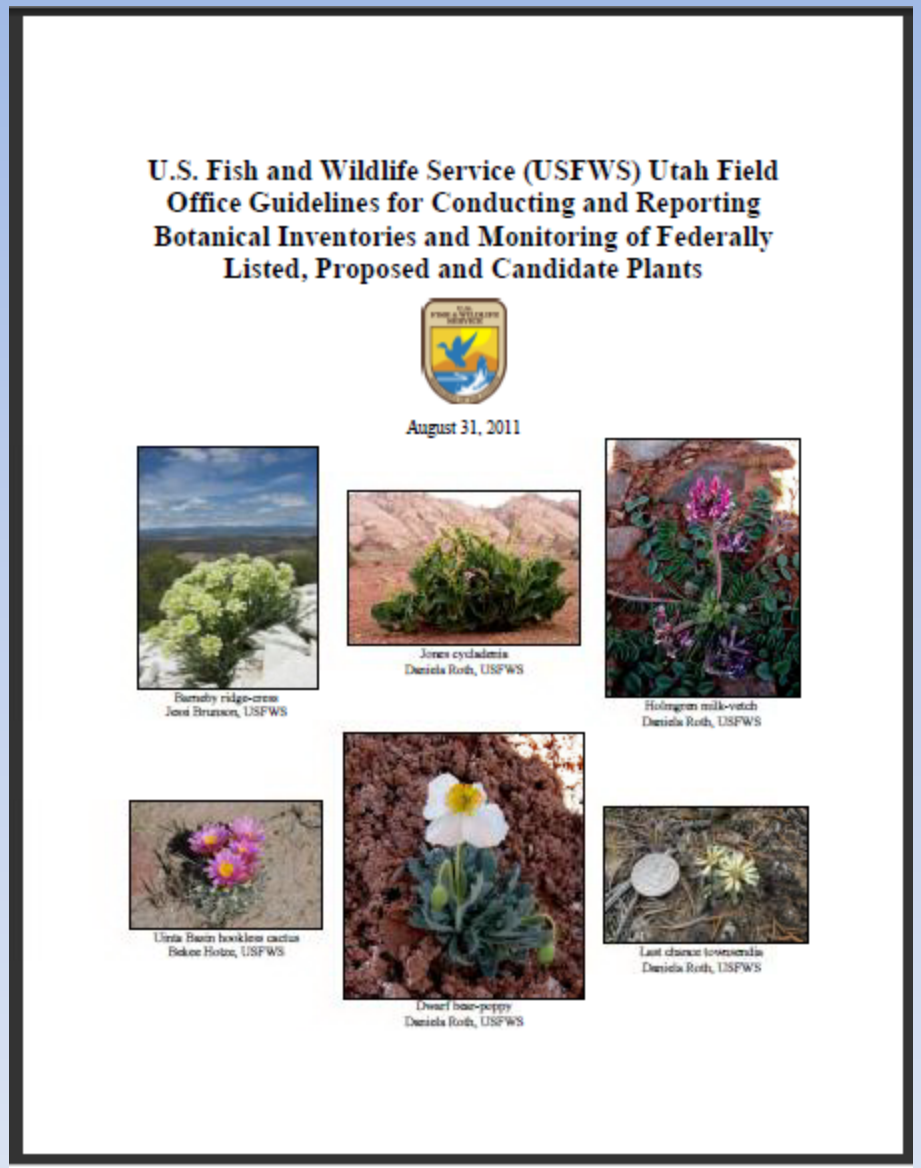


Utah Field Office Guidelines for Inventory and Monitoring

http://www.fws.gov/utahfieldoffice/surveyor.php

Purpose

- Minimum standards for plant surveys for “target” species
- To improve data consistency
- Improve reporting consistency
- USFWS protocols are part of the BLMs and BIA’s required protocols for listed species

Format of guidance

- I. Personnel Qualifications
- II. Survey Guidelines
- III. GPS Data
- IV. Reporting Guidelines

I. Personnel Qualifications

A. Field Crew leaders
   - Degree in botany and 2 field seasons (recommended)

   OR
   - Education and experience
   - Crew leader must be present, Max 5 assistants per 1 leader
   - Submit resume to federal agency

B. Technicians/assistants
   - 1 year biological coursework, plant taxonomy

II. Survey Guidelines

A. General guidelines
B. Clearance surveys (most pertinent)
C. Status surveys
D. Monitoring surveys

A. General Guidelines

- Must maximize likelihood of finding target species (usually during flowering)
  - If outside recommended survey date, should receive prior approval from USFWS
- May need multiple site visits (based on flowering)
- Reference populations (contact local agency office)

A. General Guidelines

- Document:
  - biological setting
  - level of survey effort
  - Photo vouchers **only** (whole specimens require permit)
  - Look alikes
  - Potential threats
  - Weed infestations

… for complete list, see p.4 of Guidance

Use standard field forms (examples Appendix C)

Species Survey Period

APPENDIX A: SPECIES SPECIFIC SURVEY PERIOD AND TRANSECT WIDTH

SPECIES	*SURVEY PERIOD*	*TRANSECT WIDTH* [a]
Arctomecon humilis	Mid April – May	10 – 20 ft
Asclepias welshii	June – September	25 – 50 ft
Astragalus anserinus	May – June	10 – 20 ft
Astragalus ampullarioides	April – May	10 – 20 ft
Astragalus desereticus	May – June	10 – 20 ft
Astragalus holmgreniorum	April – May	10 – 20 ft
Astragalus montii	July – August	10 ft
Carex specuicola	May – September	N/A, habitat not suitable for transects
Cycladenia humilis var. jonesii	April – June	10 – 20 ft
Eriogonum corymbosum var. nilesii	September - October	10 – 20 ft
Eriogonum soredium	Mid June - July	10 – 20 ft
Lepidium barnebyanum	May – June	10 – 20 ft
Lepidium ostleri	Mid June - July	5 ft
Lesquerella tumulosa	May – June	5 – 10 ft
Pediocactus despainii	April – May	3 ft
Pediocactus sileri	April – June	3 – 6 ft
Pediocactus winkleri	March – April	3 ft
Penstemon scariosus var. albifluvis	May – June	10 – 20 ft
Penstemon grahamii	May – June	10 ft
Phacelia argillacea	June	10 ft
Primula maguirei	May	N/A, habitat not suitable for transects
Ranunculus aestivalis	July	5 ft

B. Clearance Surveys

- **Objective:** cover 100% of suitable habitat in project area plus avoidance buffer (300ft min)
  - First, conduct suitable habitat assessment
  - Second, 100% survey within suitable habitat
- Follow specified minimum transect widths
- Usually done with belt transects, good for 1 year (unless otherwise specified)

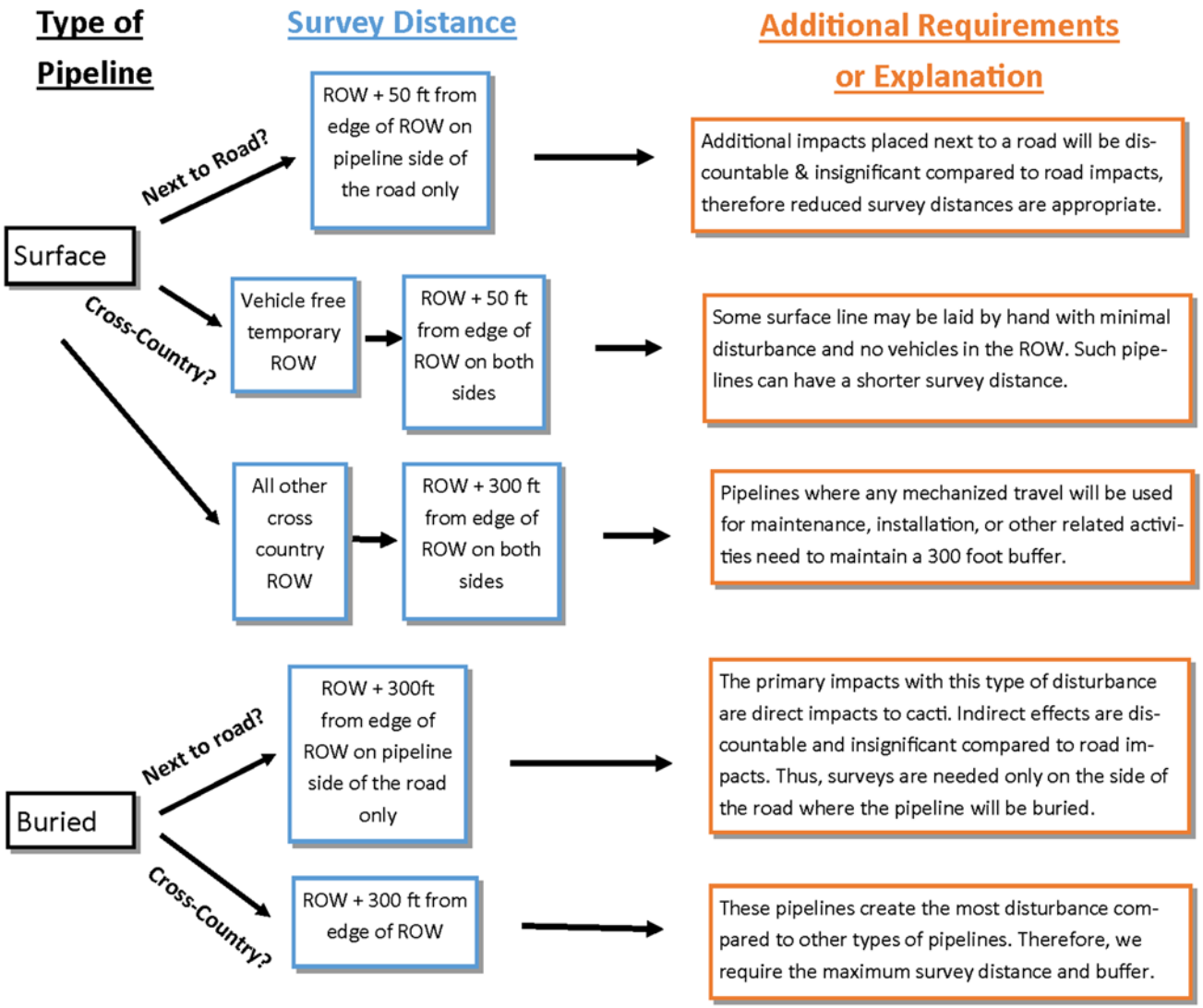
Clearance Surveys cont'd

- If target species not found;
  - indicate if area is suitable/unsuitable habitat, why, & provide photos
- If area is inaccessible;
  - Indicate why, suitability, and photos
- *Sclerocactus* habitat polygon requires 100% clearance survey throughout (no habitat assessments first)

Important Considerations

- Ute ladies'-tresses: Use Interim 1992 Survey Requirements.
- Protocols may differ on Tribal lands
  - Contact the BIA prior to conducting survey work on Tribal lands.
- Adverse conditions preventing survey (disease, drought, predation, herbivory)—discuss with agency personnel!

Flowchart for Cactus Buffers & Survey Distances for Pipelines



C. Status Surveys

- Objective: distribution and abundance in specific area at point in time
  - visits to known locations or new locations
  - less intensive survey, tradeoff with covering broader area

- Note if habitat is occupied, unoccupied and suitable or unsuitable
- Note existing and former patterns of land use

D. Monitoring Surveys

- Objective: structured, repeated assessments of target species to investigate responses
- Monitoring plan developed ahead of time
- Periodic monitoring reports
- Electronic files
- Adaptive management

III. GPS data collection and reporting

- UTM Zone 12 NAD 83
  - Electronic file format, easily imported into GIS:
    - Shapefile, coverage, etc.
    - Spreadsheet
    - .txt file
- Include info about make, model, precision of GPS
- Must be differentially correct

METADATA!

- Data to include:
  - Unique location identifier (waypoint ID)
  - **Collector name/Company name**
  - **Target species**
  - Date of observation
  - Accuracy (meters)
  - Photo identifier
  - Number of plants (rosette/clusters/individual)
  - Threats
  - **Positive and negative data**
  - Others….**See Guidelines!**

IV. Reporting

A. General guidelines

- All reports should include basics (who, what, when, where, why)
- Send copy of report to UNHP, land owner or manager (BLM, BIA, Ute Tribe, private), USFWS

B. Clearance Surveys

- Maps depicting survey area
- Descriptions of spatial extent of occupied and suitable, unoccupied habitat

  … (see guidance for complete list)
- Sclerocactus Clearance Surveys:
  - Project Reports go to land manger (BLM or BIA)
  - Annual data summary reports go to BLM (include all data regardless of land owner)
  - Due to volume of data received

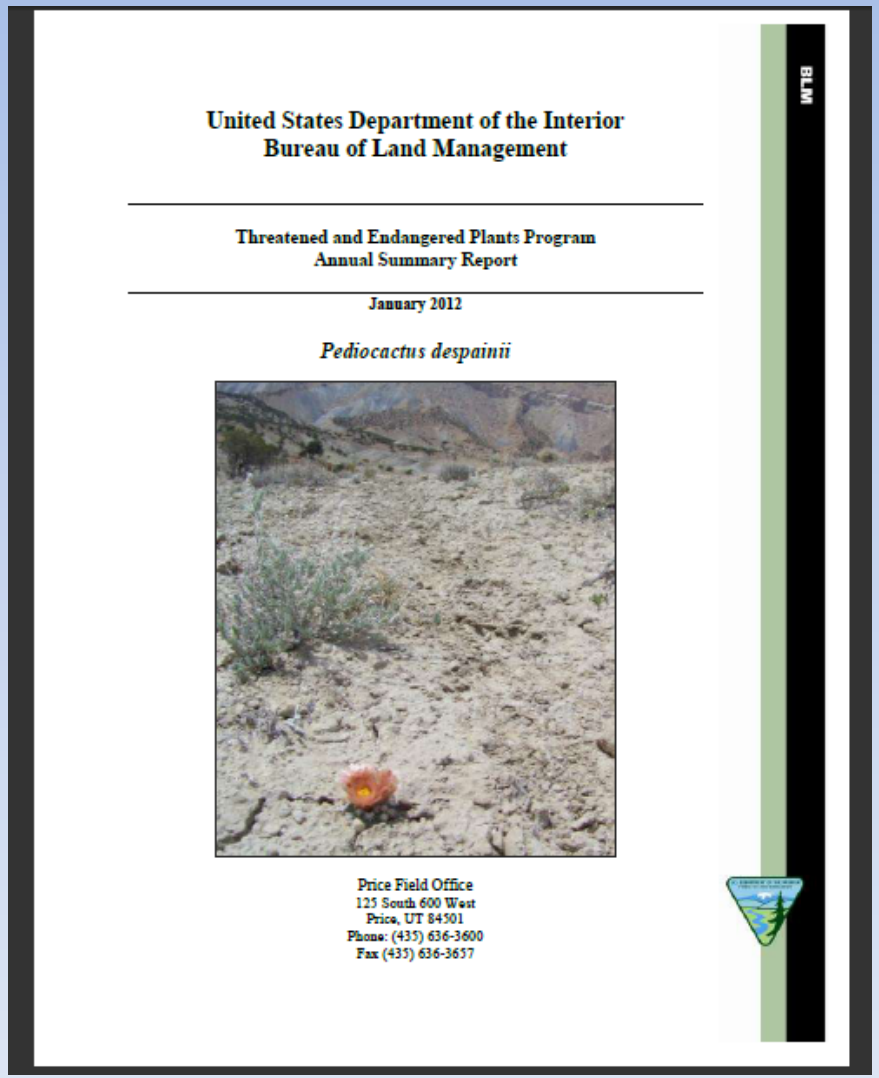
C. Status Surveys

- Ecological condition of landscape
- land uses
- relative density of target species
- Acres of occupied habitat at each site and across range
- Have these changed since last survey?
- Draft copies to species' leads for preliminary review and comment

D. Monitoring Reports

- Monitoring plan
- Format modeled after peer-reviewed scientific papers
- Prior years' reports
- Data summaries and analysis of trends
- Draft copies to species' leads for preliminary review and comment

Examples of Good Monitoring Reports



United States Department of the Interior
Bureau of Land Management

Threatened and Endangered Plants Program
Annual Summary Report

January 2012

Pediocactus despainii

Price Field Office
125 South 600 West
Price, UT 84501
Phone: (435) 636-3600
Fax (435) 636-3657

BLM

Price BLM *Pediocactus despainii* monitoring report:

Developed based on our new guidelines …

What do we like?

- Management goals and objectives clearly stated
  - For example, human-caused mortality less than 5 percent annually
- Standard format: methods, results, discussion, conclusion
- Included tables of summary data

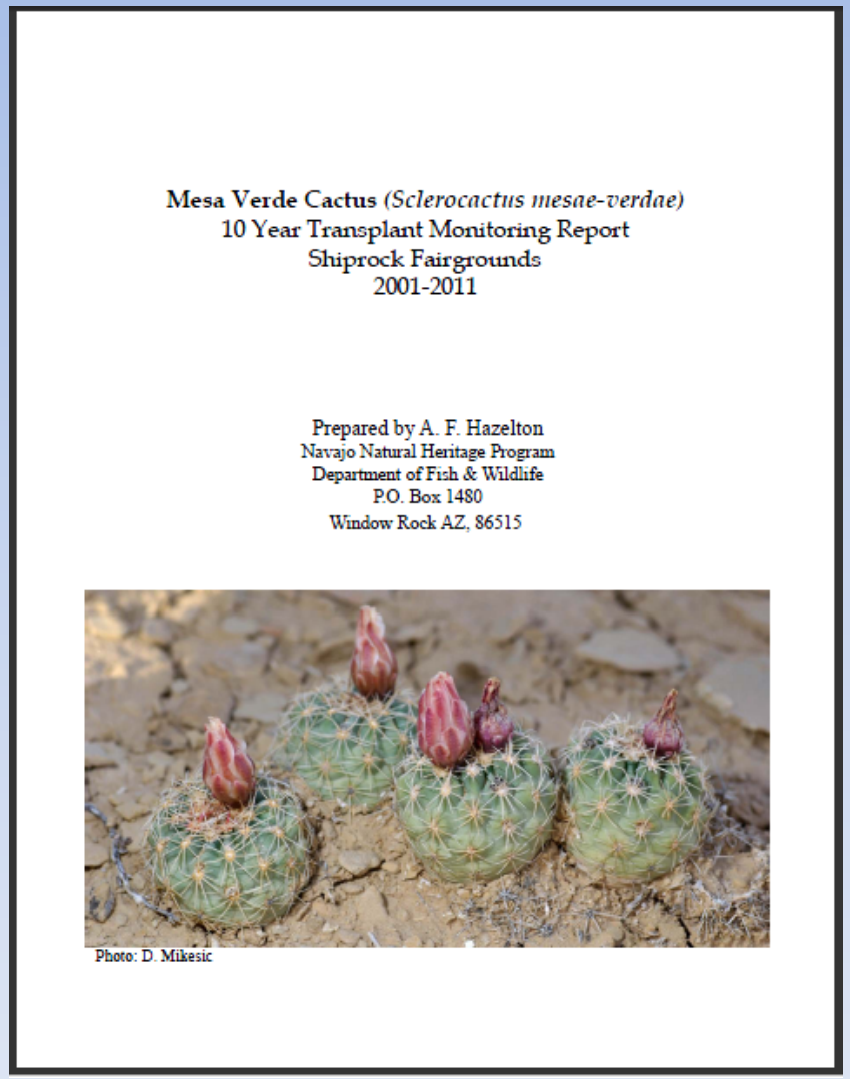
Table 4- *Pediocactus despainii* Localities Visited in 2011

Locality	# plants found in 2011	Risk Category	Primary Threats	% of Plants within 15cm of any disturbance*
Big Ridge 1	none	Low		n/a
Big Ridge 2	59	Moderate	Horse	<1%
Big Ridge 3	53	Low		0%
Blue Flat Reservoir 1	none	Moderate		n/a
Blue Flat Reservoir 2	4	Moderate		0%

Examples of Good Monitoring Reports

Mesa Verde Cactus 10 year transplant monitoring report

What do we like?



Mesa Verde Cactus *(Sclerocactus mesae-verdae)*
10 Year Transplant Monitoring Report
Shiprock Fairgrounds
2001-2011

Prepared by A. F. Hazelton
Navajo Natural Heritage Program
Department of Fish & Wildlife
P.O. Box 1480
Window Rock AZ, 86515

Photo: D. Mikesic

RESULTS

The majority of the cacti that were recorded at the start of the study in 2001 died within two years (Fig. 1). This high mortality has been attributed to exceptionally dry years in 2002 and 2003 (Roth 2008; Fig. 2). Mortality rates were equally high among both transplanted and naturally occurring cacti (Table 2; α=0.05). Most of these deaths occurred between the 2002 and 2003 sampling seasons.

As of 2011, the five monitoring plots contained 19 naturally occurring cacti and 19 transplanted cacti. Of the 19 naturally occurring cacti remaining in the plots, only four are survivors from 2001, the year of the transplants. Of the remaining 15, three were first observed in 2003, four were first observed in 2005, five were first observed in 2007, and three were found in 2011.

New germination kept pace with mortality in the naturally occurring population for the last few years. Between 2008 and 2011, three cacti died and three germinated.

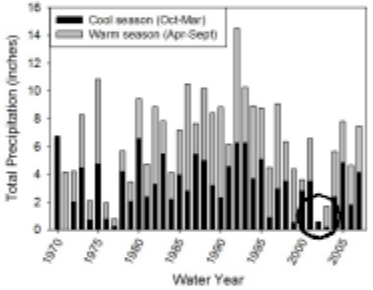


Figure 2. Total precipitation in Shiprock, NM, coded by precipitation falling during the cool season (October-March) and the warm season (April-September) for water years 1970-2007. Water years start the October preceding the calendar year and run through the September of that calendar year.

Table 2. Mortality rates and t-tests testing for differences in mortality rates for naturally occurring vs. transplanted cacti in five monitoring plots at Shiprock Fairgrounds, 2001-2011. There was no mortality in 2006 or 2008, so t-tests could not be performed for those years.

	Mortality Rate		t- test results		
Year	Naturally Occurring	Transplanted	*t*	*df*	*p*
2001-2002	0.12	0.09	0.20	8	0.85
2002-2003	0.77	0.57	0.56	8	0.59
2003-2004	0.23	0.14	0.77	8	0.46
2004-2005	0.17	0	1.61	7	0.51
2005-2006	0	0	N/A		
2006-2007	0.13	0	1.50	7	0.18
2007-2008	0	0	N/A		
2008-2009	0.05	0	1.14	7	0.29
2009-2011	0.06	0.03	0.90	7	0.40

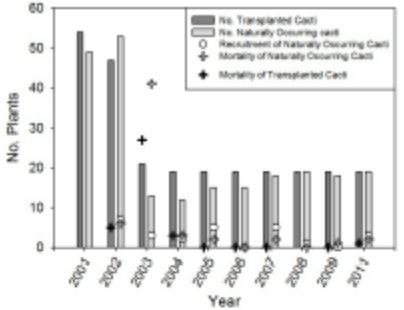


Figure 1. Total number , recruitment, and mortality of naturally occurring and transplanted Mesa Verde cactus clusters in five plots at the Shiprock Fairgrounds transplant site, 2001-2011.

The transplanted population has been holding steady as well; since 2004 there have been 19 living transplants.

In 2008, all naturally occurring cacti and 89% of the transplanted cacti were in excellent health (Fig. 3). Since then, vigor has declined slightly for the naturally occurring population, with 4 cacti, or 12%, classified as "good" rather than excellent in 2011. Of the transplanted cacti, 45% were in excellent health in 2011, 45% were in good health, and 10% were classified as being in fair health.

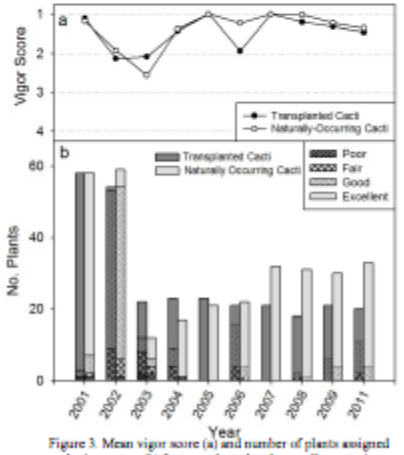


Figure 3. Mean vigor score (a) and number of plants assigned each vigor score (b) for transplanted and naturally occurring Mesa Verde cacti at the Shiprock Fairgrounds transplant site, 2001-2011. Vigor scores range from 1 (excellent), to 4 (poor).

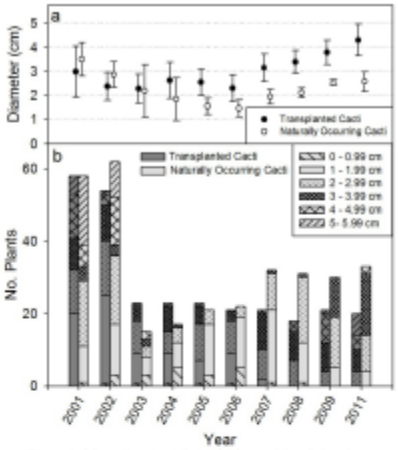


Figure 4. Mean diameter ± 1 standard error (a) and size class distribution (b) for transplanted and naturally occurring Mesa Verde cacti in five plots at the Shiprock Fairgrounds transplant site, 2001-2011.

At the beginning of the study, and until 2005, the mean diameter of transplanted cacti and naturally-occurring cacti was statistically identical (Fig. 4a, Table 3, α=0.05). Beginning in 2005, transplanted cacti were on average larger than the naturally occurring cacti. For both groups, there was a trend of decreasing diameter in the early 2000s, followed by an increase in the late 2000s. The initial decrease in diameter was more pronounced within the naturally-occurring group, while the later increase was more pronounced for the transplanted cacti (Fig 4a). Between 2006 and 2011, the naturally occurring population increased from an average 1.5 cm diameter to an average 2.6 cm diameter. Mean diameter of transplants increased from 2.6 cm in 2006 to 4.3 cm in 2011.

In 2011, the majority of naturally occurring cacti (51%) were in the 3-3.99 cm size class, followed by 30% in the 2-2.99 cm size class (Table 4, Fig. 4b). Size class distribution was more even with the transplants, with 50% of cacti less than 4 cm in diameter, and 50% greater than or equal to 4 cm diameter (Table 5, Fig. 4b).

Table 3. T-test results testing for differences in plant diameter between transplanted and naturally occurring groups of Mesa Verde cactus in five monitoring plots. Each row reports results of one t-test. *p<.05. **p<.01.

Year	t	df	*p*
2001	0.90	8	0.39
2002	1.37	8	0.21
2003	-0.16	8	0.88
2004	-1.42	7	0.20
2005	-3.11	7	0.02*
2006	-2.53	7	0.04*
2007	-3.76	7	0.01*
2008	-5.02	7	0.001**
2009	-4.81	7	0.002**
2011	-4.58	7	0.003**

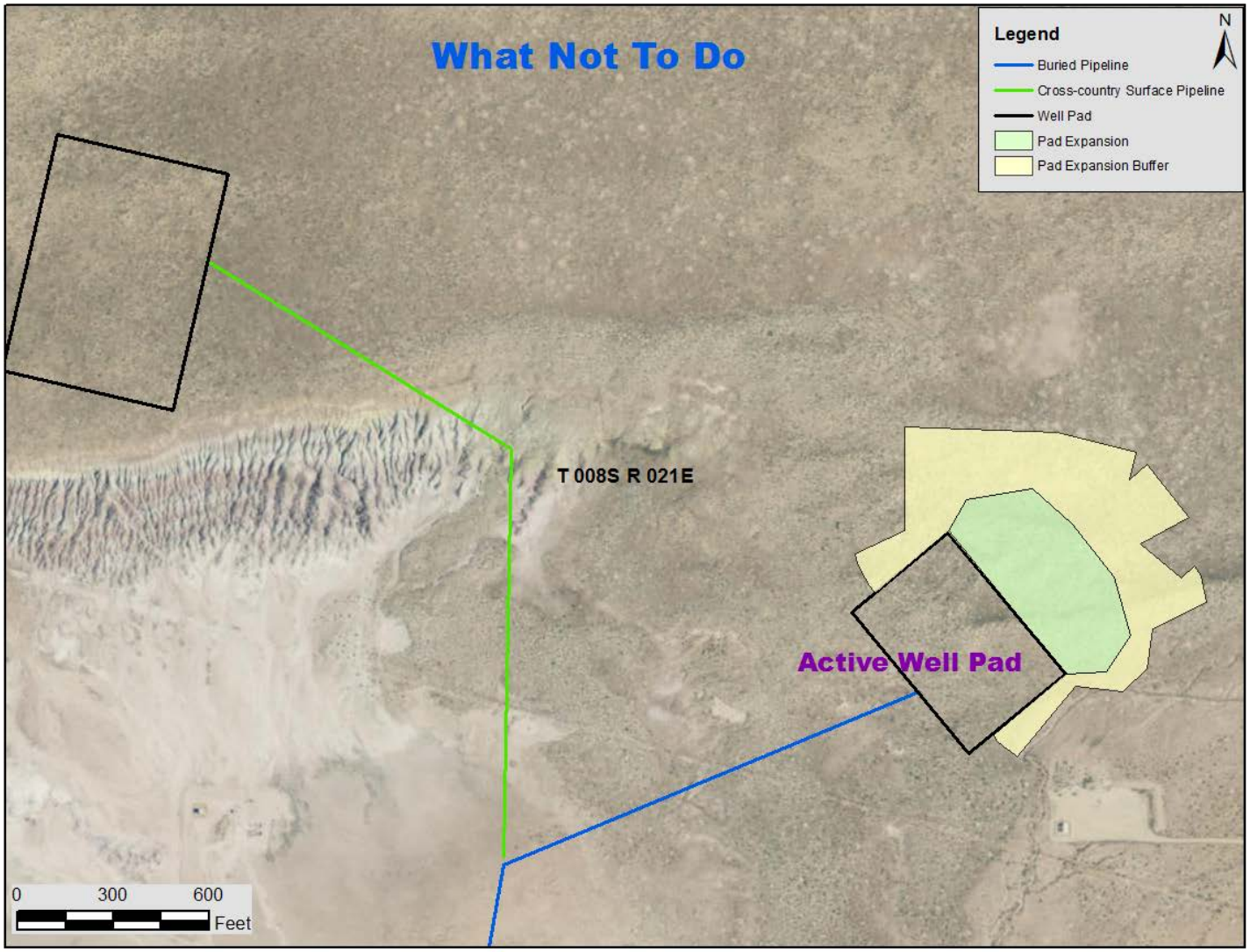
Table 4. Size class distribution for naturally occurring Mesa Verde Cacti in five plots at the Shiprock Fairgrounds transplant site, 2001-2011.

Size class	2001	2002	2003	2004	2005	2006	2007	2008	2009	2011
0 - 0.99cm	1	3	3	5	3	5	1	1	0	0
1 - 1.99cm	10	14	5	7	14	14	20	11	5	4
2 - 2.99cm	18	19	3	4	4	3	10	18	14	10
3 - 3.99cm	4	3	2	1	0	0	1	1	11	17
4 - 4.99cm	6	13	2	0	0	0	0	0	0	2
5 - 5.99cm	19	10	0	0	0	0	0	0	0	0

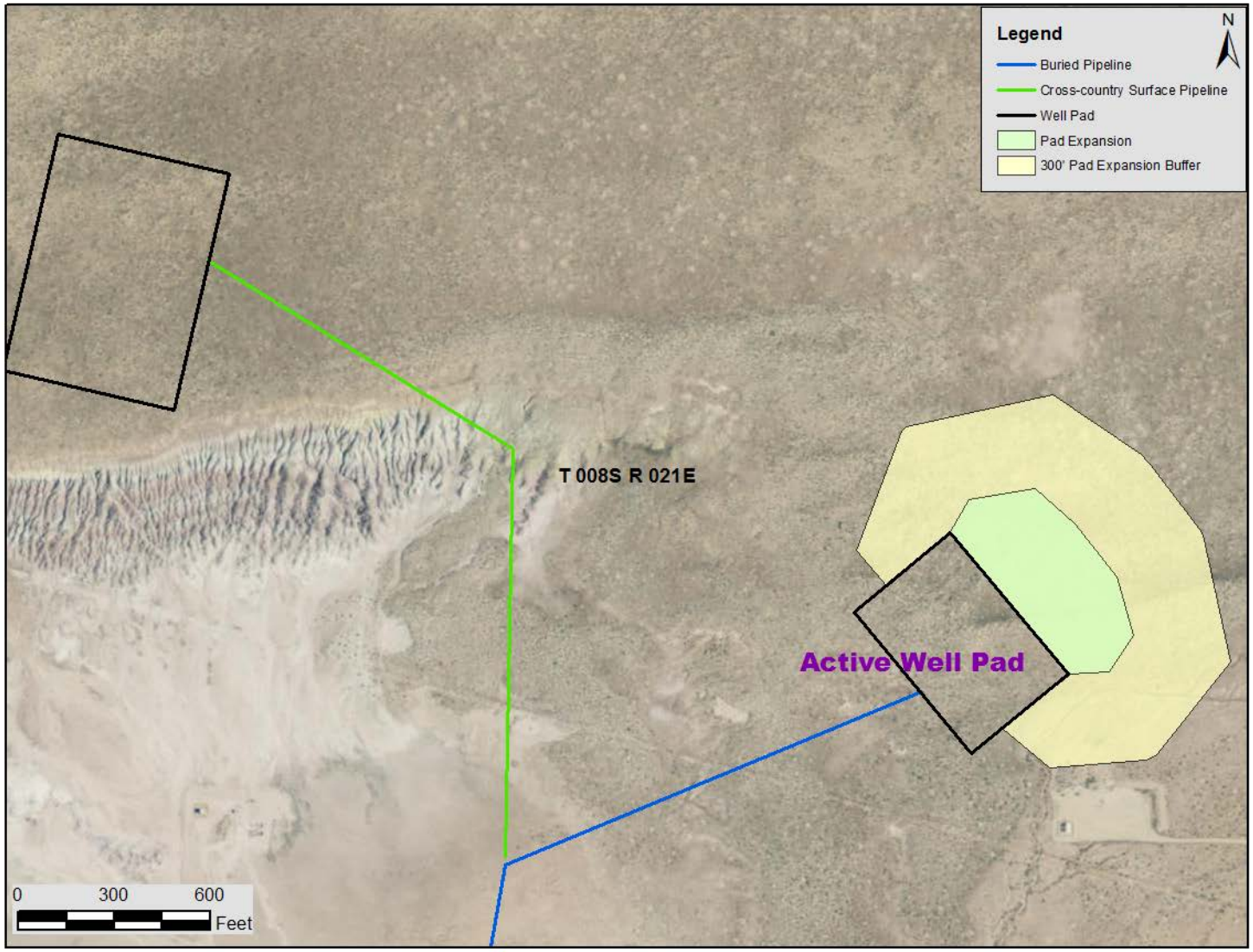
Table 5. Size class distribution for Mesa Verde Cacti transplanted into five plots at the Shiprock Fairgrounds transplant site, 2001-2011.

Size class	2001	2002	2003	2004	2005	2006	2007	2008	2009	2011
0 - 0.99cm	0	1	1	1	1	1	0	0	0	0
1 - 1.99cm	20	24	8	8	6	8	2	0	0	0
2 - 2.99cm	12	15	9	6	10	9	8	7	4	4
3 - 3.99cm	9	10	5	7	5	3	10	8	8	6
4 - 4.99cm	12	3	0	1	1	0	1	3	8	4
5 - 5.99cm	5	1	0	0	0	0	0	0	1	6

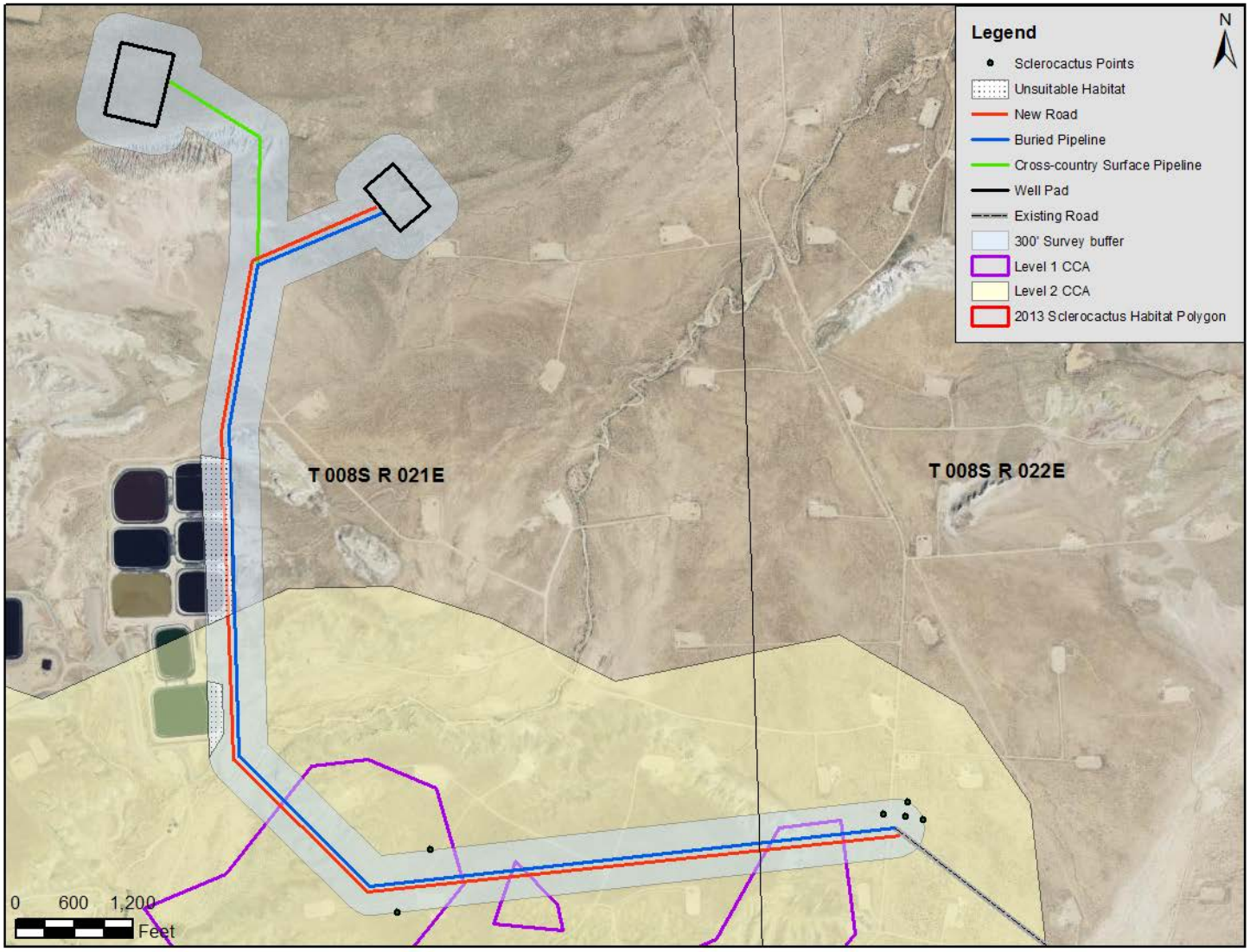
MAPS: Poor


What Not To Do
Legend
Buried Pipeline
Cross-country Surface Pipeline
Well Pad
Pad Expansion
Pad Expansion Buffer
N
T 008S R 021E
Active Well Pad
0
300
600
Feet

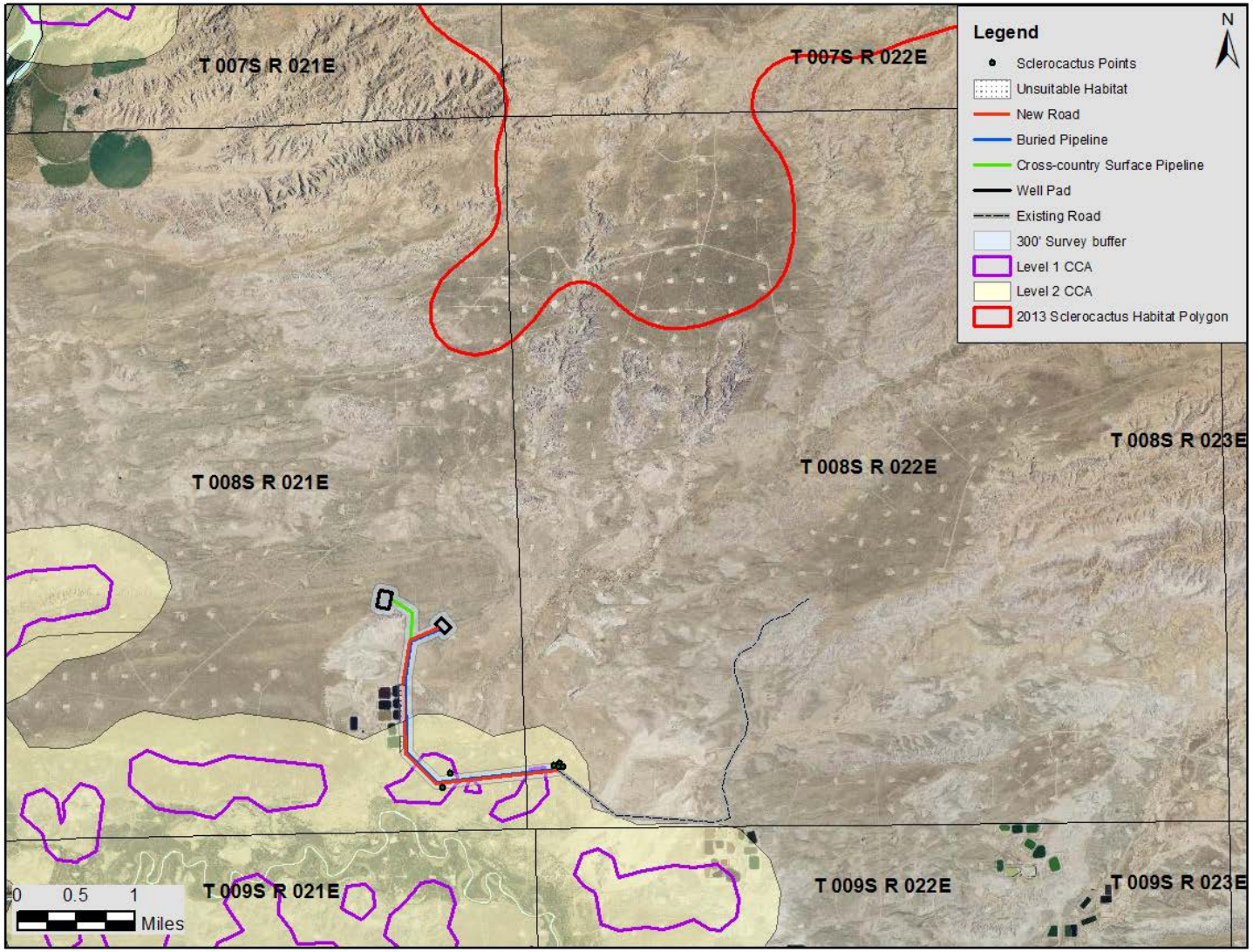
Maps: Improved



Mapsa: Good Example



Maps: Overview Map



Ute ladies'-tresses Orchid (*Spiranthes diluvialis*)

1. Use IPAC to see if Ute ladies'-tresses is on the species list: (http://ecos.fws.gov/ipac/). If so, and the project area occurs below 7,000 ft, go to #2.

2. Assess habitat suitability during growing season.
   - Use 1992 Interim Survey Requirements for Ute ladies'-tresses Orchid (pp. 4-5: Sites not requiring a survey)
   - Use Associated Plant Species List (Table 4) in Fertig et al. 2005. Rangewide Status Review Incorporate Best Management Practices (BMPs) that apply to the Project into Project Design

   ➢ **All documents found on our website: http://www.fws.gov/utahfieldoffice/surveyor.php**

Ute ladies'-tresses Orchid (*Spiranthes diluvialis*)

3. Survey protocol: 3 consecutive years of surveys (good for 3 yrs). Exception where only temporary disturbance will occur (buried pipelines, vehicle traffic):
   - 1 yr of surveys (good for 1yr) + follow our BMPs + recommend 2 yrs surveys post-construction to meet 3 yr survey guidance.
   - ➢ **Immediately notify USFWS if plants are found!**

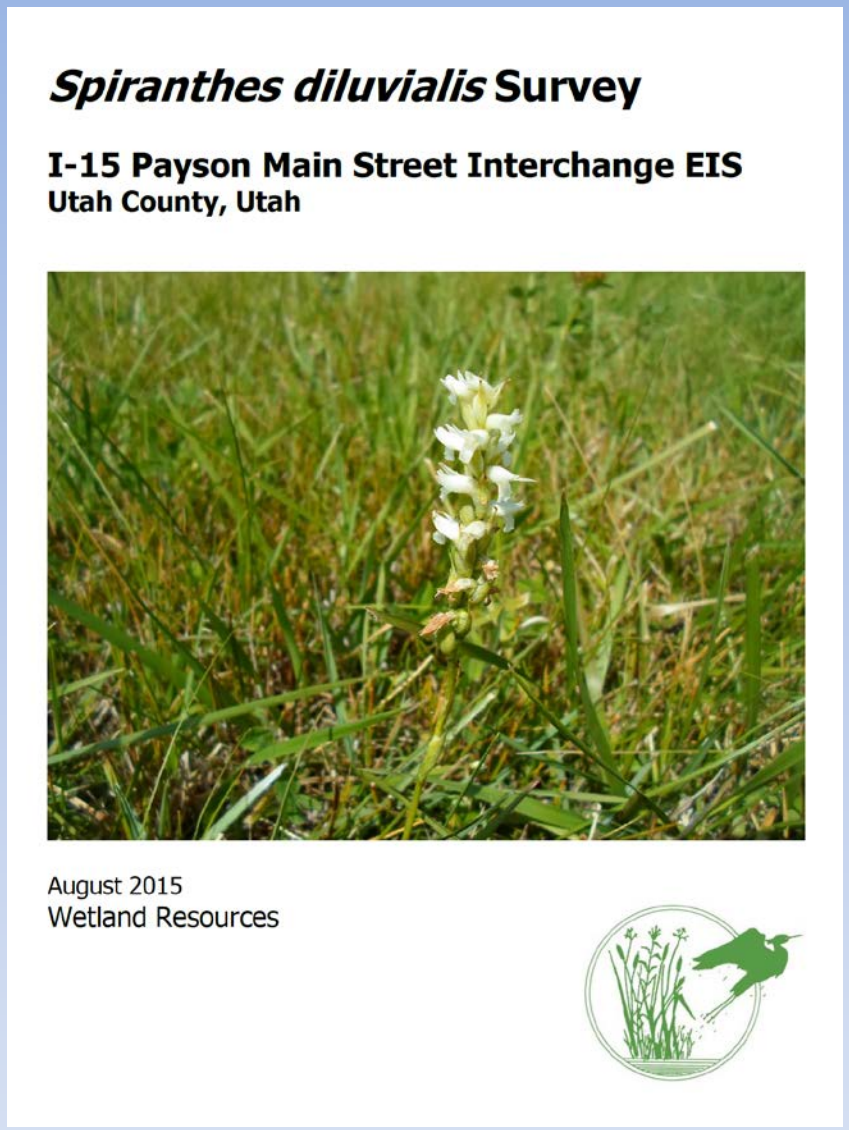
4. Reference Population:
   - Vernal BLM checks reference pop and identifies valid survey window for Uintah Basin. Contact Jessi Brunson to be added to her email list: **jbrunson@blm.gov**
   - Surveyors need to check reference pop in remainder of the State. Service provides flowering update only for Wasatch Front. Email list: **rita_reisor@fws.gov**

August 3

August 24

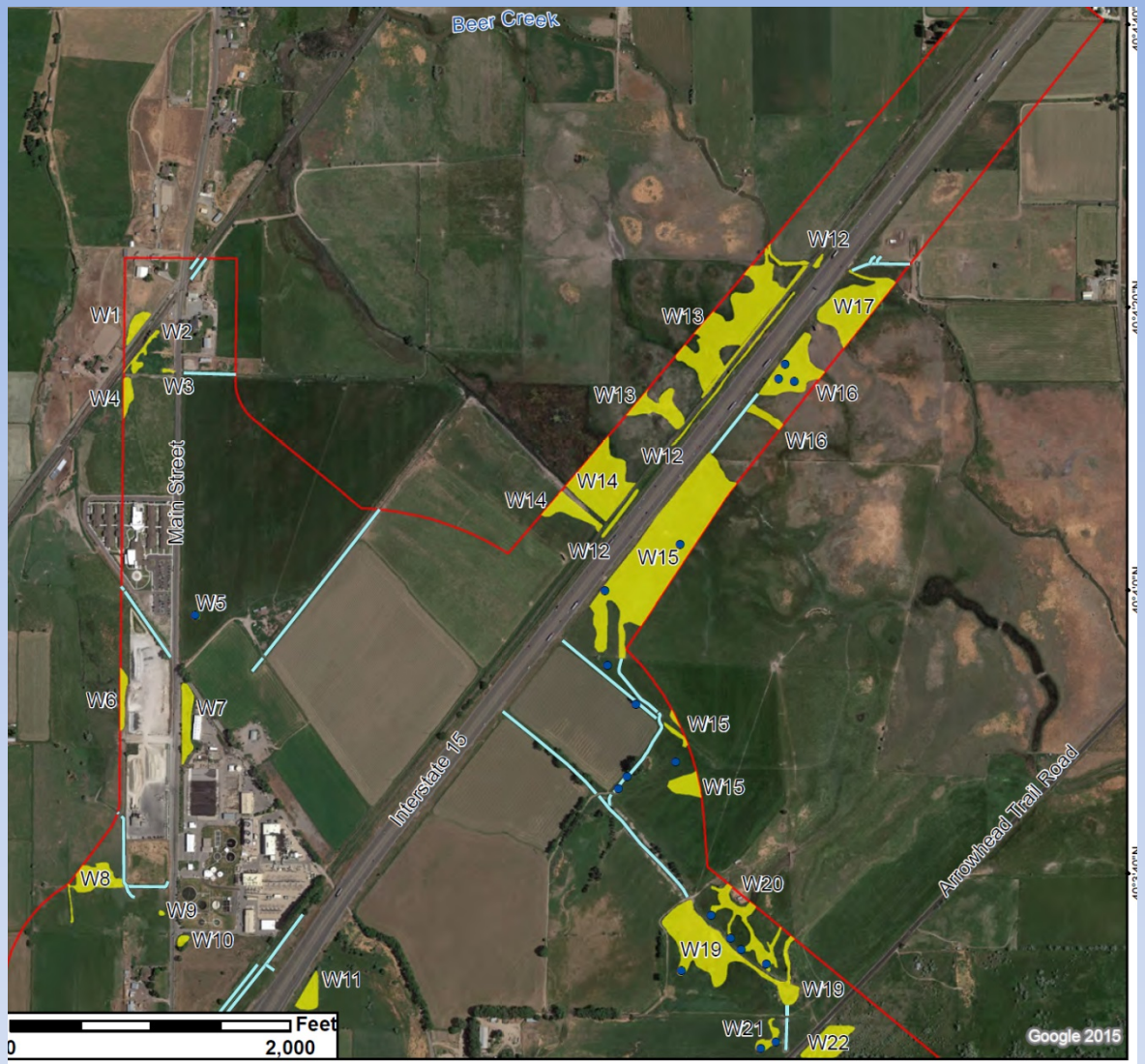

September 30


September 30



Example Monitoring Report

- Clear and accurate evaluation of Suitability Criteria within the project area summarized in report, don't have to evaluate scribbles on field notes
- Excellent maps and photos
- Great crosswalk between all three



Ute Ladies Tresses Survey Map
Payson Interchange

Project Dimensions:
Note: dimensions include entire project area

ULT Survey Area
= 1,193 ac
ULT Suitable Habitat
= 69.12 ac

Legend
- ULT Survey Area
- ULT Suitable Habitat
- Groundwater Seeps
- Ditches

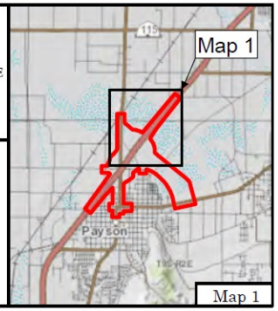
Projection:
NAD 83 UTM Zone 12N

Source:
2015 Google Imagery

Survey Performed by
Todd Sherman

Wetland Resources, Inc.

Created: 9/14/2015
Author: CMM



Clearly identified features on maps

C. Results and Discussion

The project area includes many Palustrine emergent wetlands that provide varying degrees of suitability for ULT habitat. All of the wetland areas within the project area, regardless of suitability, were surveyed for ULT during this first survey season, and a detailed description of each surveyed area is provided below. In addition to the wetlands, all irrigation ditches and canals within the project area were surveyed for ULT. The corresponding survey areas can be found on Maps 1 and 2 in Appendix A. Photos of the surveyed areas are provided in Appendix B. No individuals were found during the 2015 survey.

The areas that were not surveyed for ULT met the criteria provided by the USFWS for disqualified habitat (USFWS 2007). Primarily these areas were dominated by upland vegetation and did not have appropriate hydrology to support ULT. These areas were primarily agricultural fields dominated by upland grasses, and developed areas that were dominated by buildings and hard surfaces.

W1 – This is an isolated emergent marsh dominated by cattails. There is some potential ULT habitat around the periphery of the marsh, but a majority of the area is characterized by standing water and cattails, which is not suitable ULT habitat. The suitable habitat is dominated by Nebraska sedge, clustered field sedge, lady's thumb, and spikerush. Photo 3.

W2 – This is an emergent marsh/wet meadow mix located in a grazed pasture. Some areas have standing water and are dominated by cattails, but there is some suitable ULT habitat dominated by spotted ladysthumb, Nebraska sedge, clustered field sedge, and spikerush. Photo 4.

W3 – This is an emergent marsh/wet meadow mix located around a flowing artesian well pipe in a grazed pasture. Most of the area has standing water all year from the flowing well, which creates conditions too wet for ULT, but there are some associated species including Nebraska sedge and spikerush that indicate possible suitability for ULT. Photo 5.

W4 – This is a wet meadow located in the low corner of a flood irrigated field. Some areas are dominated by meadow fescue and are too dry for ULT, but there is some suitable ULT habitat in the lower wetter areas dominated by baltic rush, clustered field sedge, and threesquare bulrush. Photo 6.

W5 – This isolated groundwater seep is located in a hay field and contains some suitable ULT habitat on the hummocks that are above the water level. Much of the area is characterized by standing water supporting hardstem bulrush, but the hummocks are comprised of a thick peat layer that supports spikerush and provide suitable ULT habitat. Photo 7.

W6 – This is the edge of a larger wet meadow/marsh complex that includes a hillside seep with peat soils. Some of the areas within the project area are too wet for suitable ULT habitat, supporting thick stands of threesquare bulrush, but there is some suitable ULT habitat along the slope seep where there are peat soils supporting spikerush, spearmint, and paintbrush. Photo 8.

W7 – This is primarily a shrub wetland with a few areas of emergent wetland adjacent to the Payson City wastewater treatment facility. There is no suitable ULT habitat within this wetland

Habitat Suitability summary

Photo 25.
Survey area W23.