available to the Enforcing Party. Grantee hereby waives, to the fullest extent permitted by Montana law, any rights it may have to argue that specific performance is an inappropriate remedy.

3.2.3. Other Remedies. In the event that Grantee fails to comply with any of the Covenants, the Enforcing Party may notify Grantee in writing of the failure, which notice shall specify the item(s) of non-compliance. Grantee shall have 30 days following delivery of the notice to correct the items of non-compliance to the written satisfaction of the Enforcing Party that gave the notice. If Grantee does not cure the failure within 30 days following delivery of the notice, the Enforcing Party shall have the right, but not the obligation, to enter onto to cure the failure and to charge to Grantee the costs incurred by the Enforcing Party in taking any such actions. Grantee shall promptly reimburse Grantor for all such costs incurred. Further, Grantee shall indemnify, defend and hold harmless, the Enforcing Party, its agents, employees or contractors from and against all claims against the Enforcing Party, or liabilities incurred by the Enforcing Party, in taking such actions. Nothing in this Section 3.2.3 shall limit, qualify or abrogate the Enforcing Party's right to specific performance under Section 3.2.2.

3.2.4. Attorneys Fees. If the Enforcing Party is the prevailing party in any action brought by it, the Enforcing Party shall be entitled to reasonable attorneys' fees and costs incurred in bringing such action.

3.3 No Waiver. A delay or failure to enforce in any specific instance any Covenant or any violation of any Covenant shall not preclude or waive the right of any Enforcing Party to enforce such Covenant or the violation thereof in that or in any other instance.

3.4 Waiver. An Enforcing Party may waive, in a writing executed by the Enforcing Party, a violation of the Covenants. Such waiver shall relate only to the specific violation described in the waiver and shall not be effective to waive any other Covenants or any prior or subsequent violation, whether of the same or different nature. A waiver by one Enforcing Party shall not be effective against or constitute a waiver by any other Enforcing Party.

3.5 Designation of Rights. Grantor may designate any person or entity to exercise the enforcement and waiver rights granted under this Article III. Any such designation shall be in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

IV. CONVEYANCE/SUBSEQUENCE OWNERS

4.1 General. The Covenants referenced in this Deed are covenants which run with the land and shall be binding upon all subsequent owners of all or any part of the Property as covenants or agreements made for the benefit of Atlantic Richfield Company.

4.2 Provisions of Subsequent Conveyance Instruments. Grantee hereby agrees that in any subsequent conveyance of all or any part of the Property, or any interest in the Property (including without limitation any grant of an easement burdening the Property or any grant of a lease of all or any part of the Property), the Grantee shall include the following provisions in the deed or other conveyance instrument (completed appropriately to refer to this Deed and modified only so as to fit appropriately in the context of the conveyance instrument):

> Grantee hereby agrees to: (i) accept the Property subject to the Covenants set forth in that certain Special Warranty Deed dated ___________, and recorded on ___________, at Book ___, Page ___, Reception No. _________ in the real property records of the City and County of Anaconda-Deer Lodge (the "Covenant Deed"), and (ii) abide by and enforce the Covenants as the owner of the Property in accordance with the terms and conditions of the Covenant Deed.
>
> Grantee hereby also agrees that in any subsequent deed or other conveyance instrument, it shall require the grantee in such deed or conveyance instrument to either (a) execute a deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph, or (b) execute a separate acknowledgment attached to the deed or conveyance instrument which contains the agreements set forth in the immediately preceding paragraph.

4.3 Binding Effect. Notwithstanding the foregoing, any person or entity who acquires any right, title or interest in all or any part of the Property shall be conclusively deemed to have consented and agreed to the provisions of Section 4.2, whether or not any reference to this Deed or these provisions is contained in the deed or other conveyance instruments by which such person or entity acquires an interest in the Property.

V. MISCELLANEOUS

Neither this Deed nor any of the terms, recitals, provisions or statements contained herein shall be construed as an admission of liability by either party in any proceeding, action or dispute under any applicable laws. In addition, Grantor may assign its rights or delegate its duties with respect to the Covenants to any person or entity. Any such assignment or delegation shall be made in writing, shall refer to this provision and shall be recorded in the Anaconda-Deer Lodge County real property records.

Executed effective for all purposes as of the date first written above.

SIGNATURES ON FOLLOWING PAGE

"GRANTOR":

ATLANTIC RICHFIELD COMPANY, a Delaware corporation

By: ______________________________
Printed Name: ______________________________
Title: ______________________________

"GRANTEE":

ARCO ENVIRONMENTAL REMEDIATION, L.L.C., a Delaware limited liability company

By: ______________________________
Printed Name: ______________________________
Title: ______________________________

STATE OF ______________)
) ss.
COUNTY OF ____________)

The foregoing instrument was acknowledged before me the ___ day of ______________, 2015, by ____________________, as ____________________ of Atlantic Richfield Company, a Delaware corporation.

Witness my hand and official seal.

My commission expires: ___________

____
Notary Public

STATE OF ______________)
) ss.
COUNTY OF ____________)

The foregoing instrument was acknowledged before me the ___ day of _____________, 2015, by _______________, as ___________________ of ARCO Environmental Remediation, L.L.C., a Delaware limited liability company.

Witness my hand and official seal.

My commission expires: __________

____
Notary Public

EXHIBIT A

Map Depicting Wetlands Area

Attachment 5 to AR Wetlands Plan

USFWS Letter Approving the
Dutchman Riparian Lands Wetlands Mitigation Process,
Step 4 – Confirmation of Response Actions
(February 20, 2013)

United States Department of the Interior

Fish and Wildlife Service

Ecological Services
Montana Field Office
585 Shepard Way
Helena, Montana 59601-6287
Phone: (406) 449-5225 Fax: (406) 449-5339

February 20, 2013

10,089A

Atlantic Richfield Company
Attn: Roy Thun
4 Centerpointe Drive
LaPalma, CA 90623-1066

Dear Mr. Thun:

In September of 2012, Atlantic Richfield Company (ARCO) submitted a final copy of the Dutchman Riparian Lands Wetlands Mitigation Process Step 4 -Confirmation of Response Actions report to the U.S. Fish and Wildlife Service (Service). This Dutchman Step 4 document incorporated comments that the Service and Ecological Solutions Group LLC (ESG) provided previously. The Service reviewed the final report and approves of the document becoming final.

During the review, the Service did note the following minor errors that do not affect the accuracy of the report:

- In the reference section, several references vary in the spacing after a period. The formatting should be consistent, and;

- In the meeting minutes for the June 9, 1012 meeting, in the 9th bullet on page 3 "wildlife" should be one word, and in the 10th bullet, "biomonitoring" should not be hyphenated.

Thank you for the opportunity to comment on this report and we look forward to our continued work with you on protection of the wetlands and other matters associated with compliance of the Consent Decree. Should you have any questions concerning these comments or desire

additional information please contact me at 406-449-5225 extension 215, or Ms. Karen Nelson of this office at extension 210.

Sincerely,

Brent Esmoil
Acting Field Supervisor

cc: John Sither (DOJ, DC)
Dana Jacobsen (DOI, Denver)
Kristine Edwards (USEPA, Helena)
Mary Capdeville (MT NRDP, Helena)
Paul Hansen (ESG, Stevensville)