



U. S. Department of the Interior
Bureau of Land Management

BLM-Alaska Open File Report 90
BLM/AK/ST-03/010+6700+025
July 2003



Alaska State Office
222 West 7th Avenue
Anchorage, Alaska 99513

Toolik Lake Research Natural Area / ACEC Rare Plant Inventory, 2002

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Cover Photo

Claytoniella bostockii (A. E. Pors.) Jurtz (photo by M. Tachibana).

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Abstract

The Bureau of Land Management-Alaska Northern Field Office and the University of Alaska Museum Herbarium entered into an agreement to search for rare plants in the Toolik and Galbraith Lake Areas of Environmental Concern (ACEC) in the northern foothills of Alaska's Brooks Range. The information gathered in this project will enable the Bureau of Land Management to address management issues concerning the conservation of rare plant species that occur on these lands.

Claytoniella bostockii (A. E. Pors.) Jurtz (Portulacaceae) [= *Montia bostockii* (A. E. Pors.) Welsh] was found during the inventory in the Toolik Lake ACEC. In addition, the inventory revealed that this plant is more common in the area than previously thought. *C. bostockii* was found in several vegetation complexes, but most frequently in the Moist and Dry Nonacidic Tundra complexes.

Acknowledgements

This work is the result of an agreement between the U.S. Department of the Interior, Bureau of Land Management, Northern Field Office and the University of Alaska Museum Herbarium. Tim Craig of the Bureau of Land Management's Northern Field Office initiated and secured the funding for this project.

We are grateful to Dave Murray, Curator Emeritus of the University of Alaska Museum Herbarium, for his assistance with the nomenclature of *Claytoniella bostockii*. We also wish to thank Marilyn and Skip Walker for sharing their Toolik Lake vegetation data and Anne-Lillian Schell and the Alaska Natural Heritage Program for sharing their line drawing of *Claytoniella bostockii*. Lastly, we thank Andrew Balser, Toolik Field Station GIS and Remote Sensing Manager, for providing maps of the Toolik Lake region and for assisting with the construction of inventory maps.

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Introduction

Nearly 140,000 acres managed by the Bureau of Land Management in the vicinity of Toolik and Galbraith Lakes, located in the northern foothills of Alaska's Brooks Range, were identified as Areas of Critical Environmental Concern in 1991. These lands include the Toolik Lake Research Natural Area (RNA) and the Galbraith Lake Outstanding Natural Area (Figs. 1 and 2). The Toolik Field Station, which is administered by the University of Alaska Fairbanks, is located in the Toolik Lake RNA. Currently, 88 different Long-term Ecological Research (LTER) sites are permitted within the Toolik RNA. These projects and other future development may affect the native vegetation within these Areas of Critical Environmental Concern (ACEC).

The Dalton Highway Utility Corridor Management Plan (USDI 1989) and a subsequent report (Lipkin and Parker 1995) indicate two rare plants, *Claytoniella bostockii* (A. E. Pors.) Jurtz. (Portulacaceae) [= *Montia bostockii* (A. E. Pors.) Welsh] (Fig. 4) and *Erigeron muirii* Gray (Asteraceae), occur in the Toolik Lake ACEC. In addition, the management plan indicates a high probability of the occurrence of rare plants in the Galbraith Lake ACEC. This document directs the Bureau of Land Management to "inventory ACECs to delineate crucial habitat for *Montia bostockii*.." and to monitor crucial plant habitats and populations in the Galbraith Lake ACEC.

To this end, the U. S. Department of the Interior, Bureau of Land Management, Northern Field Office and the University of Alaska Museum Herbarium entered into an agreement to search at least 3,000 acres/year for rare plants; in the vicinity of Toolik and Galbraith Lakes. In addition to those plants previously encountered in the vicinity of Toolik Lake (*Claytoniella bostockii* and *Erigeron muirii*), we searched for other rare plants that we suspected to occur as well, within the survey area (Lipkin

2000, Carolyn Parker, personal communication; Tables 1 and 2). The inventory began in 2002 and will occur over the next 5 years, as funding is available. This project will enable the Bureau of Land Management to address management issues concerning the conservation of rare plant species that occur on these lands. This report outlines the work accomplished during the 2002 field season.

Methods

In July and August 2002, we inventoried lands in the vicinity of the Toolik Field Station, including all high use research areas and the lake perimeter. To accomplish this, we surveyed a 3 x 3 mile area (5,760 acres or 23.31 km²) with Toolik Lake at its center. These dimensions were selected to coincide with section lines that provided a clear boundary for the survey area (Fig. 3). We further divided the study area into square mile sections and then searched each of these sections for rare plants. We walked line transects that were no more than 400 m apart within each of these sections and oriented transects either north to south or east to west. Search areas were recorded on 1 mile² aerial photographs of the area and for each rare population encountered we recorded:

1. the approximate location on the map using a GeoExplorer 3 GPS unit (Trimble Navigation Limited, Sunnyvale, CA) for populations covering more than 5000 m² and
2. the exact location via a GPS point for populations covering less than or equal to 5000 m².

In addition, a rough estimate of the population size and associated vegetation complex was recorded, following the classification established by Walker (2000) and Walker *et al* (In prep). The inventory began July 11 and concluded July 21, 2002. We also conducted a brief search on August 29 for *Erigeron muirii* on the rocky southeast-facing slope of "Jade Mountain," a 3,057 ft peak southwest of the Toolik Field Station. After the inventory was complete, we mapped the occurrences of all rare

plants encountered with ArcView GIS 3.2 (Environmental Sciences Research Institute, Inc., Redlands, CA). Field maps were deposited at the University of Alaska Museum Herbarium.

Results and Conclusion

We found one rare plant species during the 2002 inventory, *Claytoniella bostockii* (Table 4, Fig. 5). This species was first documented by T. Jorgenson at Toolik Lake in 1978 and four more specimens have been collected over the years at Toolik Lake, the last by D. A. Walker in July 1988, all were deposited at the University of Alaska Museum Herbarium (Lipkin and Parker 1995). These previous specimens of *Claytoniella bostockii* were collected from the north shore of Toolik Lake “on the peninsula that juts toward the center of the lake” (Lipkin and Parker 1995).

Claytoniella bostockii is endemic to eastern Beringia including several disjunct populations at Toolik Lake and in the Wrangell-St. Elias Mountains, Tetlin Hills, Nutzotin Mountains and eastern Yukon-Tanana Uplands. The state rank for this species is S3 (Lipkin 2000). However, Lipkin and Parker (1995) indicate that “although not yet documented from more than 20 locations, it has been found at an increasing number of sites and almost certainly will be found at additional sites.”

Our inventory revealed *Claytoniella bostockii* is more common in the Toolik Lake ACEC than previously thought. Not only is the species well

established north of Toolik Lake, it also occurs to the west and south of the lake (Fig. 5) where we located populations adjacent to boardwalk trails and research sites. We do not know if these populations have increased or decreased since they were first discovered in 1978. We found this species was easiest to locate during its most conspicuous stage - flowering. Future inventories should search for *Claytoniella bostockii* at the height of flowering (mid-July in the Toolik Lake region).

The vegetation of the Toolik Lake area is well documented (Walker *et al.* 1994; Walker and Walker 1996; Walker 2000; Walker *et al.* In prep). As a result, we are able to describe the habitat where *Claytoniella bostockii* was most prolific (Table 4 and Fig. 6). Previously, this habitat was described as “wet meadows on ridge tops, alpine slopes and by lake shores, as well as frost boils, and wet ridge crest gravels” (Lipkin and Parker 1995). We found *Claytoniella bostockii* occurred most frequently within the Moist and Dry Nonacidic Tundra Complexes. These vegetation complexes are dominated by *Carex membranacea* and by *Astragalus umbellatus* and *Dryas integrifolia*, respectively (Walker 2000; Walker *et al.* In prep). However, *Claytoniella bostockii* also occurs within several other vegetation complexes to a lesser extent including Rich Fen, Snowbed and Moist and Dry Acidic Tundra. Therefore, future inventories for *Claytoniella bostockii* should broaden their search efforts to include a range of vegetation complexes.

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TABLE 1. List of rare plants that potentially could occur within the Toolik Lake ACEC. Global and state species ranks are defined in Table 2.

Scientific Name	Global Rank	State Rank
<i>Aster pygmaeus</i>	G3	S1S2
<i>Beckwithia glacialis</i> ssp. <i>alaskensis</i> [= <i>Ranunculus glacialis</i> ssp. 1]	G4T2	S2
<i>Claytonia arctica</i>	G3	S1
<i>Draba micropetala</i>	G4	S1S2
<i>Erigeron muirii</i>	G2	S2
<i>Montia bostockii</i>	G3	S3
<i>Oxytropis arctica</i> var. <i>barnebyana</i>	G4T2	S2
<i>Pedicularis hirsuta</i>	G5?	S1
<i>Potentilla stipularis</i>	G5	S1

TABLE 2. Definitions of rare species ranks used by the Alaska Natural Heritage Program (Lipkin 2002).

<u>Species Global Rankings</u>	
G1:	Critically imperiled globally
G2:	Imperiled globally
G3:	Rare or uncommon globally
G4:	Apparently secure globally, but cause long-term concern
G5:	Demonstrated secure globally
G?:	Unranked
G#G#:	Global rank of species uncertain, best described as a range between the two ranks
G#Q:	Taxonomically questionable
G#T#:	Global rank of species and global rank of the described variety or subspecies of the species
GU:	Unrankable
GH:	Historical occurrence
GX:	Extinct
HYB:	Hybrid
<u>Species State Rankings</u>	
S1:	Critically imperiled in state
S2:	Imperiled in state
S3:	Rare or uncommon in state
S4:	Apparently secure in state, but with cause for long-term concern
S5:	Demonstrably secure in state
S#S#:	State rank of species uncertain, best described as a range between the two ranks
S?:	Unranked
SU:	Unrankable
SA:	Accidental
SR:	Reported from the state, but not yet verified
SRF:	Reported falsely
SP:	Potential to occur in the state
HYB:	Hybrid
SSYN:	Synonym
<u>Qualifiers</u>	
B:	Breeding status
N:	Non-breeding status
?:	Inexact
Q:	Questionable taxonomy

TABLE 3. One mile² sections surveyed for rare plants in the Toolik Lake ACEC in 2002.

Meridian	Township	Range	Section	Date Surveyed
Umiat	T9S	R11E	19	Jul-20-02
Umiat	T9S	R11E	20	Jul-19-02
Umiat	T9S	R11E	21	Jul-18-02
Umiat	T9S	R11E	30	North: Jul-11-02
				South: Jul-16-02
Umiat	T9S	R11E	29	North: Jul-19-02
				South: Jul-13-02
Umiat	T9S	R11E	28	West: Jul-15-02
				East: Jul-18-02
Umiat	T9S	R11E	31	North: Jul-16-02 and Aug-29-02
				South: Jul-20-02
Umiat	T9S	R11E	32	North: Jul-13-02
				South: Jul-21-02
Umiat	T9S	R11E	33	Jul-17-02

TABLE 4. *Claytoniella bostockii* occurrences within the 2002 Toolik Lake ACEC Survey Area. Vegetation complexes follow the nomenclature of Walker (2000) and Walker *et al.* (In prep). “Primary vegetation complex” is defined as the most common vegetation type within a polygon, while “Other Vegetation Complex” refers to any additional vegetation type overlapped by a polygon.

ID	SHAPE	DATE	COLLECTOR	# OF INDIVIDUALS	ABUNDANCE	STAGE	AREA (m ²)	PRIMARY VEGETATION COMPLEX	OTHER VEGETATION COMPLEX
1	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	79358	MOIST NONACIDIC TUNDRA	RICH FEN, DRY ACIDIC TUNDRA
2	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5757	DRY ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA
3	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1406	SNOWBED	RICH FEN
4	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	16905	MOIST NONACIDIC TUNDRA	RICH FEN, DRY ACIDIC TUNDRA
5	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5015	MOIST NONACIDIC TUNDRA	
6	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	6957	DRY ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA
7	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	3083	DRY ACIDIC TUNDRA	
8	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	6528	RICH FEN	MOIST ACIDIC TUNDRA
9	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	284588	MOIST NONACIDIC TUNDRA	MOIST ACIDIC TUNDRA, SHRUB TUNDRA, SNOWBED
10	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	27383	MOIST ACIDIC TUNDRA	SNOWBED
11	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1495	MOIST NONACIDIC TUNDRA	
12	POLYGON	Jul-20-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5483	SHRUB TUNDRA	MOIST NONACIDIC TUNDRA
13	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	FREQUENT	FLOWER	920195	MOIST NONACIDIC TUNDRA	DRY NONACIDIC TUNDRA, DRY ACIDIC TUNDRA, MOIST ACIDIC TUNDRA, SNOWBED, RICH FEN, RIPARIAN SHRUBLAND
14	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1591	MOIST NONACIDIC TUNDRA	DRY NONACIDIC TUNDRA
15	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	FREQUENT	FLOWER	294105	MOIST NONACIDIC TUNDRA	SNOWBED
16	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	2984	MOIST NONACIDIC TUNDRA	SNOWBED
17	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1534	MOIST NONACIDIC TUNDRA	
18	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	4033	MOIST NONACIDIC TUNDRA	
19	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	27774	MOIST NONACIDIC TUNDRA	DRY ACIDIC TUNDRA
20	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	4846	MOIST NONACIDIC TUNDRA	
21	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1207	MOIST NONACIDIC TUNDRA	
22	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	17947	MOIST NONACIDIC TUNDRA	
23	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	10888	MOIST NONACIDIC TUNDRA	
24	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	7084	MOIST NONACIDIC TUNDRA	
25	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	2452	MOIST NONACIDIC TUNDRA	

ID	SHAPE	DATE	COLLECTOR	NUMBER OF INDIVIDUALS	ABUNDANCE	STAGE	AREA (m ²)	PRIMARY VEGETATION COMPLEX	OTHER VEGETATION COMPLEX
26	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5442	DRY ACIDIC TUNDRA	
27	POLYGON	Jul-18-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	3873	RIPARIAN SHRUBLAND	MOIST ACIDIC TUNDRA
28	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	11073	DRY ACIDIC TUNDRA	
29	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1276	DRY ACIDIC TUNDRA	
30	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	61581	DRY ACIDIC TUNDRA	SNOWBED
31	POLYGON	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	21204	DRY ACIDIC TUNDRA	
32	POLYGON	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	7904	DRY ACIDIC TUNDRA	
33	POLYGON	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	14476	DRY ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA
34	POLYGON	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	3500	DRY ACIDIC TUNDRA	SNOWBED
35	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	516282	MOIST NONACIDIC TUNDRA	SNOWBED, DRY ACIDIC TUNDRA
36	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1599	DRY ACIDIC TUNDRA	
37	POLYGON	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5970	MOIST NONACIDIC TUNDRA	DRY ACIDIC TUNDRA, MOIST NONACIDIC TUNDRA
38	POLYGON	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5674	DRY ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA, MOIST ACIDIC TUNDRA
39	POLYGON	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	3738	MOIST NONACIDIC TUNDRA	SNOWBED
40	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	7983	MOIST NONACIDIC TUNDRA	DRY NONACIDIC TUNDRA
41	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	20170	MOIST ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA, DRY NONACIDIC TUNDRA, RICH FEN
42	POLYGON	Jul-11-02	AMY BREEN CARROLL	100+	FREQUENT	FLOWER	21682	MOIST ACIDIC TUNDRA	
43	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	219714	MOIST NONACIDIC TUNDRA	SNOWBED, MOIST ACIDIC TUNDRA, DRY NONACIDIC TUNDRA, DRY ACIDIC TUNDRA
44	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	2324	MOIST NONACIDIC TUNDRA	
45	POLYGON	Jul-19-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1261	MOIST NONACIDIC TUNDRA	
46	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	106750	MOIST NONACIDIC TUNDRA	DRY ACIDIC TUNDRA, RIPARIAN SHRUBLAND, MOIST ACIDIC TUNDRA
47	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	2917	DRY ACIDIC TUNDRA	
48	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	7463	DRY ACIDIC TUNDRA	MOIST ACIDIC TUNDRA
49	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5498	MOIST ACIDIC TUNDRA	DRY ACIDIC TUNDRA
50	POLYGON	Jul-13-02	AMY BREEN CARROLL	100+	FREQUENT	FLOWER	41776	DRY ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA, SHRUB TUNDRA
51	POLYGON	Jul-13-02	AMY BREEN CARROLL	100+	FREQUENT	FLOWER	41758	DRY ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA, SNOWBED
52	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	41814	MOIST ACIDIC TUNDRA	DRY ACIDIC TUNDRA

ID	SHAPE	DATE	COLLECTOR	NUMBER OF INDIVIDUALS	ABUNDANCE	STAGE	AREA (m ²)	PRIMARY VEGETATION COMPLEX	OTHER VEGETATION COMPLEX
53	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	10132	RIPARIAN SHRUBLAND	MOIST NONACIDIC TUNDRA, RICH FEN, SHRUB TUNDRA
54	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	1145	DRY ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA
55	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	2151	RIPARIAN SHRUBLAND	SHRUB TUNDRA
56	POLYGON	Jul-13-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	52858	MOIST ACIDIC TUNDRA	MOIST NONACIDIC TUNDRA
57	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	4803	MOIST ACIDIC TUNDRA	SHRUB TUNDRA, MOIST NONACIDIC TUNDRA
58	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	3863	DRY ACIDIC TUNDRA	RIPARIAN SHRUBLAND
59	POLYGON	Jul-21-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	4430	MOIST NONACIDIC TUNDRA	RICH FEN
60	POINT	Jul-16-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	600	MOIST NONACIDIC TUNDRA	
61	POINT	Jul-16-02	AMY BREEN CARROLL	>50	COMMON	FLOWER	300	DRY ACIDIC TUNDRA	
62	POINT	Jul-16-02	AMY BREEN CARROLL	>50	COMMON	FLOWER	150	DRY ACIDIC TUNDRA	
63	POINT	Jul-16-02	AMY BREEN CARROLL	<50	COMMON	FLOWER	500	MOIST NONACIDIC TUNDRA	
64	POINT	Jul-16-02	AMY BREEN CARROLL	<50	COMMON	FLOWER	150	SNOWBED	
65	POINT	Jul-13-02	AMY BREEN CARROLL	<100	FREQUENT	FLOWER	200	MOIST NONACIDIC TUNDRA	
66	POINT	Jul-13-02	AMY BREEN CARROLL	100+	COMMON	FLOWER	5000	MOIST NONACIDIC TUNDRA	
67	POINT	Jul-21-02	AMY BREEN CARROLL	>10	COMMON	FLOWER	50	MOIST NONACIDIC TUNDRA	

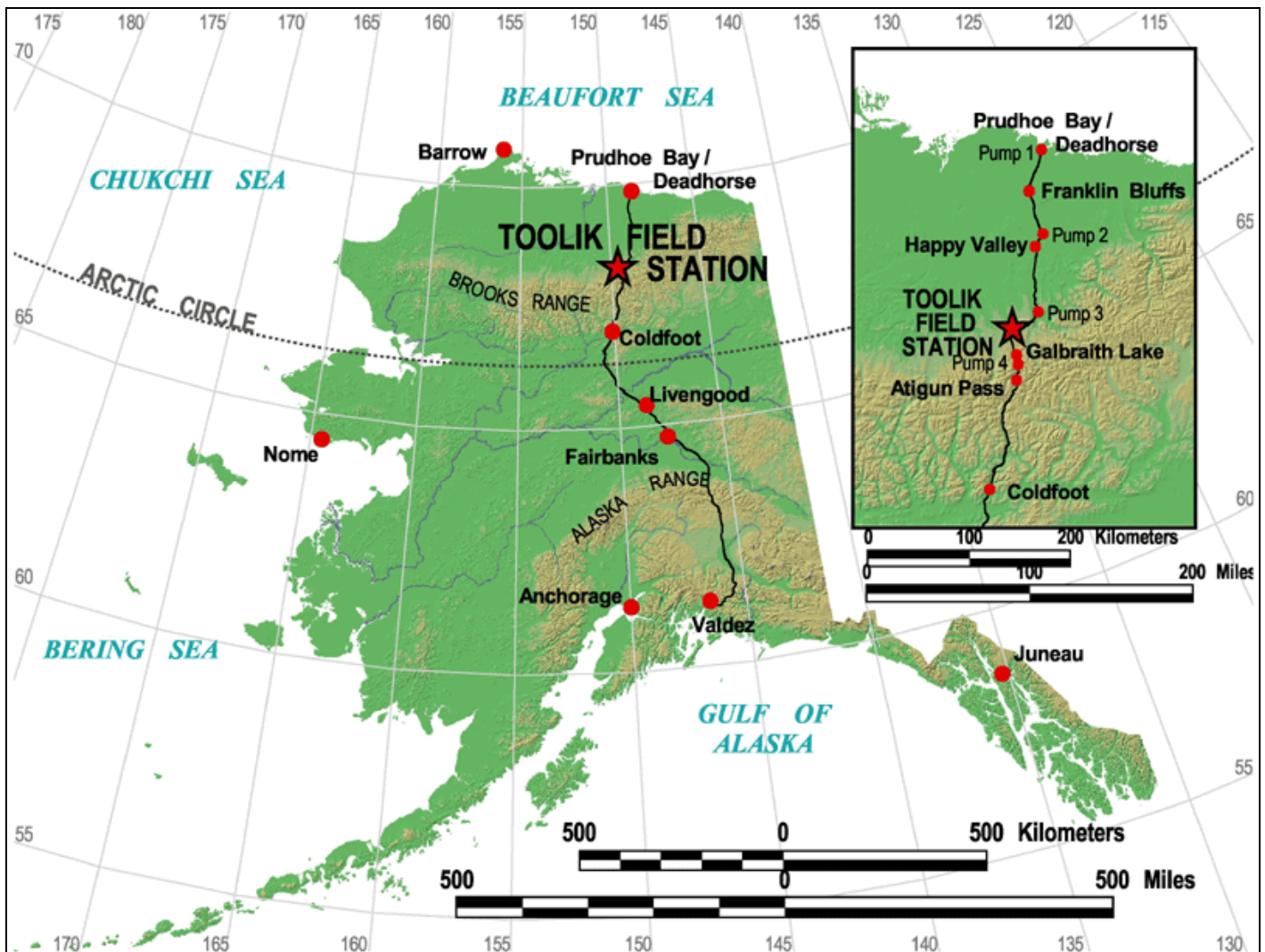


FIGURE 1. Map of Alaska showing the location of the Toolik Field Station. Map courtesy of Andrew Balser, Toolik Field Station GIS and Remote Sensing Manager.

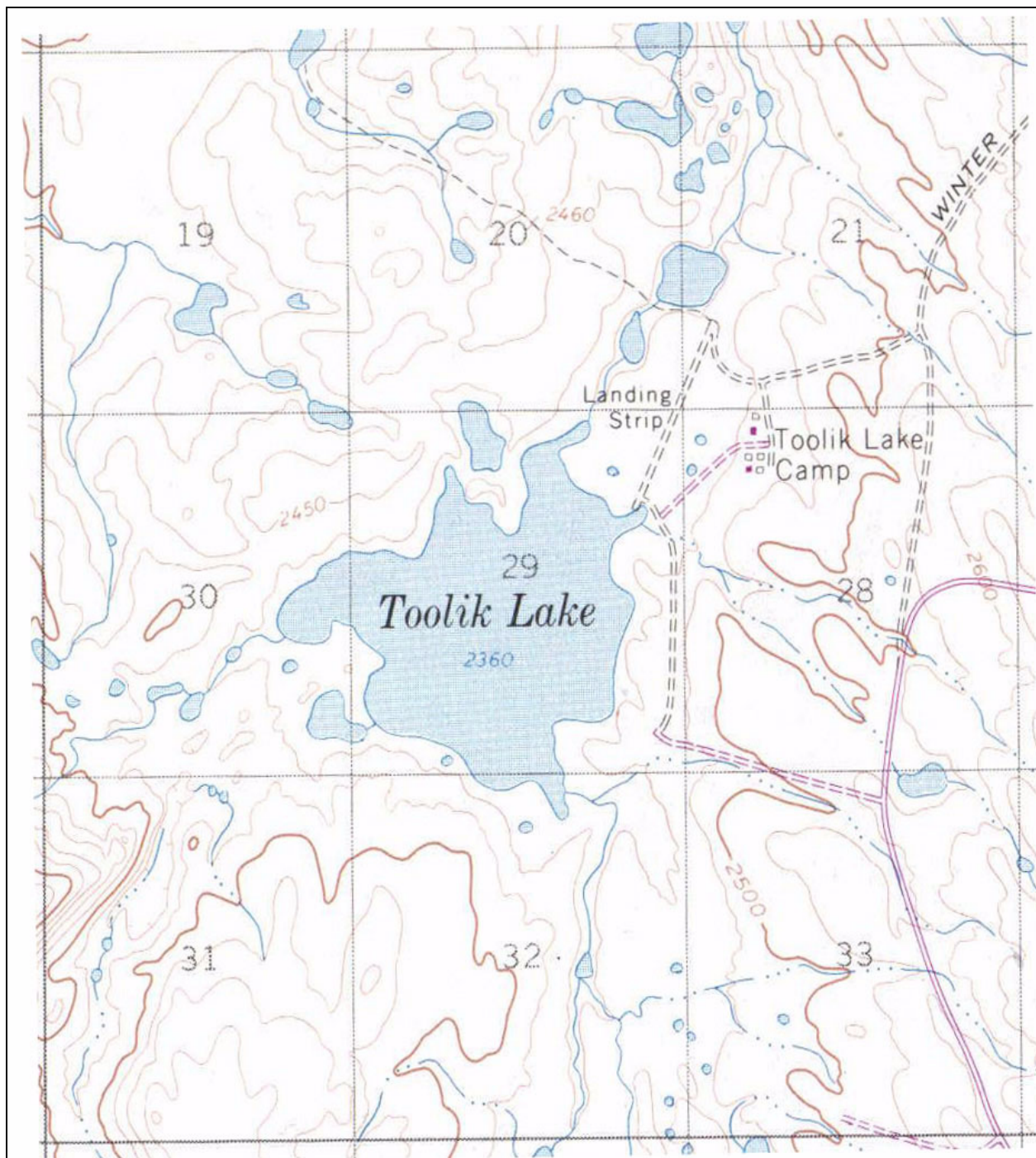


FIGURE 3. Map of the 2002 Rare Plant Survey Area around Toolik Lake. Each square represents a one mile² section within the Umiat Meridian's T9S and R11E. Numbers in the center of each square identify the section.

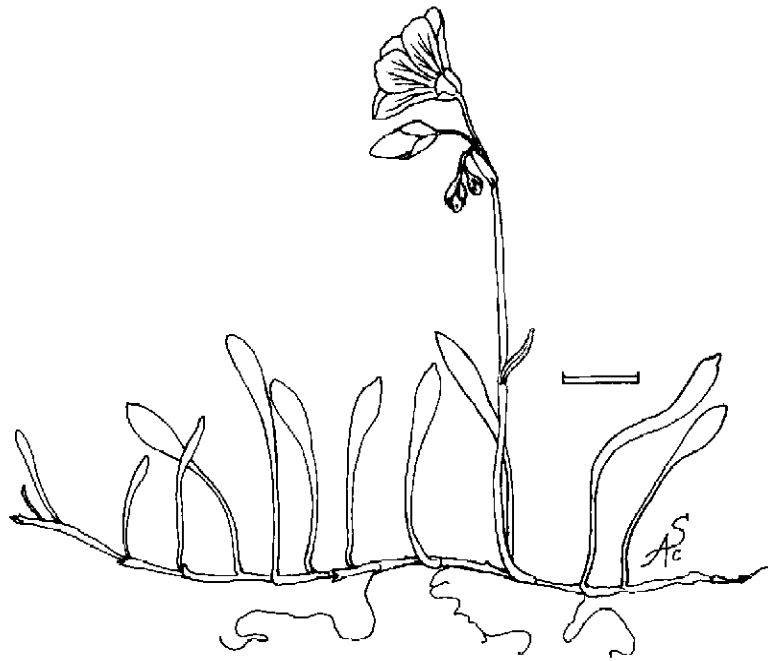


FIGURE 4. Line drawing of *Claytoniella bostockii* (A. E. Pors.) Jurtz. Synonyms for this species include: *Claytonia bostockii* A. E. Pors., *Montia bostockii* (A. E. Pors.) Welsh, and *Montiastrum bostockii* (A. E. Pors.) O. Nilsson. This species was placed in the *Claytoniella* genus due to its pollen and seed morphology and its leaf arrangement (Boris Yurtzev, personal communication). Drawing reproduced with permission of the illustrator, Anne-Lillian Schell and the Alaska Natural Heritage Program.

Toolik Lake Research Natural Area/ ACEC Rare Plant Inventory 2002

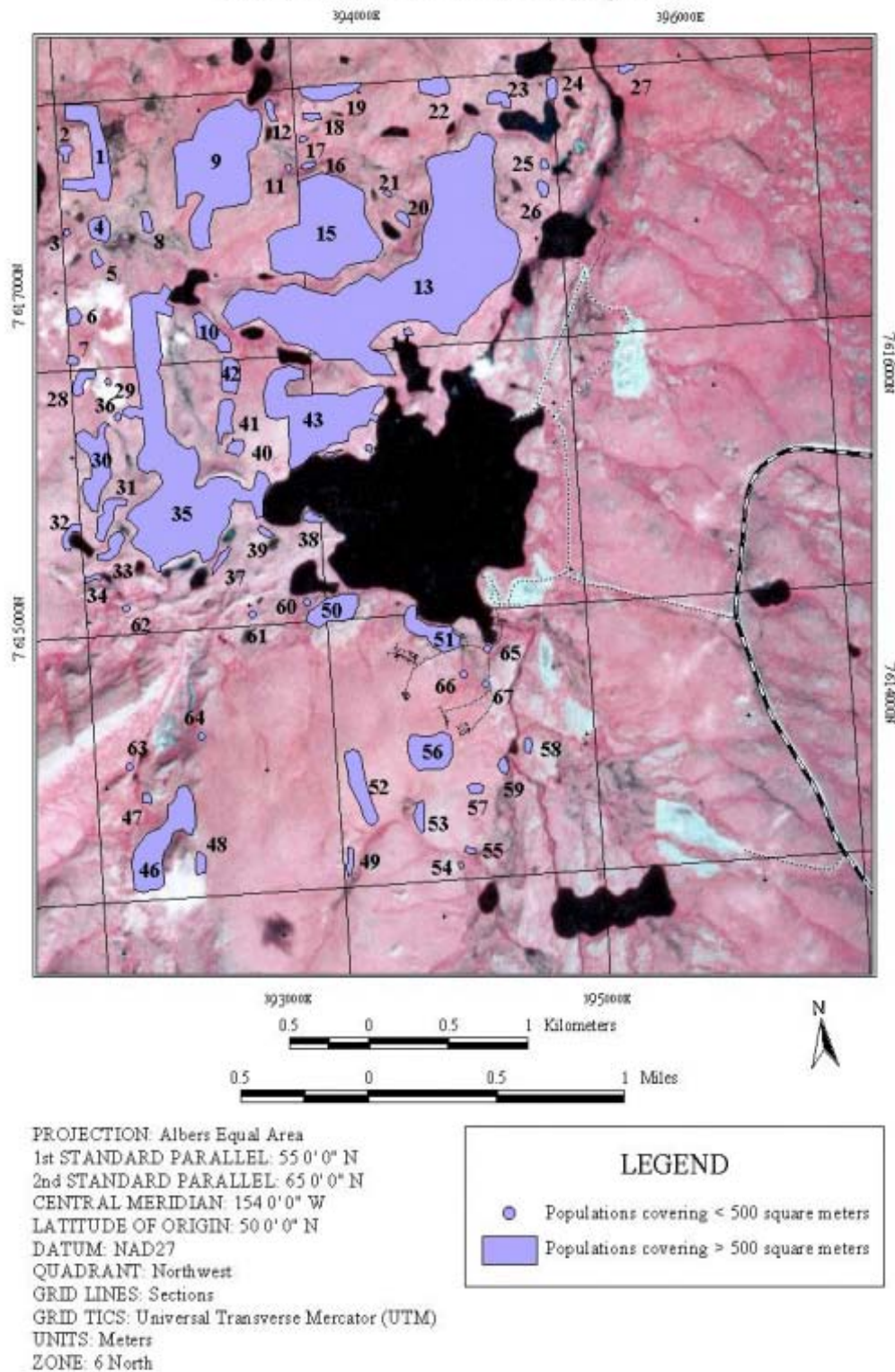


FIGURE 5. Aerial photograph map of *Claytoniella bostockii* occurrences within the 2002 Toolik Lake ACEC Survey Area (aerial photograph, August 1982).

Toolik Lake Research Natural Area/ ACEC Rare Plant Inventory 2002

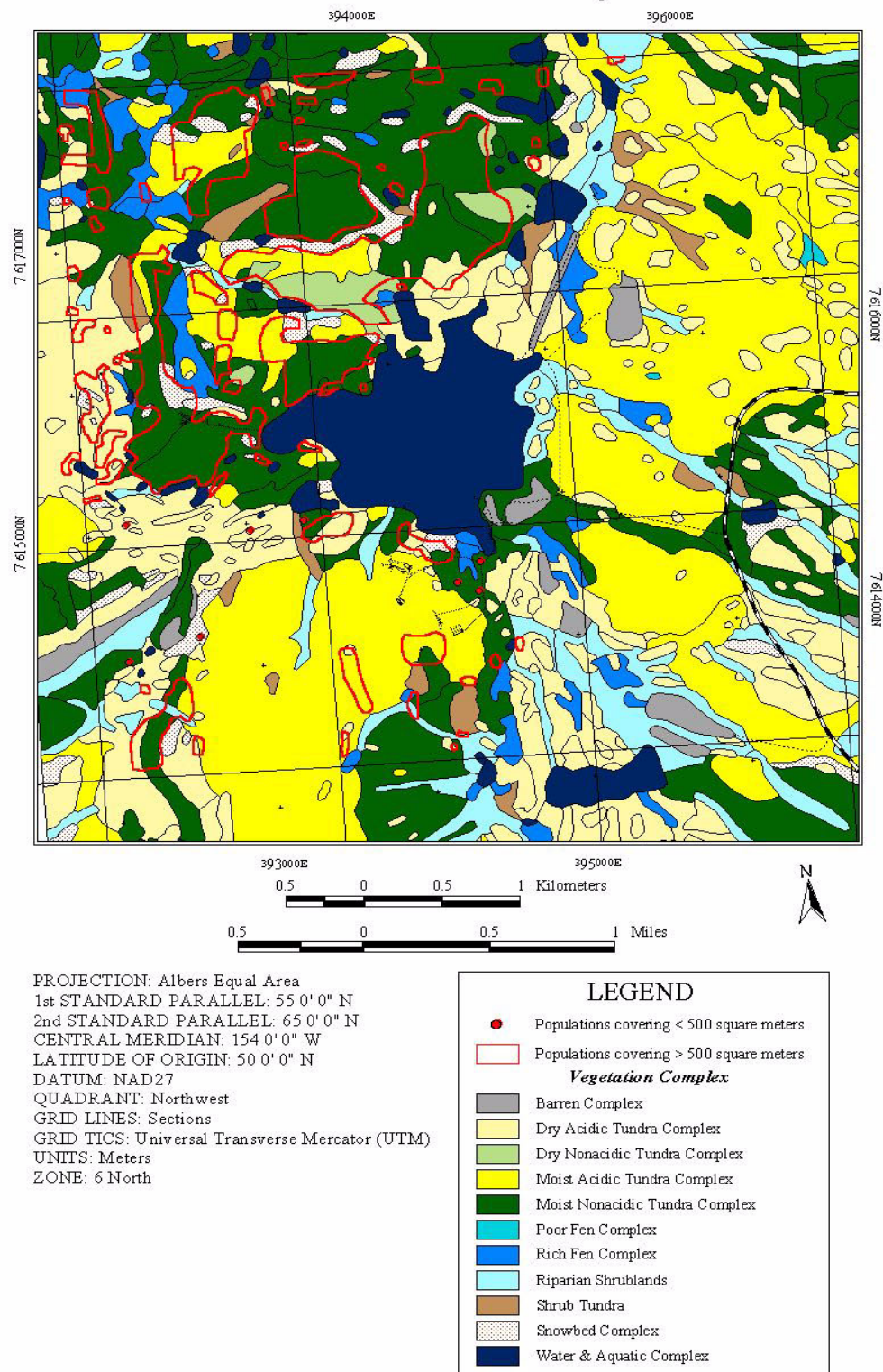


FIGURE 6. Vegetation map showing *Claytoniella bostockii* occurrences within the 2002 Toolik Lake ACEC Survey Area. Vegetation complex nomenclature follows the classification established by Walker (2000) and Walker *et al* (In Prep).