

Prairie Fameflower (*Talinum parviflorum*) Survey
Cedar River National Grassland
August 2008



Report to:
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Dakota Prairie Grasslands

By:
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November 20, 2008



TALINUM PARVIFLORUM SURVEY 2008 CEDAR RIVER RANGER DISTRICT DAKOTA PRAIRIE GRASSLANDS

ABSTRACT

Target rare plant surveys for prairie fameflower (*Talinum parviflorum*) were conducted in August 2008 on the Cedar River Ranger District of the Dakota Prairie Grasslands in Sioux County, North Dakota. Approximately 5280 acres of national grassland were surveyed. No historic populations of *T. parviflorum* existed in the survey area, but suitable habitat was known to exist there. Two metapopulations of *T. parviflorum* were discovered in the survey area. One population numbered approximately 8065 plants and occupied 4 hectares of land. The second population numbered approximately 455 plants and covered ¼ hectare of land. All plants exhibited good vigor. No threats were apparent.

SPECIES INFORMATION

Prairie fameflower, or *Talinum parviflorum*, is succulent-leaved perennial herb native to the central United States. It is distributed from Arizona to Arkansas and north to North Dakota and Minnesota. It is most common in Missouri and Oklahoma. It is listed as Threatened in Iowa. It is on the Sensitive plant list with the Dakota Prairie Grasslands (DPG) in North Dakota.

It is a resident of shallow, often exposed soils. It shows tolerance to a broad array of substrates, but is most often found on sandy, acidic soils and least often found on calcareous soils. In the Dakotas it tends to grow on sandstone outcrops of Sioux quartzite or on sparsely vegetated slick spots amidst fragile pricklypear cactus (*Opuntia fragilis*). It is drought and heat tolerant, flowering in the late afternoon for many weeks during the height of summer.

PROJECT INFORMATION

On July 11, 2008, the DPG commissioned a rare plant survey for *T. parviflorum* populations on approximately 5280 acres of the 6717 acres of the Cedar River National Grassland in Sioux County, North Dakota. A map of the survey sites is contained in [Appendix 1](#).

The objective of the inventory was to locate and map new *T. parviflorum* populations, collect population data, and obtain an overview of the status and condition of these populations.

Yellowfield Biological Surveys was contracted to perform the survey. Field work was performed in August 2008 by David and Amy Schmoller with the able assistance of Piper and Jordan Erdman of Morristown, SD.

Base maps were provided by the DPG. The Grand River Ranger District (GRRD) of the DPG provided an Off Road Travel permit allowing for the use of an All Terrain Vehicle (ATV) or a four-wheel-drive pickup truck to access the survey area. The project was supervised by Dan Svingen, Grasslands Biologist with the DPG in Bismarck, ND. The final report was composed in November 2008.

METHODS

The rare plant surveys were conducted according to the guidelines published in J. R. Nelson's publication, *Rare plant surveys: Techniques for impact assessment* (Nelson 1985). The surveys were conducted during August 2007 in order to coincide with the best phenology of *T. parviflorum*. All sites were accessed by a four-wheel-drive pickup or on foot. All sites were inspected on foot. Surveys were conducted at an intuitive controlled survey intensity level. Four surveyors participated in the field surveys.

All DPG land in the survey areas that contained suitable habitat for *T. parviflorum* was inspected thoroughly. This habitat included sparsely vegetated, clayey slickspots dominated by fragile pricklypear cactus and sandstone outcrops. Habitats with a lower potential for *T. parviflorum* were inspected with less intensity. These habitats included ridges and wooded draws.

All sites were visited so as to confirm, describe, and map the populations. The surveys extended beyond the project boundaries when suitable habitat extended beyond that boundary.

When *T. parviflorum* populations were encountered the general ecology was described. This site data was logged into the GPS unit. Data included the following: location, population size, estimated area covered by the population, geomorphology, and substrate. Any unusual or noteworthy features were described.

Plants were identified in the field based on the descriptions in the plant keys listed in the **Bibliography** on page 5. Close-up photographs served to confirm the identity of the species. No voucher specimens were collected. Population densities were determined by visual estimate or actual count. Detail and panoramic photographs were taken using Kodak[®] DX6490 and Lumix DMC-FZ18 digital cameras. Selected photographs are included in this report.

Population locations were marked using Garmin[®] 12XL and Trimble Geoexplorer[®] 3 GPS units. Using Pathfinder Office 2.8, Trimble GPS data was differentially corrected over the internet using the base station at CORS, Medora 3, ND. Using Maptech[®] software, population locations were displayed on topographic maps. These maps are in **Appendix 1**.

RESULTS AND DISCUSSION

1) GENERAL DESCRIPTION OF PROJECT AREA

The project area is within the Moreau Prairie physiographic region within the Northwestern Great Plains ecoregion. It is in the Cedar River watershed, a tributary of the Cannonball River, which empties into the Missouri River. It is mixed grass prairie or Northern Wheatgrass-Needlegrass Plains characterized by rolling, grassy uplands, badlands, and wooded riparian areas. It has inclusions of the Little Missouri River Badlands. The region has a semiarid continental climate. Temperatures are extreme, winds are relatively high, and annual precipitation is low. Most precipitation arrives as spring rain.

The geologic formations in the project area are primarily shale from the Hell Creek formation with debris from the overlying Cannonball and Ludlow formations. (Gries 1996) Badland exposures are infrequent in the project area and are mostly outcrops of Hell Creek shale. Soils in the project area are aridisols, alfisols, and mollisols.

Cattle graze throughout the project area. Cattle were seen in one pasture at the time of the survey.

2) FINDINGS

The vast majority of the landscape in the survey area is dense mixed grass prairie uplands. About half of the acreage is non-native grassland, either reclaimed grassland seeded in crested wheatgrass or overrun with yellow sweetclover (*Melilotus officinalis*). (**Figure 1**) Smooth brome (*Bromus inermis*) and Japanese brome (*Bromus japonicus*) make a strong showing throughout the survey area. The native grassland habitat is dominated by blue grama (*Bouteloua gracilis*), needle-and-thread (*Stipa comata*) and green needlegrass (*Stipa viridula*). (**Figure 2**) Other species seen in the native habitat include Kentucky bluegrass (*Poa pratensis*), tumblegrass (*Schedonnardus paniculatus*), woolly plantain (*Plantago patagonica*), false pennyroyal (*Hedeoma hispidula*), western ragweed (*Ambrosia psilostachya*), and selaginella (*Selaginella densa*). These components indicate good soil aeration, fertility, texture, and moisture. Much of the surrounding private lands are in cropland or hayfield. (**Figure 3**)

The gentle relief in the survey area has limited the development of wooded draws or shrubby swales. Badland outcrops are infrequent, found mainly in the eastern sections.

Slickspots are present in the survey area. They occur in the eastern reaches of the grassland, in the vicinity of the badland out-



Figure 1. Greenish-yellow vegetation in this view is yellow sweetclover. Pasture is about 4 miles west of Morristown.



Figure 2. View of native grassland vegetation. Sagebrush, sagewort, and needle-and-thread in foreground. This pasture is 1.5 miles north of Morrystown.



Figure 3. Cropland that is common in private lands adjacent to national grassland. This field is 4 miles north of Morrystown.

crops. They are located at the base of buttes with badland outcrops and in shallow swales and drainages in which sediments from adjacent badlands are deposited. It is in these habitats that two metapopulations of *T. parviflorum* were found.

One metapopulation was located within the 160-acre Knispel Wildlife Area. This unit is influenced by badland buttes to the south and west that shed sediment onto the surrounding lowlands and into the low drainages that run to the north and northeast. The *T. parviflorum* was distributed around the base of a badland in the southwest quarter of the wildlife area, within badland blowouts along a shallow drainage



Figure 4. View of typical slickspot habitat with abundant pricklypear cactus and bare clay.

and stock dam in the northwest quarter of the unit, and along a drainage that runs along the eastern border. (See map in [Appendix 1](#)) Approximately 8065 plants occupied 4ha of ground in nine sub-populations. See [Table 1](#) for details.

The other metapopulation was located in another 160-acre unit about 3.5 miles to the southwest of the Knispel Wildlife Area. This unit contains only a few acres of slightly exposed badland strata, but at the



Figure 5. Closeup of fameflower showing pricklypear, false pennyroyal, and saturated soil.



Figure 6. Closeup of fameflower showing shiny, saturated soil surface, greenish algae crust, and common purslane.

base of these badlands, along the course of a seasonal drainage, there are slickspots. Other slickspots are located on the crest of a ridge that rises to the southwest of the drainage. The *T. parviflorum* is scattered within these slickspots. (See map in [Appendix 1](#)) Approximately 455 plants occupied 0.25ha in five sub-populations. See [Table 1](#) for details.

All populations of *T. parviflorum* were in typical slickspot habitat, with black alkali, bare soil, ponding, and algae crusts. (**Figure 4**) Associated species were very limited due to the extreme conditions. They included pricklypear cactus (*Opuntia polyacantha*), fragile pricklypear (*Opuntia fragilis*), blue grama, Japanese brome, selaginella, fringed sagebrush (*Artemisia frigida*), false pennyroyal, kochia (*Kochia scoparia*), saltgrass (*Distichlis spicata*), western ragweed (*Ambrosia psilostachya*), western wheatgrass (*Agropyron smithii*), common purslane (*Portulaca oleracea*), silver sagebrush (*Artemisia cana*), and green sagewort (*Artemisia campestris*). (**Figure 5**) Slopes were flat, exposure was full sunlight, and the surface soil was ponded or saturated at the time of the survey. (**Figure 6**)

3) HABITAT REQUIREMENTS

Fameflower appeared on poorly vegetated, exposed, clayey slickspots. Cultivation of these soils is very difficult. Seedbed preparation often fails, seed germination is poor, fertility accumulates, and yields are low.

Slickspots have accumulations of sodium and calcium, commonly from perched, ephemeral water tables. Excess sodium prevents soil colloids from aggregating and the colloids are dispersed. Organic colloids will form a black film on the soil when surface moisture evaporates - the renowned black alkali. This dispersion gives the soil the greasy feel when wet and the excess hardness when dry. Soil aeration and percolation are impacted as the pores and channels become plugged with dispersed colloids. Precipitation and runoff ponds on the surface; moisture and oxygen fail to reach the subsoil. Moisture stress and root asphyxiation follow. Most prairie plants are intolerant of these conditions and mortality follows within days or weeks.

These are the conditions under which the *T. parviflorum* thrived. This suggests that the success of *T. parviflorum* in this particular habitat is the result of its tolerance to moisture and oxygen deprivation as well as the reduced competition that these conditions produce. The only species that occurred with any regularity in this habitat was the hardy pricklypear cactus.

CONCLUSIONS AND RECOMMENDATIONS

The habitats on which *T. parviflorum* were located in this survey are remote, undeveloped lands, rarely visited by humans. While livestock grazing is prevalent in these pastures, the habitats in which *T. parviflorum* resides are so poorly vegetated and so well armed with cactus that livestock generally make an appearance only as they traverse to better forage. No adverse impacts from cattle grazing are seen or expected in the future.

Table 1. Population Data

SITE ID	NUMBER OF PLANTS	AREA OCCUPIED (Hectares)	POPULATION CENTROID
METAPOPULATION 1			
T1	500	0.08	14 T 319522 5103472
T2	300	0.10	14 T 319739 5103837
T3	20	0.01	14 T 319795 5103857
T4	50	0.01	14 T 319814 5103891
T5	50	0.12	14 T 319848 5103910
T6	85	0.01	14 T 319893 5103932
T7	2000	0.87	14 T 319855 5103785
T8	5000	2.81	14 T 320037 5103795
T9	60	0.01	14 T 319554 5103686
TOTALS	8065	4.02	
METAPOPULATION 2			
T11	200	0.17	14 T 313587 5101870
T11	25	0.01	14 T 313652 5101793
T12	30	0.0	14 T 313675 5101733
T13	50	0.01	14 T 313704 5101716
T14	150	0.05	14 T 313470 5101841
TOTALS	455	0.24	
GRAND TOTAL	8520	4.26	

Recent projections on global climate change indicate that 'mid-continental summer-drying is expected due to increased evaporation with increased temperatures, resulting in an increased tendency for drought in those regions.' (Wetherald 1999) This has the potential to adversely impact the viability of many species of flora and fauna in years to come. However, this is a durable plant. It demonstrates drought and substrate tolerance and has a broad distribution, spanning many latitudes. It can be expected that this species would not exhibit adverse effects due to anticipated global climate change at the rate that less tolerant species might. In any event, damage to the species may be minimized by collection and storage of seeds in a seed bank or by propagation of the species in more northern latitudes or higher elevations.

The *T. parviflorum* populations described in this survey should be revisited periodically to observe trends.

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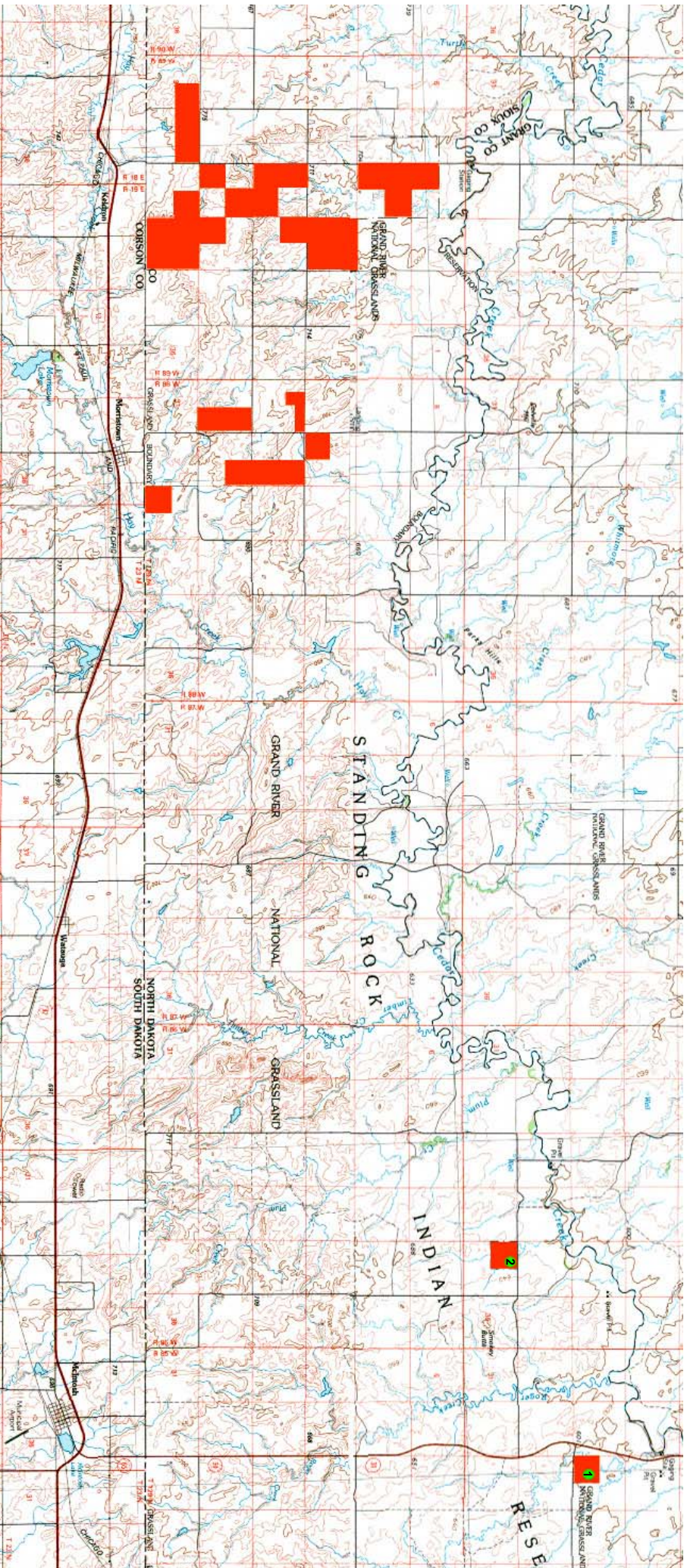
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**APPENDIX 1
MAPS**

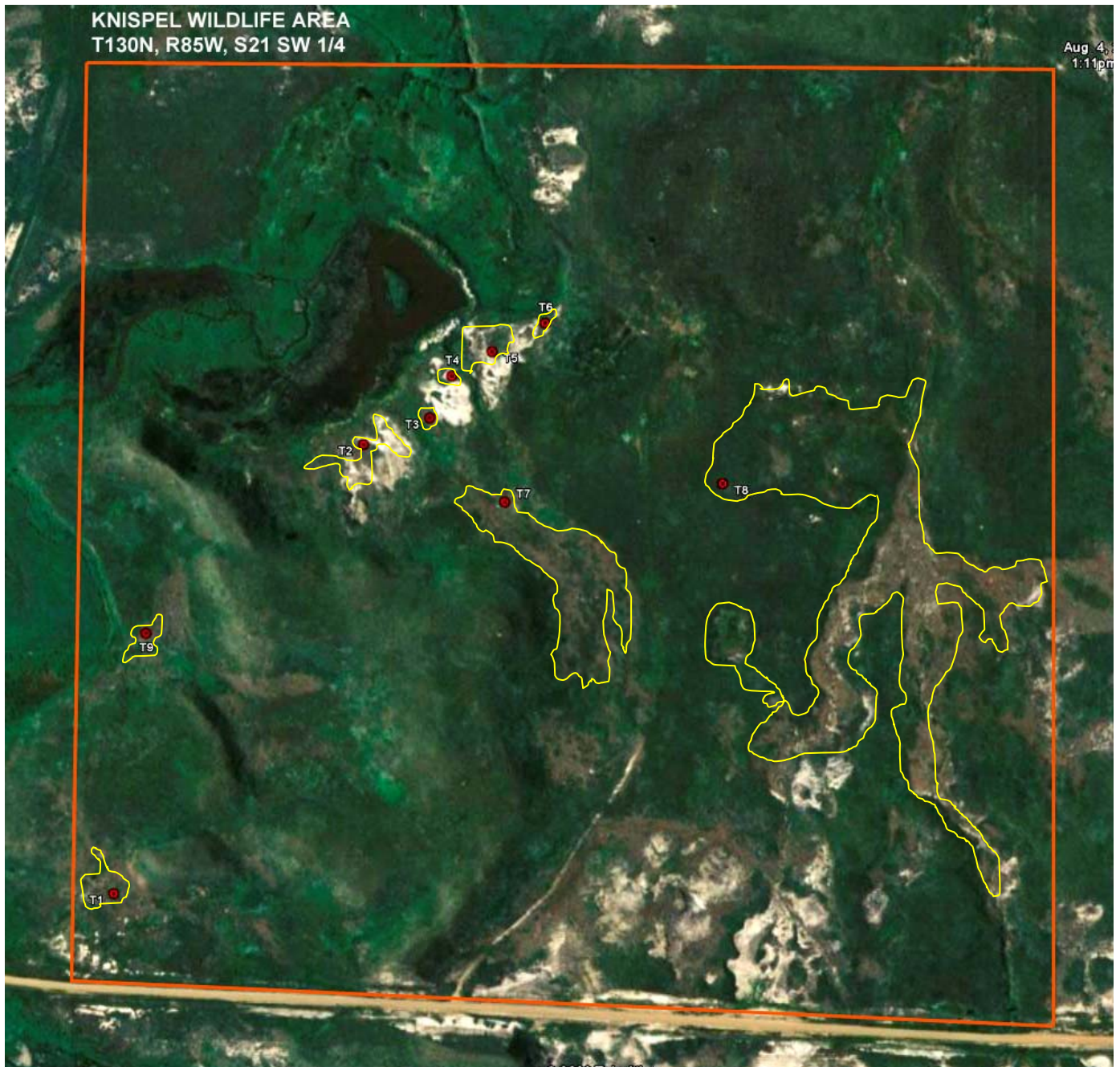
SURVEY SITES



-  = Area surveyed
-  = Tallium metapopulation





TALINUM PARVIFLORUM METAPOPULATION 1





SITE ID	NUMBER OF PLANTS	AREA OCCUPIED (Hectares)	POPULATION CENTROID
T1	500	0.08	14 T 319522 5103472
T2	300	0.10	14 T 319739 5103837
T3	20	0.01	14 T 319795 5103857
T4	50	0.01	14 T 319814 5103891
T5	50	0.12	14 T 319848 5103910
T6	85	0.01	14 T 319893 5103932
T7	2000	0.87	14 T 319855 5103785
T8	5000	2.81	14 T 320037 5103795
T9	60	0.01	14 T 319554 5103686
TOTALS	8065	4.02	

Legend

 NORTH

 USFS boundary

 Population boundary


 T4 Population ID


TALINUM PARVIFLORUM METAPOPOPULATION 2





SITE ID	NUMBER OF PLANTS	AREA OCCUPIED (Hectares)	POPULATION CENTROID
T11	200	0.17	14 T 313587 5101870
T11	25	0.01	14 T 313652 5101793
T12	30	0.0	14 T 313675 5101733
T13	50	0.01	14 T 313704 5101716
T14	150	0.05	14 T 313470 5101841
TOTALS	455	0.24	

Legend

 NORTH

 USFS boundary

 Population boundary

 T4 Population ID



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