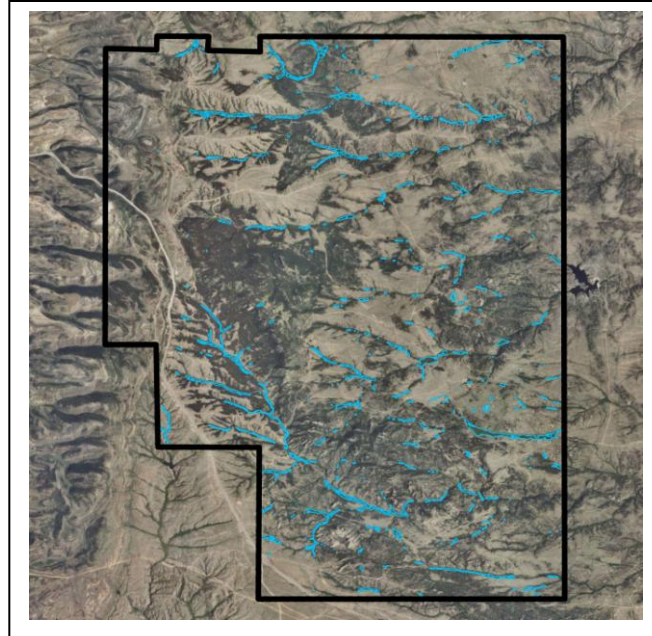


**Status Report on Sensitive Plant Species
of Pole Mountain Wetlands, Medicine Bow National Forest;
Albany County, Wyoming**



Prepared for the Medicine Bow National Forest

By

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ABSTRACT

Systematic surveys were conducted for Sensitive wetland plants on Pole Mountain, Medicine Bow National Forest. At the start of the project, three species designated Sensitive by U.S. Forest Service (USFS) were known from single locations. As a result of surveys, the original records were greatly expanded and the three Sensitive species are now known from eleven locations. In addition, four other Wyoming species of concern were documented, and new information was collected on nine other USFS Species of Local Concern in wetland habitats of the study area. The Sensitive species are highly-restricted on the Pole Mountain landscape. The habitat information and wetland documentation that were addressed as part of Sensitive plant surveys contribute information on rare plant species habitat requirements and Pole Mountain wetlands in general.

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Cover photo: National Wetland Inventory mapping superimposed on NAIP 2009 aerial photo of Pole Mountain.

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INTRODUCTION

The primary project purpose was to systematically survey for plant species designated Sensitive by U.S. Forest Service – Rocky Mountain Region (USFS) in wetlands on the Pole Mountain Unit of Medicine Bow National Forest (hereafter referred to as Pole Mountain). Secondary purposes were to document USFS Species of Local Concern that might occupy wetlands particularly other Wyoming plant species of concern as tracked by Wyoming Natural Diversity Database (WYNDD), and to collect data on Pole Mountain wetlands as part of field surveys.

STUDY AREA

The Pole Mountain study area is located in Albany County, southeastern Wyoming, encompassing an area of about 87 mi² (225 km²). It lies between Cheyenne and Laramie. It represents an isolated block of federal land in the southern Laramie Range, approximately 5-14 miles (8-22.5 km) east of Laramie in four townships: T14-15N, R71-72W. The southern Laramie Range is comprised of low mountains separating the Laramie Basin from High Plains (Figure 1).

The Laramie Range was uplifted during the Laramide orogeny which began about 70 million years ago near the end of the Cretaceous period and continued into the middle Tertiary. Sherman Granite is the predominant parent material at the south end, with Casper Formation sedimentary rock fringing the western margin (Love and Christiansen 1985). Elevations within Pole Mountain range from 7500-9055 ft (2286-2760 m). The topography is predominantly a gently-rolling, low-gradient surface interrupted by the Sherman Mountains and smaller hills. The highest elevations are in the Sherman Mountains. The landscape is crossed by a series of predominantly east-trending drainages.

The Pole Mountain area falls within the Laramie District of Medicine Bow National Forest. The management unit name refers to the local history of logging for pole-size timber. While there are many creek names and a campground name with “pole” or “lodgepole” in them, there is no discrete landform or other geographic place name referred to as Pole Mountain.

Pole Mountain vegetation is a mosaic of steppe with three tip sagebrush (*Artemisia tripartita* var. *rupicola*) and mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*); woodland with lodgepole, limber and ponderosa pine (*Pinus contorta*, *P. flexilis*, and *P. ponderosa*) and montane meadows (Merrill et al. 1996). National Wetlands Inventory mapping (NWI; U.S. Fish and Wildlife Service 2012) indicates that wetland habitat comprises about 2.4% (2.1 mi²; 5.4 km²) of the Pole Mountain area. Nearly all mapped wetland habitat are in riparian settings along the stream courses (Figure 2), representing much of the Crow Creek Watershed, municipal water source for Cheyenne (Mountain and Plains Project 2013). There are 11 wetland

types in over 1000 polygons mapped by NWI, following the system of Cowardin et al. (1979). Of the 11 types, palustrine graminoid and freshwater ponds are the most extensive. Small areas of closed-basin wetlands are mapped, and man-made wetland features are almost absent.

The dry, montane climate of the Laramie Range is characterized as receiving most precipitation from snowfall. The nearest maintained meteorological station is at the Laramie airport (1948-2006), an intermontane setting at 7270 ft (2216 m). Mean annual temperature is 40.8° F (4.9° C) with mean January temperature at 21.1° F (-6.1° C) and mean July temperature at 64.0° F (17.8° C). Mean annual precipitation is 10.63 in (27.00 cm), with peak precipitation in May and July at 1.50 in (3.81 cm); USDI National Oceanic and Atmospheric Administration (2006).

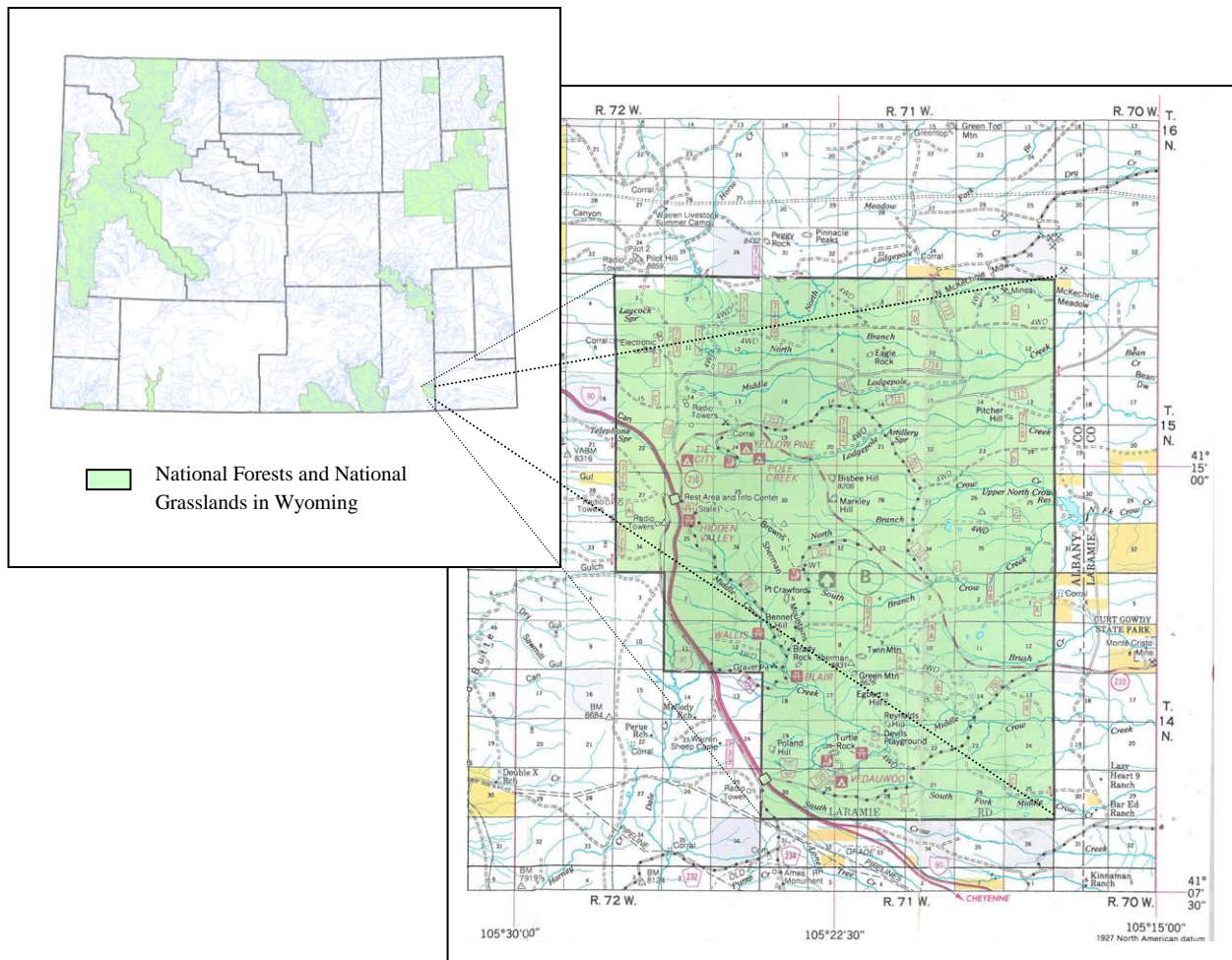


Figure 1. Pole Mountain study area, southeastern Wyoming

METHODS

On Pole Mountain, the only plant species with special management status are three species designated “Sensitive” by the U.S. Forest Service – Rocky Mountain Region (2011). No Threatened or Endangered plants are known to occur there. The three Sensitive plant species were known from single locations prior to this study. The Medicine Bow National Forest also recognizes Species of Local Concern (SOLC) that may be abundant in other parts of the state and Rocky Mountain Region. All Sensitive and some SOLC species are also rare in the state and recognized as Wyoming species of concern. A total of 26 plant species of concern are known on Pole Mountain (Heidel 2012; Wyoming Natural Diversity Database 2013).

The three Sensitive species include hoary willow (*Salix candida*), autumn willow (*S. serrisima*), and lesser bladderwort (*Utricularia minor*). All three are wetland plants (Lichvar 2012). Previous work on plants of Pole Mountain has been conducted informally by Laramie botanists over the years, and addressed in a study project that aimed to cover all Wyoming plant species of concern (Burke 2001). We compared the survey routes recorded by Burke (2001) with wetland habitat, and examined the total number of collection and survey records for all Pole Mountain Sensitive and SOLC species, including both extant and historic records. All of the above indicated that the three Sensitive species on Pole Mountain lacked systematic surveys, and that this might also be true for other SOLC plant species of concern found in wetlands. Nine wetland plants species were identified as a priority for 2012 surveys (Table 1).

The systematic surveys focused on the Sensitive species. The SOLC species were recorded incidental to surveying Sensitive species. Species not previously known from Pole Mountain were also collected incidental to surveys. The Rocky Mountain Herbarium (RM) has posted an on-line specimen database that permits large on-line data searches including searches by delimited polygon. We searched the database for all plant collections in the Pole Mountain area, printed the list (Rocky Mountain Herbarium 2012), and referenced it during fieldwork.

Areas for survey were compiled and prioritized by four methods. First, we flagged potential habitat in proximity to known Sensitive plant populations (hereafter referred to as occurrences) that were known from North Lodgepole Creek and South Fork of Middle Crow Creek. Second, National Wetland Inventory (NWI) mapping (U.S. Fish and Wildlife Service 2012) was superimposed on digital aerial photography (USDA NAIP 2009) and photointerpretation conducted to flag additional drainages for survey based on extent of wetland habitat, similarity of habitat appearing on aerials to that at known occurrences, and presence of any patterns that might indicate specialized habitat. Third, wetlands mapped as small pools in closed basin swale settings were surveyed as one of the rarest settings if not types on Pole Mountain, without knowing whether their flora is specialized. These three approaches produced an initial target list of six stream reaches and eight swale features. This framework was modified during the field season based on observations and logistics.

Table 1. Sensitive and SOLC species in Pole Mountain wetlands

Scientific Name	Common Name	FS status	WYNDD status
<i>Besseyia plantaginea</i>	White River kittentails	SOLC	Track
<i>Carex parryana</i> var. <i>unica</i>	Hall's sedge	SOLC	Track
<i>Euthamia gramifolia</i>	Flat-top fragrant goldenrod	SOLC	Track
<i>Gentiana affinis</i> var. <i>bigelovii</i>	Bigelow's prairie gentian	SOLC	Track
<i>Juncus vaseyi</i>	Vasey's rush	SOLC	Track
<i>Lomatogonium rotatum</i>	Marsh felwort	SOLC	Track
<i>Salix candida</i>	Hoary willow	Sensitive	Track
<i>Salix serissima</i>	Autumn willow	Sensitive	Track
<i>Utricularia minor</i>	Lesser bladderwort	Sensitive	Track
TOTAL		3 Sensitive; 6 SOLC	9 Track

Surveys were conducted when plant species were identifiable: 8 June-9 September. The 2012 growing season was early and dry, and essentially suitable for wetland fieldwork during most of June through frost, though not all of the species could be identified throughout the growing season. The most time-sensitive task involved collection of soil samples to fit the schedules of the Soil Testing Lab, collected 11 June before most botanical surveys had been conducted.

An alternative approach to site selection and prioritization was considered, the conductance of a systematic peatland survey. Many of the Sensitive plant species in Wyoming are obligate or facultative fen species (Heidel 2006). However, there were no known intact wetland features classified as fens on Pole Mountain, and only place on the South Branch of Crow Creek supported two Sensitive plant species typically associated with fens (Heidel and Laursen 2003). Documentation of fen habitat was beyond the scope of species surveys, and the recognition of fen habitat is complicated by subtle disturbance histories involving beaver and livestock in the open, low-gradient terrain of Pole Mountain. We settled on a pilot task of collecting soil samples from areas mapped in the NWI mapping as having saturated organic soils at the surface (histosols; Appendix A), including seven of 37 small polygons. Soil organic content and texture were determined at the University of Wyoming Soil Testing Laboratory.

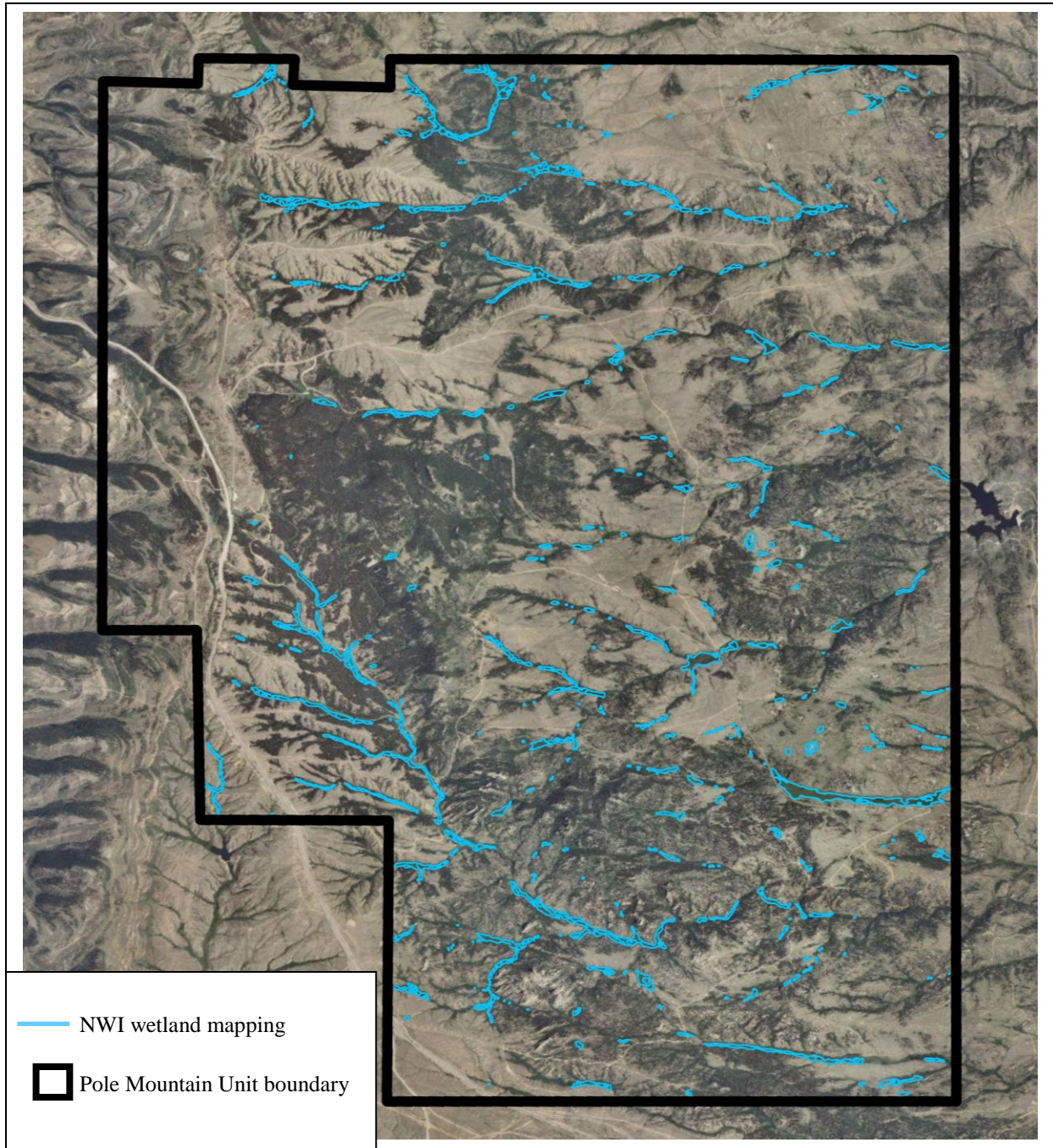


Figure 2. Wetlands in Pole Mountain, National Wetland Inventory mapping

The upper and lower endpoints of drainage survey were recorded using Global Positioning System (GPS) units, and wetland information collected in a format provided by Medicine Bow National Forest. At each rare plant population, GPS data were also collected to map the population as a point or polygon. Additional information represented on the Wyoming plant species of concern survey form was also collected. Voucher specimens were collected for

depositing at RM and photographs were taken. Surveys spanned over 20 miles on ten main drainages, and covered seven of eight small basins mapped in National Wetlands Inventory (NWI) mapping (Figure 3).

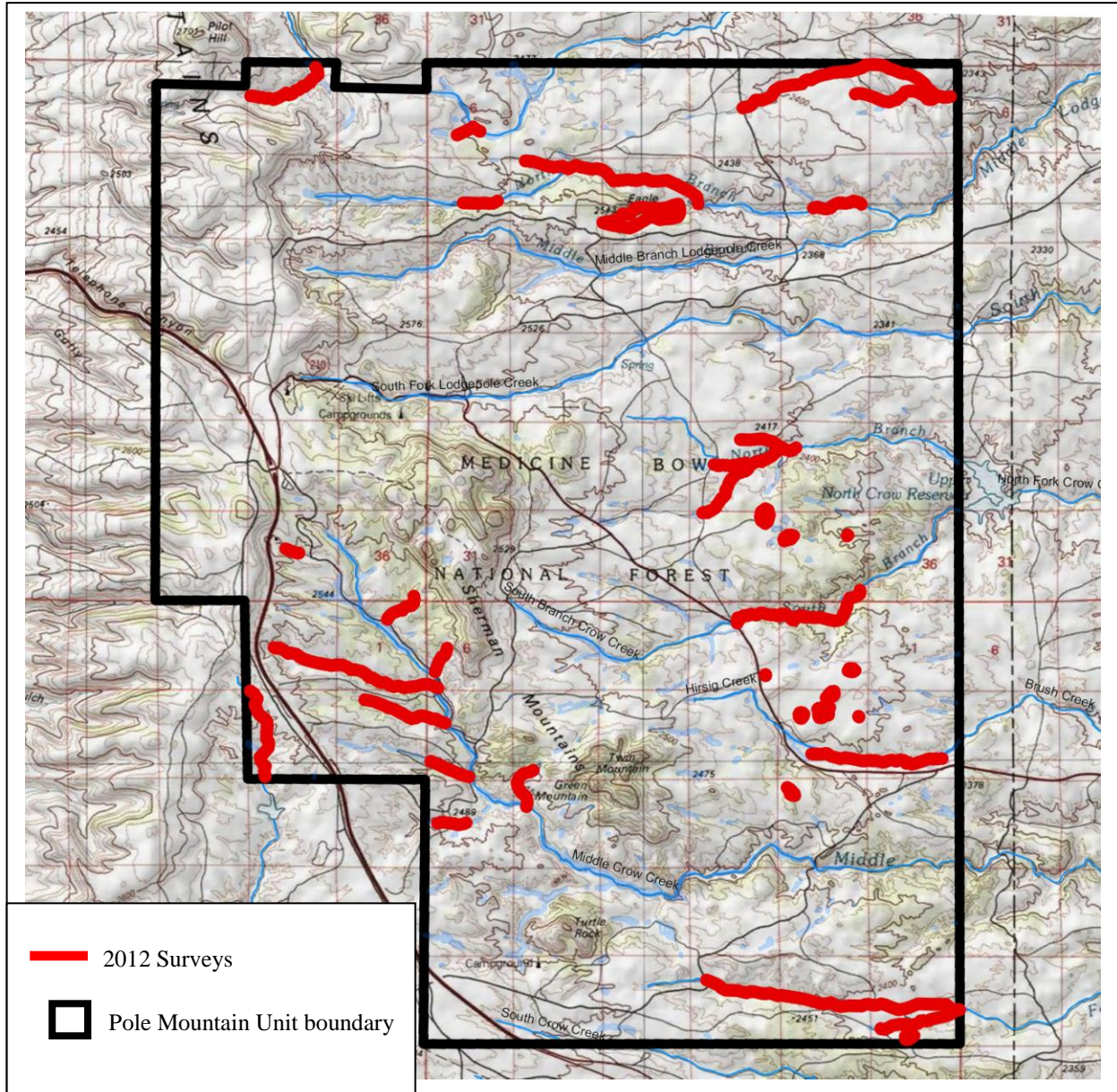


Figure 3. 2012 Sensitive species survey routes

RESULTS

As a result of 2012 surveys, a total of 11 detailed population records were documented for the three Sensitive species (3 expanded, 8 new). Ten population records were also documented for four of the SOLC species that are Wyoming plant species of concern, twelve new records for six more SOLC species were collected or otherwise noted, and one new Wyoming plant species of concern was added to the study area (Table 2, Figure 4). Species' results and status information for the seven Sensitive and SOLC species are addressed on the following pages. The following pages include maps of Pole Mountain distribution map for each species, showing only those records that can be precisely mapped, and distinguishing between 2012 survey results from prior results. Complete population records and detailed maps are presented in Appendix B. The results provide basis for updating Sensitive species evaluations for the three Sensitive species (Appendix C).

In addition, over 25 additions to the Pole Mountain flora were collected incidental to Sensitive species surveys (Appendix D). The SOLC species are incorporated in the overview of results shown in Figure 4, and overlapped in their distribution with the primary survey targets. While only a fraction of Pole Mountain wetland areas were surveyed in 2012, surveys covered the landscapes around all known populations of Sensitive species, the largest graminoid wetlands on Pole Mountain, and many of the largest shrub wetlands.

Samples were collected in seven of the 37 polygons mapped as peatland (Appendix A). However, none of them proved to have peatland soils except for a borderline case on North Lodgepole Creek that almost met the organic threshold and was provisionally placed in the fibrist category because it had almost no clay. The only definite peatland soils that were sampled came from two Sensitive species sites that were not mapped as peatland on South Branch of Crow Creek and newly-documented on Brush Creek. The pH values of all wetland soils were mildly acidic to circumneutral, ranging from 5.1-6.9 (Table 3). Organic matter values were generally high, ranging from 4.6-69.6%; highest in the two fibrist samples. It was not until later in summer after soils samples were collected that additional fen sites were found. Fen habitat on the landscape is addressed in greater detail at the end of this report. The two sites with fibrist soils had peat depth exceeding 40 cm.

Finally, wetland forms were completed for all ten surveyed drainage reaches and seven swales (total=17). Labelled photographs accompany them (Appendix E).

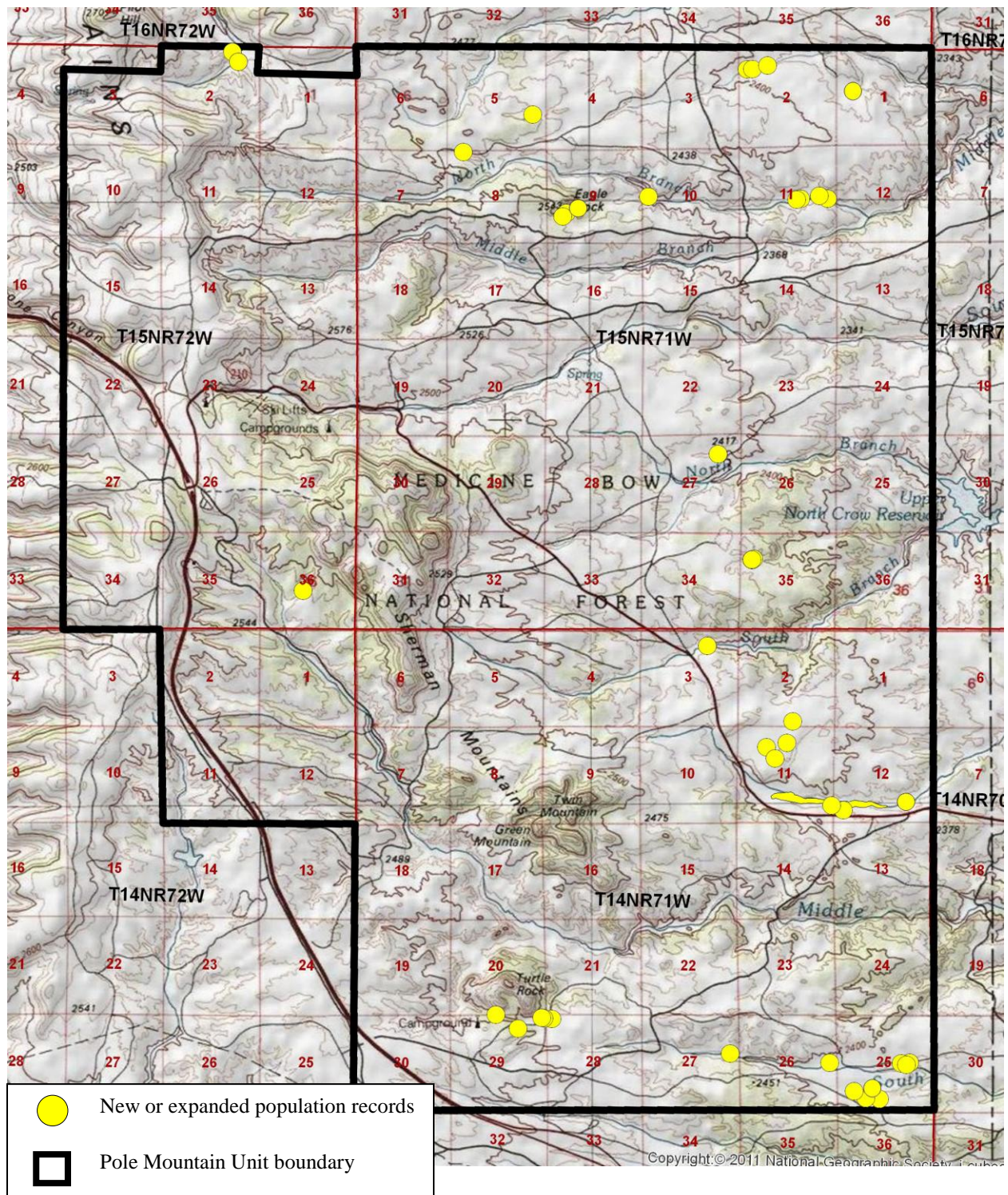


Figure 4. New or expanded Sensitive and SOLC population records in Pole Mountain (summarized in Table 2 and detailed in Appendix B)

Table 2. Results of surveys for Sensitive and SOLC species in Pole Mountain wetlands, with additions (H=Historic, KE=Known Extant, Expanded Extant, N=New)

Species	FS status/ WYNDD	Fen indicator	H	KE	EE	N	Legal description of EE or N (Figure 4)
<i>Besseya plantaginea</i> White River kittentails	SOLC/ track	No	0	3	0	1	T14NR71W Sec 25
<i>Carex interior</i> Inland sedge	SOLC/ not track	Facultative	0	0	0	2	T15NR71W Sec 35 T15NR72W Sec 2
<i>Carex leptalea</i> Bristle-stalk sedge	SOLC/ not track	Obligate	0	0	0	2	T15NR71W Sec 35 T15NR72W Sec 2
<i>Carex parryana</i> var. <i>unica</i> Hall's sedge	SOLC/ track	Facultative?	1	1	1	1	T14NR71W Sec 11, 12 T15NR71W Sec 35
<i>Eriophorum</i> <i>angustifolium</i> Tall cottongrass	SOLC/ not track	Facultative	2	1	0	1	T15NR71W Sec 1
<i>Euthamia gramifolia</i> Flat-top fragrant goldenrod	SOLC/ not track	No	1	0	0	0	--
<i>Gentiana affinis</i> var. <i>bigelovii</i> Bigelow's prairie gentian	SOLC/ track	No	0	4	3	1	T14NR71W Sec 2, 11, 12, 25, 26 T15NR71W Sec 8
<i>Juncus vaseyi</i> Vasey's rush	SOLC/ track	No	1	0	0	0	--
<i>Lomatogonium rotatum</i> Marsh felwort	SOLC/ track	Facultative	1	1	0	3	T14NR71W Sec 25 T15NR71W Sec 1 T15NR72W Sec 2
<i>Menyanthes trifoliata</i> Buckbean	SOLC/ not track	Obligate	0	0	0	1	T15NR71W Sec 1
<i>Muhlenbergia glomerata</i> Marsh muhly	--/ track	Facultative	0	0	0	1	T15NR72W Sec 2
<i>Petasites sagittatus</i> Arrowleaf sweet coltsfoot	SOLC/ not track	Facultative	0	4	3	0	T14NR71W Sec 28, 29 T15NR71W Sec 5 T15NR72W Sec 36
<i>Salix candida</i> Hoary willow	Sensitive/ track	Obligate	0	1	1	2	T15NR71W Sec 1, 35 T15NR72W Sec 2
<i>Salix serissima</i> Autumn willow	Sensitive/ track	Obligate	0	1	1	2	T14NR71W Sec 3 T15NR71W Sec 27, 35, 9 T15NR72W Sec 2
<i>Triglochin palustris</i> Marsh arrowgrass	SOLC/ not track	Facultative	1	0	0	3	T14NR71W Sec 11, 12 T15NR71W Sec 1 T15NR72W Sec 2
<i>Utricularia minor</i> Lesser bladderwort	Sensitive/ watch	Obligate?	0	1	1	4	T14NR71W Sec 11, 12, 27 T15NR71W Sec 1, 2, 10, 11 T15NR72W Sec 2
Totals for S=Sensitive, Tr=other tracked by WYNDD, s=SOLC			7	17	3 S 4Tr 3s	8S 7Tr 9s	

Table 3. Soils test results from Pole Mountain

Sample #	Drainage	pH	Organic Matter* (%)	Soil Type	Sampling Category
1	Brush Cr. A	5.23	4.60	Mineral	NWI mapping
2	Brush Cr. B	5.30	13.40	Mineral	NWI mapping
3	Brush Cr. C	6.52	48.50	Fibrist	Sensitive species locale
4	Brush Cr. D	6.87	14.40	Mineral	Adjoining Sensitive species locale
5	Middle Crow	6.74	6.20	Mineral	NWI mapping
6	North Lodgepole Cr. A	5.06	12.20	Mineral	NWI mapping
7	North Lodgepole Cr. B	5.36	19.60	Mineral	SOLC species locale
8	North Fork Lodgepole Cr.	5.35	25.50	Fibrist?	NWI mapping
9	South Branch Crow Cr.	6.14	69.60	Fibrist	Sensitive species locale
10	South Fk Middle Crow Cr	5.07	14.30	Mineral	NWI mapping
11	Middle Crow	5.84	8.00	Mineral	NWI mapping
12	Middle Crow	5.64	19.70	Mineral	NWI mapping
13	Sherman Mtns A	5.14	6.90	Mineral	NWI mapping
14	Sherman Mtns B	5.24	9.70	Mineral	NWI mapping

*Organic content by weight, contingent on particle size, following NRCS standards (USDA NRCS 2006).

--SENSITIVE SPECIES--

HOARY WILLOW (*Salix candida* Flugge ex Willd.)

Classification

Scientific name: *Salix candida* Flugge ex Willd.

Synonyms: none

Common name: Hoary willow

Family: Salicaceae

Size of genus: The willow genus is a widespread genus of arctic, boreal and temperate regions comprised of about 450 species (Argus 2010). There are 37 unique willow taxa in Wyoming (Dorn 2001). Eleven willow taxa are documented in Pole Mountain (Rocky Mountain Herbarium 2012).

Present legal or other formal status

U.S. Fish & Wildlife Service: none

U.S. Forest Service – Rocky Mountain Region: Sensitive

Global Heritage rank: G5

State Legal status: none

State Heritage rank: The more recent list update (Heidel 2012) reported an SRANK of S2.

Results of 2012 surveys, including that on Pole Mountain, might support a rank change to S3.

Wyoming contribution rank: Conservation of hoary willow as a disjunct species in Wyoming signifies a medium-level contribution to rangewide conservation.

Description

General description: Hoary willow is a low shrub 30-120 cm tall. The branches are light brown and mostly glabrous. Twigs of the current year are densely white pubescent. This pubescence may persist into the second year. The leaves are narrowly elliptic to narrowly ovate, 3-8 cm long, and have entire, in-rolled margins. The upper leaf surface is dark green with scattered tufts of woolly hair, while the lower surface is densely white-tomentose. Catkins appear with the leaves and are borne on short leafy branchlets or are nearly sessile. Flower bracts are brownish and wavy-pubescent. Staminate catkins are 1.5-2.5 cm long with 2 stamens and reddish-purple anthers. Pistillate catkins are 2-5 cm long with tomentose, tawny capsules, styles 0.8-1.6 mm long, and stipes 0.5-1.2 mm long (Dorn 1997, 2001; Hitchcock and Cronquist 1964; Argus 2010; Figures 5, 9 and 10).

Local field characters: The tomentose undersides of leaves are diagnostic.



Figure 5. *Salix candida*

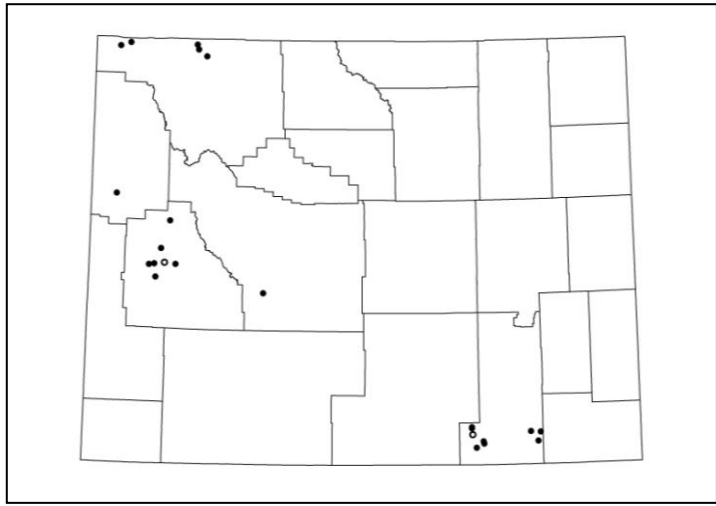


Figure 6. Distribution of *Salix candida* in Wyoming

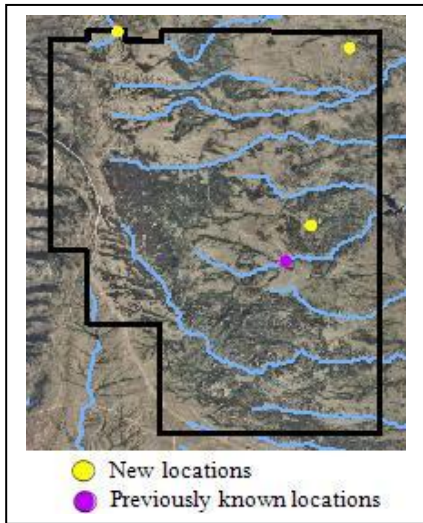


Figure 7. Distribution of *Salix candida* in Pole Mountain



Figure 8. Habitat of *Salix candida* at Horse Creek



Figure 9. Hedged *Salix candida*, 0.3 m tall at McKechnie Meadow



Figure 10. Unbrowsed *Salix candida*, 1.2 m tall at Horse Creek

Similar species: Drummond’s willow (*Salix drummondiana*) is a taller shrub and has thin, silvery, appressed hairs on the leaves, pruinose leaves and in-rolled leaf margins. Shortfruit willow (*S. brachycarpa*) has relatively smaller elliptic leaves that are densely gray-hairy on both sides (Dorn 1997).

Phenology: Flowering (late May) June, producing fruits in June-early July. Identifiable by vegetative characteristics throughout the growing season.

Geographical distribution

Range: From Labrador to Alaska and south to the Great Lakes states, South Dakota, Colorado, and Idaho (Hitchcock and Cronquist 1964). In Wyoming, it is known from the Absaroka, Beartooth, Laramie, Medicine Bow and Wind River ranges, Yellowstone Plateau, and upper Green River Basin, in Albany, Carbon, Fremont, Park, Sublette and Teton counties (Figure 6). The Pole Mountain populations lie near northern and eastern boundaries of the Unit on Horse Creek, the South Branch of Crow Creek, and McKechnie Meadow (Figure 7; Appendix B).

Number of populations in the state and in the study area: *Salix candida* is known from 21 extant occurrences in the state, not counting two that have low viability or unknown contributions to species’ viability plus two historic records. In Pole Mountain, there are three occurrences.

Additional species information

Size and extent: *Salix candida* subpopulation sizes in Pole Mountain ranged from a single plant to numbers over 1000 plants.

Habitat in the state and in the study area: In Wyoming, *Salix candida* occupies graminoid and shrub fens, including floating mats, sometimes with marl accumulation. Pole Mountain populations in shrub fen are in high numbers (Figure 8), and those in graminoid fen are in low numbers.

Table 4. Pole Mountain occurrences of *Salix candida*

#	Directions	Legal Description	Elevation ft (m)	USGS 7.5’ Quad
002	Laramie Range; South Branch Crow Creek and western tributary, both sides of Happy Jack Road	TT14N R71W Sec. 3; T15N R71W Sec. 35	7760-7920 (2365-2414)	Sherman Mountains East
022	Laramie Range; between North McKechnie and McKechnie Meadow	T15N R71W Sec. 1	7760 (2365)	Green Top Mountain
023	Laramie Range; both sides of Horse Creek, immediately south of Forest boundary	T15N R72W Sec. 2	8240 (2512)	Pilot Hill

Pole Mountain notes: *Salix candida* is browsed by livestock and wildlife, and is widely accessible to both at Pole Mountain. At the site where only one plant could be found, the species was moderately hedged and less than 0.4 m tall. There were a few severely hedged plants among the moderately hedged plants in the McKechnie Meadow population, all of which were accessible to livestock (Figure 9). On Horse Creek, where over 1000 plants were found, a large part of the population was inaccessible to livestock and had limited wildlife sign, *S. candida* had no grazing or hedging and the majority of plants grew over 1 m tall (Figure 10). The other part of the population, accessible to livestock, had hedged plants that grew no more than 0.6 m tall. Signs of recruitment only at the Horse Creek population.

AUTUMN WILLOW (*Salix serissima* (Bailey) Fern.)

Classification

Scientific name: *Salix serissima* (Bailey) Fern.

Synonyms: none

Common name: Autumn willow

Family: Salicaceae

Size of genus: The willow genus is a widespread genus of arctic, boreal and temperate regions comprised of about 450 species (Argus 2010). There are 37 unique willow taxa in Wyoming (Dorn 2001). Eleven willow taxa are documented in Pole Mountain (Rocky Mountain Herbarium 2012).

Present legal or other formal status

U.S. Fish & Wildlife Service: none

U.S. Forest Service – Rocky Mountain Region: Sensitive

Global Heritage rank: G5

State Legal status: none

State Heritage rank: S1

Wyoming contribution rank: Conservation of autumn willow as a disjunct species in Wyoming signifies a medium-level contribution to rangewide conservation.

Description

General description: Autumn willow is a shrub 1-4 m tall with grayish-brown branches and reddish-brown, glossy twigs. The elliptic leaves are lighter below than above and have glandular-toothed margins and glandular petioles. Catkins are borne on short, leafy stalks (peduncles). Pistillate catkins are 2-4 cm long and have glabrous capsules and deciduous, pale yellow, hairy



Figure 11. *Salix serissima*, in fruit September 2012 Wyoming

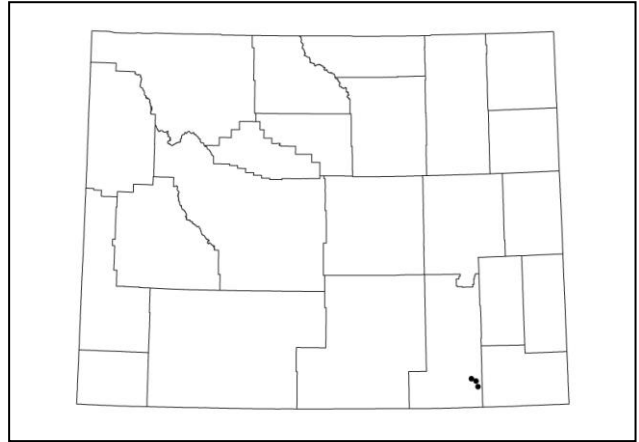


Figure 12. Distribution of *Salix serissima* in

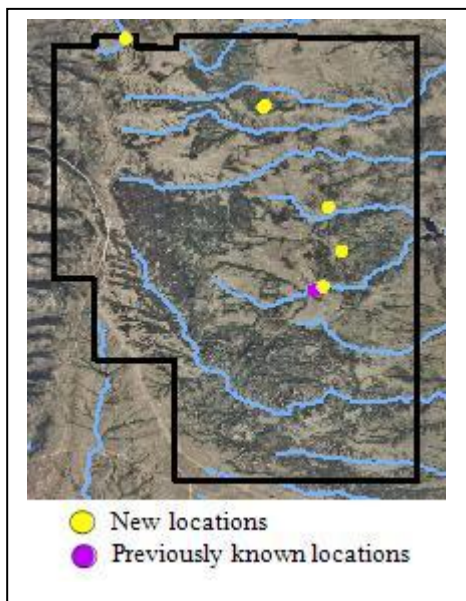


Figure 13. Distribution of *Salix serissima* in Pole Mountain



Figure 15. Decadent *Salix serissima* near South Branch of Crow Creek, an isolated pair of staminate and pistillate plants



Figure 14. Habitat of *Salix serissima* at Horse Creek

Local field characters: It is unique among Wyoming willows in having a late fruiting period. flowers bracts. Staminate catkins, produced on separate plants, have flowers with 3-8 stamens (Dorn 1997, 2001; Fertig et al. 1994, Argus 2010; Figure 11).

Similar species: Greenleaf willow (*Salix lasiandra* var. *caudata*) has long-pointed leaves equally green on both sides. Crack willow (*S. fragilis*) has twigs that are brittle at the base and catkins maturing in early spring.

Phenology: Flowers May - July, fruits produced June - September. In Pole Mountain, it was found in fruit throughout the 2012 growing season, noted from 11 June-9 September. In some places it was beginning to senesce by late July, possibly reflecting the dry 2012 conditions.

Geographic distribution

Range: Alberta to Newfoundland, south to Minnesota and New York, with disjunct populations in South Dakota, Wyoming, and Colorado. In Wyoming, known only from the Laramie Range in Albany County (Figures 12 and 13, Appendix B).

Number of populations in the state and the study area: The three Pole Mountain populations are the only ones in Wyoming. They range from having very low viability (only 2 plants were found) to having excellent viability (est. 200-1000 plants).

Additional species information

Size and extent: *Salix serissima* population sizes in Pole Mountain ranged from a pair of plants to numbers estimated at 200-1000 plants.

Habitat in the state and in the study area: In Pole Mountain, the only place where *Salix serissima* is known in Wyoming, it occupies graminoid and shrub fens, and margins of wet meadow that may be high in organic content. The habitat in best condition is represented in Figure 14.

Table 5. Pole Mountain occurrences of *Salix serissima*

#	Directions	Legal Description	Elevation ft (m)	USGS 7.5' Quad
001	South Branch Crow Creek and western tributary as well as northern tributary of North Branch Crow Creek, both sides of Happy Jack Rd (WY HWY 210), ca 12 mi SE of Laramie.	T14N R71W Sec. 3; T15N R71W Sec. 27, 35	7640-7900 (2329-2408)	Sherman Mountains East
002	West side of Horse Creek, immediately south of Forest boundary, ca 1.25 miles east-southeast of Pilot Hill, ca 6 miles east of Laramie.	T15N R72W Sec. 2	8240 (2512)	Pilot Hill
003	Head of tributary of North Branch Middle Lodgepole Creek, just south of Eagle Rock, ca 10 miles east-southeast of Laramie.	T15N R71W Sec. 9	8050 (2454)	Green Top Mountain

Pole Mountain notes: *Salix serissima* is browsed by livestock and wildlife and is widely-accessible to both at Pole Mountain, although it typically reaches heights that are inaccessible, up to 2.5 m tall. In places, it numbers only 1-2 plants, and at one of them, it was decadent with about half of branches dead (Figure 15). On Horse Creek, where numbers were estimated at 200-1000 plants, it appeared to be restricted to an area inaccessible to livestock and with limited wildlife sign. Signs of recruitment were evident at only the Horse Creek population.

LESSER BLADDERWORT (*Utricularia minor* L.)

Classification

Scientific name: *Utricularia minor* L.

Synonyms: none

Common name: Lesser bladderwort

Family: Lentibulariaceae

Size of genus: The bladderwort genus is a large cosmopolitan genus comprised of nearly 300 species, best developed in the tropics (Hitchcock et al. 1959). It is so complex and variable that early authors divided it into 12 genera. There are four bladderwort species in Wyoming (Dorn 2001, and Hellquist et al. in preparation). Two bladderwort taxa are documented in Pole Mountain (Rocky Mountain Herbarium 2012).

Present legal or other formal status

U.S. Fish & Wildlife Service: none

U.S. Forest Service – Rocky Mountain Region: Sensitive

Global Heritage rank: G5

State Legal status: none

State Heritage rank: S3; reranked in the most current revision (Heidel 2012)

Wyoming contribution rank: Conservation of lesser bladderworts a disjunct species in Wyoming signifies a medium-level contribution to rangewide conservation.

Description

General description: Lesser bladderwort is a perennial aquatic herb with submersed, weak stems and leaves. The leaves are 0.3-1 cm long and finely dissected, with each 3-parted leaflet further divided into 1-3 flat, toothed segments. Small bladders (1-2 mm wide) are scattered along the main leaf blade among the leaflets, and sometimes also on separate branches. The inflorescence is a raceme of 2-9 yellow flowers on an emergent stalk 4-15 cm long. The short-spurred,



Figure 16. *Utricularia minor*

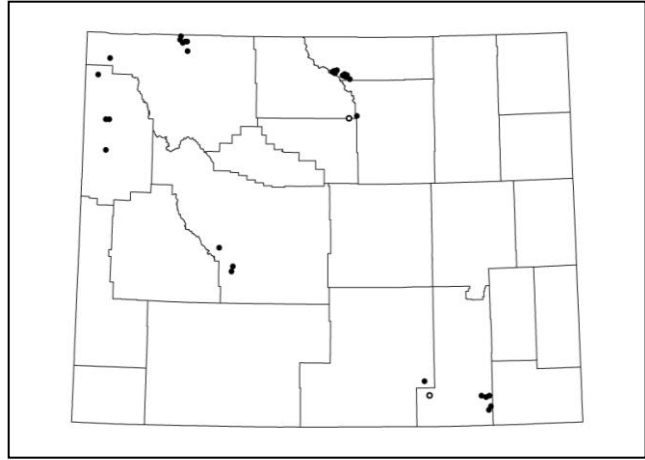


Figure 17. Distribution of *Utricularia minor* in Wyoming

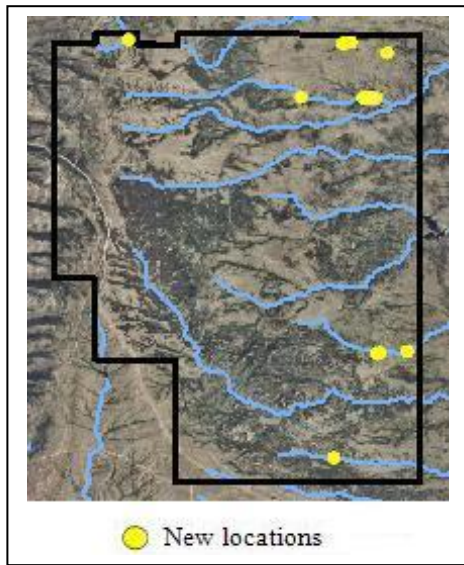


Figure 18. *Utricularia minor* habitat in shaded pool



Figure 19. *Utricularia minor* habitat by beaver ponds including upstream fringe pools (arrow) and downstream isolated pool pockets



Figure 20. Open setting of *Utricularia minor* habitat
By Melanie Arnett



Figure 21. View toward *Utricularia minor* habitat (in Fig. 15)

snapdragon-like flowers are bilobed, with the lower lip 4-8 mm long and about twice as long as the upper lip (Hitchcock et al. 1959, Cronquist et al. 1984; Figure 16).

Local field characters: Leaves are mostly 3-parted at base, 1 cm or less long, and bladders are mostly on ordinary leaves.

Similar species: Common bladderwort (*Utricularia vulgaris*) has leaves that are mainly 2-parted, 1-5 cm long, and flowers 12-18 mm long. Flatleaf bladderwort (*U. intermedia*) has bladders 2.5-4.0 mm long, borne on separate, leafless branches.

Phenology: Rarely seen in flower. Collected vegetatively June-September. A specimen collected in this study represents the first time it has been collected in June.

Geographic distribution

Range: Circumboreal, extending south in North America to California, Colorado, Indiana and New Jersey. In Wyoming, known from the Yellowstone Plateau, Jackson Hole, Laramie Basin, and Absaroka, Big Horn, Laramie, Medicine Bow and Wind River Ranges; in Albany, Fremont, Johnson, Park, Sheridan and Teton counties (Figure 17). In Pole Mountain, it is known from Brush Creek, Horse Creek, McKechnie Meadow, the South Fork of the Middle Crow Creek and the North Branch of Lodgepole Creek (Figure 18).

Number of populations in the state and in the study area: *Utricularia minor* is known from 31 extant occurrences in the state, not counting two historic records. In Pole Mountain, there are five occurrences (Table 6).

Additional species information

Size and Extent: *Utricularia minor* populations in Pole Mountain ranged from single, isolated pools to repeated occurrences in a series along the drainage.

Habitat in the state and in the study area: In Wyoming, *Utricularia minor* occupies shallow water in isolated pools and ponds. It is usually in well-developed fen wetlands where the peat forms small pool pockets with stable levels, no circulation, and warming conditions in mid-summer. It is a carnivorous plant and the specificity of its prey, and prey habitat requirements are not known.

The Pole Mountain settings stretch the circumscription of potential habitat. It was in undisturbed pools on the North Branch of Middle Lodgepole Creek near Eagle Rock (Figure 14) and on Horse Creek. However, it was also found downstream from Eagle Rock on a stream segment interrupted by beaver ponds. It was found above a pond in a tiny pool in peat and above or

below the ponds in isolated pool pockets with little or no surface flow (Figure 19). It was found within a beaver pond of North Branch of Middle Lodgepole Creek in 2011 surveys during highwater conditions. It was also found in a beaver pond of Middle Fork of South Crow Creek when 2012 beaver activity essentially cut a large pond in half to raise water levels in the dry conditions of 2012. These two observations suggest that beaver ponds are secondary habitat or reflect habitat alteration in progress.

It was also found in the center of well-developed peat habitat at McKechnie Meadow, and in central peat zone of the broad Brush Creek meadow within more extensive alkaline meadow (Figure 20). Only the Brush Creek population was documented in time to include among soil samples, and the soils there were confirmed as fibrist (Table 3). Pole Mountain data prove that it is not a peatland obligate, although the settings that do not fit may have historically had a greater development of peat accumulation.

Table 6. Pole Mountain occurrences of *Utricularia minor*

#	Directions	Legal Description	Elevation ft (m)	USGS 7.5' Quad
003	Laramie Range; North Branch Middle Lodgepole Creek, 0.9 mile east to 1 mile west of Carey Road (Forest Service Road 713).	T15N R71W Sec. 10, 11	7660-7840 (2335-2390)	Green Top Mountain, Pilot Hill
030	Laramie Range; South Fork Middle Crow Creek, ca 0.75 mile east of Forest Service Road 700, ca 2 mile east-southeast of Vedauwoo, ca 15 miles southeast of Laramie.	T14N R71W Sec. 27	7840 (2390)	Sherman Mountains East
031	Laramie Range; east side of Horse Creek, ca 0.2 mile south of Forest boundary, ca 1.25 miles southeast of Pilot Hill, ca 6.75 miles east of Laramie.	T15N R72W Sec. 2	8240 (2512)	Pilot Hill
032	Laramie Range; North McKechnie and McKechnie Meadow, ca 2.2-3.2 miles east-northeast of Eagle Rock, ca 13 miles east of Laramie.	T15N R71W Sec. 1, 2	7800 (2377)	Green Top Mountain
035	Laramie Range; along Brush Creek, near Hirsig, north side of Wyoming Highway 210 (Happy Jack Road), ca 1-2 miles west of Laramie County, ca 3.5 miles east of Sherman Mountain.	T14N R71W Sec. 11, 12	7750-7800 (2362-2377)	Sherman Mountains East

Pole Mountain notes: *Utricularia minor* is a submerged plant that does not have forage value. Most of its habitats are widely accessible to both livestock and wildlife (Figure 21), and may be exposed to trampling, eutrophication, succession, or other habitat alteration. It is possible, but not proven, that beaver dams constructed in select settings flood or otherwise constrain suitable habitat.

--OTHER WYOMING SPECIES OF CONCERN--

WHITE RIVER KITTENTAILS (*Besseyia plantaginea* (James) Rydb.)

Classification

Scientific name: *Besseyia plantaginea* (James) Rydb.

Synonyms: none

Common name: White River kittentails

Family: Scrophulariaceae sensu lato; Plantaginaceae

Size of genus: The kittentail genus is a North American genus, closely-related to the *Synthesis* genus, and subsumed by it in revisionary molecular genetics research (Albach et al. 2005).

There are three kittentail species in Wyoming (Dorn 2001), two of which are documented in Pole Mountain (Rocky Mountain Herbarium 2012).

Present legal or other formal status

U.S. Fish & Wildlife Service: none

U.S. Forest Service – Rocky Mountain Region: none

Global Heritage rank: G5

State Legal status: none

State Heritage rank: S1

Wyoming contribution rank: Conservation of White River kittentails as a regional endemic species at the edge of its range in Wyoming signifies a medium-level contribution to rangewide conservation.

Description

White River kittentails is a perennial herb with woolly-hairy stems up to 40 cm tall and fibrous roots. Basal leaves are 5-15 cm long, with oval to oblong leaf blades and round-toothed margins. Flowers are arranged in an elongate terminal spike with several bract-like leaves below the inflorescence. The calyx is 4-7 mm long and 4 or 5 lobed, with the sepals joined at the base for less than 1/3 of their length. Sepals are glabrous except for the densely woolly margins. The corolla is whitish (sometimes pink to purplish tinged), and 5-8 mm long. Anther filaments are not conspicuously colored. The fruit is a glabrous capsule 5-6 mm long (Dorn 2001, Figure 22).

Local field characters: *Besseyia plantaginea* is readily distinguished by having a corolla.

Similar species: *Besseyia wyomingensis* lacks a corolla, has brightly colored (usually purplish) anther filaments, and pubescent fruits and sepals. *Besseyia alpina* has basal leaves that are less than 5 cm long, reddish to purplish corollas, and occurs in alpine or subalpine habitats.



Figure 22. *Besseyia plantaginea*

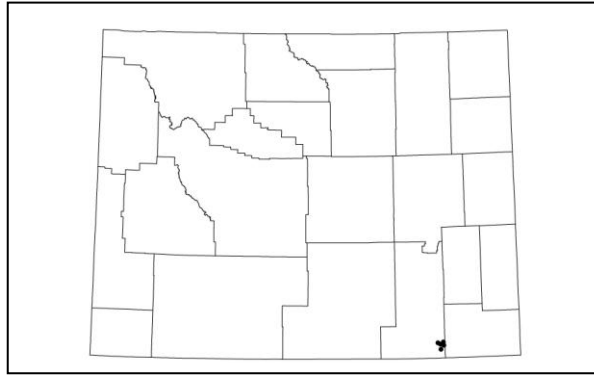


Figure 23. Distribution of *Besseyia plantaginea* in Wyoming

Figure 24. Distribution of *Besseyia plantaginea* in Pole Mountain

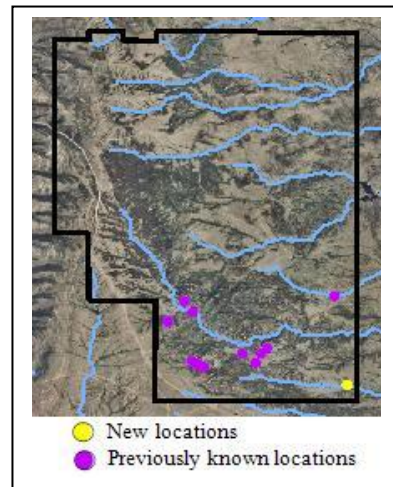


Table 7. Pole Mountain occurrences of *Besseyia plantaginea*

#	Directions	Legal Description	Elevation ft (m)	USGS 7.5' Quad
002	Two locations (1) S and SW sides of Turtle Rock, near trail, above a trib of Middle Fork Crow Creek, (2) immediately S and E of Devils Playground, 0.5-2 mi ENE of Turtle Rock, above tribs of Middle Fork Crow Creek, ca 0.5 mi N of Vedauwoo Road, ca 12-15 mi SE of Laramie.	T14N R71W Sec. 20, 21, 22, 29	7920-8200 (2414-2499)	Sherman Mountains East, Sherman Mountains West
003	Ca 0.5 mile west of Hirsig, on N side of WY HWY 210, S side of Brush Creek, ca 1.5 mi W of Albany/Laramie County line	T14N R71W Sec. 11, 12	7800 (2377)	Sherman Mountains East
004	Sherman Mountains (1) mouth of canyon S of Brady Rock, ca 0.3 mi N of Middle Crow Creek and 0.4 mi SE of Blair Road, (2) slopes on the S side of Middle Crow Creek, (3) east-west ridge S of trib of Middle Crow Creek, 4 mi SE of Lincoln Monument at I-80 rest area.	T14N R71W Sec. 7, 8, 17, 18	8020-8200 (2444-2499)	Sherman Mountains West
005	Laramie Range; N side of South Fork Middle Crow Creek, ca 0.9 mile W of Laramie County line, ca 4 mi ESE of Vedauwoo, ca 17 mi SE of Laramie.	T14N R71W Sec. 25	7800 (2377)	Sherman Mountains East

Phenology: Flowers from late May-early July; fruits present June-July.

Geographic distribution

Range: Regional endemic of southeast Wyoming, central Colorado, and northern New Mexico. In Wyoming, it is known only from the Pole Mountain area of the Laramie Range in Albany County (Figures 23 and 24).

Number of populations in the state and in the study area: *Besseya plantaginea* is known from 5 extant occurrences in the state, all of which are in or adjoining Pole Mountain (Table 7).

Additional species information

Size and extent: *Besseya plantaginea* is often represented by low numbers of plants in low density. The largest subpopulation is semi-continuous in 20 acres. It is not known if plants produce aboveground shoots every year, confounding surveys and censusing.

Habitat in the state and in the study area: Pennell (1933) reports this species from moist wooded slopes at 6000-10,000 feet. Wyoming populations occur on pink Sherman granite as gravelly loams in or adjoining aspen groves and the edge of moist meadows or willow thickets at 7800-8200 feet.

Pole Mountain notes: No signs of browsing or grazing have been noted on plants of *Besseya plantaginea* during or after flowering. Its habitat is generally well-drained, and not usually subject to trampling.

HALL'S SEDGE (*Carex parryana* Dewey var. *unica* Bailey)

Classification

Scientific name: *Carex parryana* Dewey var. *unica* Bailey

Synonyms: none

Common name: Hall's sedge

Family: Cyperaceae

Size of genus: The sedge genus is a circumboreal genus of about 2000 species (460 in North America; Ball and Reznicek 2002). It is the largest genus in Wyoming, with 120 unique taxa as reported in Dorn (2001), 25 of which are documented in Pole Mountain (Rocky Mountain Herbarium 2012).

Present legal or other formal status

U.S. Fish & Wildlife Service: none

U.S. Forest Service – Rocky Mountain Region: none

Global Heritage rank: G5

State Legal status: none

State Heritage rank: S1S2

Wyoming contribution rank: Conservation of Hall's sedge as a peripheral species at the edge of its range in Wyoming signifies a low-level contribution to rangewide conservation.

Description

Hall's sedge is a perennial graminoid with slender culms 1-6 dm tall that are clustered along short, scaly rhizomes. The leaves are crowded near the base, flat or rolled, 2-4 mm wide and much shorter than the culms. The inflorescence consists of 1-5 erect, cigar-shaped spikes each 1-3 cm long, the terminal one longer and thicker than the lateral ones. Terminal spikes may consist only of pistillate flowers (or occasionally contain all male flowers). The perigynia are flat on 1 side, rounded and slightly hairy near the tip, and 2-3 mm long and 1.5-2 mm wide with a bitoothed beak. Flowering scales are as long as the perigynia and have a conspicuous green central stripe (Figure 25; Dorn 2001, Johnston 2001, Ball and Reznicek 2002).

Synonyms: *Carex hallii*, *Carex parryana* ssp. *hallii*.

Local field characters: The single-spiked inflorescence is unique among wetland sedges on Pole Mountain.

Similar species: Parry's sedge (*Carex parryana* var. *parryana*) has 1 to several lateral spikes that are equal in size and thickness to the terminal spike. Idaho sedge (*C. parryana* var. *idaho*) has flowering scales that are conspicuously longer than the perigynium and is not known from Wyoming. Northern singlespike sedge (*Carex scirpoidea*) has a single terminal spike and flowering scales that lack a green midrib (Dorn 2001).

Geographic distribution

Range: *Carex parryana* var. *unica* ranges from southwestern Manitoba to Nebraska and Colorado. In Wyoming it is known from the Southeastern Plains, Hartville Uplift, Laramie Basin, and Laramie Range in Albany, Carbon, Laramie, and Platte counties (Figure 26). In Pole Mountain, it is known from two extant records (Figure 27) and a historic record that could not be relocated in 2012. Reports from Yellowstone National Park (Park or Teton counties) are probably based on historical reports from Idaho.

Number of populations in the state and in the study area: *Carex parryana* var. *unica* is known from six extant occurrences and six historic occurrences in Wyoming. Pole Mountain has two extant occurrences and one historic occurrence which was not relocated in 2012 surveys (Table 8).



Figure 25. *Carex parryana* var. *unica*
By Melanie Arnett

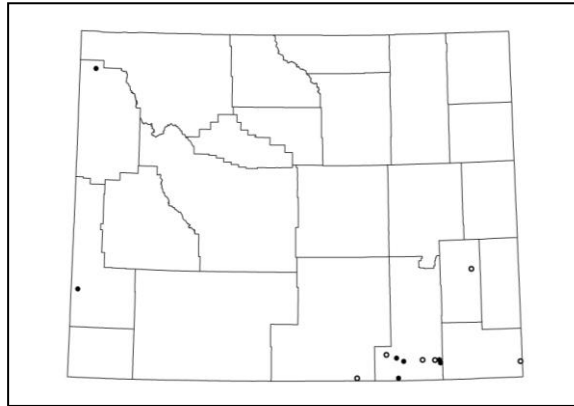


Figure 26. Distribution of *Carex parryana* var. *unica* in Wyoming

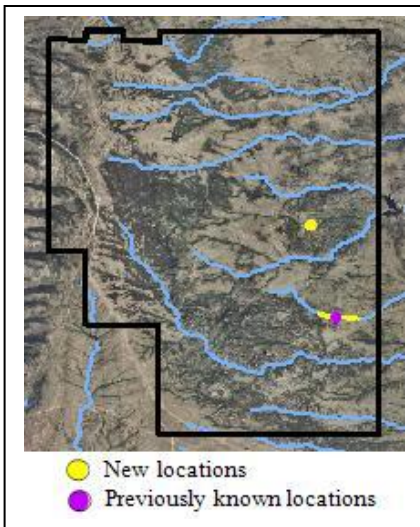


Figure 27. Distribution of *Carex parryana* var. *unica* in Pole Mountain

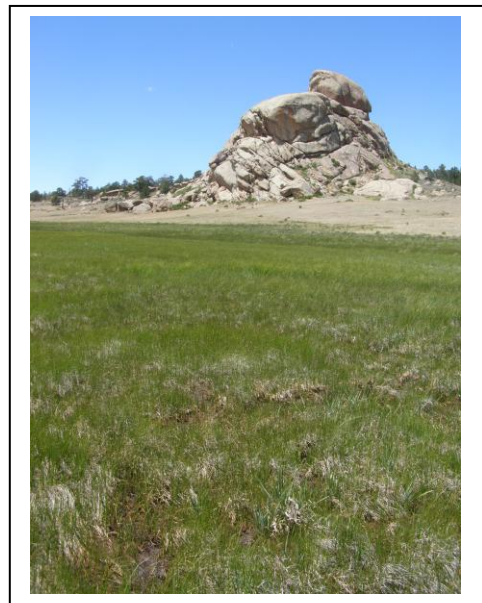


Figure 28. *Carex parryana* var. *unica* habitat at Brush Creek

Additional species information

Size and extent: The 2012 surveys represent the only information on size and extent of *Carex parryana* var. *unica* populations in Wyoming. The two surveyed populations are a contrast. The Brush Creek population has thousands of stems across an area of about 40 acres while the population above the South Branch of Crow Creek is extremely small, with less than 20 stems.

Habitat in the state and in the study area: Wyoming populations occur on alkaline meadows and around cold springs at 4450-8500 feet. Common species at the largest population included tufted hairgrass (*Deschampsia cespitosa*), mat muhly (*Muhlenbergia richardsonis*), poverty oatgrass (*Danthonia spicata*) and clustered field sedge (*Carex praegracilis*). Salt accumulation was evident throughout most of the habitat (Figure 28).

Table 8. Pole Mountain occurrences of *Carex parryana* var. *unica*

#	Directions	Legal Description	Elevation ft (m)	USGS 7.5' Quad
003	Lodgepole allotment [Sherman Mountains, ca 2.5 miles north of Brady Rock]. IMPRECISELY MAPPED	T14N R71W Sec. 5, 6, 7; T14N R72W Sec. 1; T15N R71W Sec. 29, 30, 31, 32, 33; T15N R72W Sec. 25, 35, 36	8500 (2591)	Sherman Mountains East, Sherman Mountains West
008	N side of WY HWY 210, along Brush Creek, ca 1.5 miles west of Laramie County, ca 2 miles east of Twin Mountain.	T14N R71W Sec. 11, 12	7800 (2377)	Sherman Mountains East
014	Laramie Range; head of western tributary of South Branch of Crow Creek, ca 2 miles west of Upper North Crow Reservoir, ca 12 miles east-southeast of Laramie.	T15N R71W Sec. 35	7760 (2365)	Sherman Mountains East

Pole Mountain notes: Habitat of *Carex parryana* var. *unica* at Brush Creek represents probably the largest meadow in Pole Mountain. It is not known whether it is an increaser or a decreaser under grazing pressure, but it may be directly affected by grazed or secondary changes such as hummock formation and associated salt accumulation.

BIGELOW'S PRAIRIE GENTIAN (*Gentiana affinis* Griseb. var. *bigelovii* (Gray) Kuhn.)

Classification

Scientific name: *Gentiana affinis* Griseb. var. *bigelovii* (Gray) Kuhn.

Synonyms: *Gentiana bigelovii*, *Pneumonanthe bigelovii*

Common name: Bigelow's prairie gentian

Family: Gentianaceae

Size of genus: The gentian genus is a large genus of roughly 300 species, mostly temperate and arctic, usually on wet soil (Hitchcock et al. 1959). There are six species reported in Wyoming (Dorn 2001), not including the two varieties of *G. affinis*. Two species are documented in Pole Mountain (Rocky Mountain Herbarium 2012).

Present legal or other formal status

U.S. Fish & Wildlife Service: none

U.S. Forest Service – Rocky Mountain Region: none

Global Heritage rank: G5T4

State Legal status: none

State Heritage rank: The more recent list (Heidel 2012) reported an SRANK of S1. Results of 2012 surveys might support a rank change to S2.

Wyoming contribution rank: Conservation of Bigelow's prairie gentian as a peripheral species at the edge of its range in Wyoming signifies a low-level contribution to rangewide conservation.

Description

General description: Bigelow's prairie gentian is a perennial herb with stems to 25 cm tall. The leaves are oblong near the base and linear to lance-shaped near the tip of the stem. Green, leaf-like, linear bracts are present in the inflorescence and are as long to longer than the flowers. Flowers have a deep blue to purple funnel-shaped corolla 20-25 mm long and a calyx tube 4-9 mm long. Anthers are 1.5-3 mm long. The fruit is a capsule with parietal placentation (Dorn 2001, Figure 29).

Local field characters: It is a deep blue or purple gentian with a relatively short calyx tube and leaf-like bracts that are lanceolate.

Similar Species: Prairie gentian (*Gentiana affinis* var. *affinis*) has floral bracts that are shorter than the flowers and calyx teeth that are less than 3 mm long. Parry's gentian (*Gentiana parryi*) has a calyx tube that is 10-18 mm long, ovate floral bracts, and anthers that are 3.5-5 mm long (Dorn 2001).

Phenology: Flowering August-September.

Geographic distribution

Range: From Southeast Wyoming to New Mexico and Arizona. In Wyoming, known only from the Laramie Range in Albany and Laramie counties (Figure 30).

Number of populations in the state and in the study area: There are six extant occurrences in Wyoming and two historic collection records. Four of the six extant occurrences are in Pole Mountain where it is widely-scattered (Figure 31), often in low numbers.



Figure 29. *Gentiana affinis* var. *bigelovii*

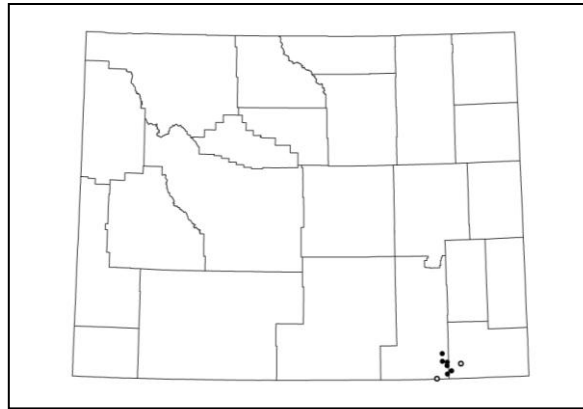
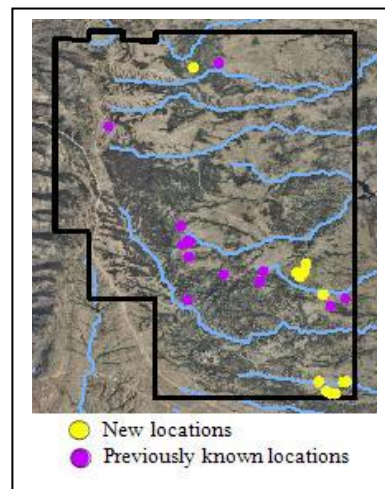


Figure 30. Distribution of *Gentiana affinis* var. *bigelovii* in Wyoming

Figure 31. Distribution of *Gentiana affinis* var. *bigelovii* in Pole Mountain



Additional species information

Size and extent: *Gentiana affinis* var. *bigelovii* is a challenge to map in detail because the extent of flowering plants in any given area is usually small and numbers are often low. It is widely-scattered across the landscape. The distribution rarely follows major drainage features or topographic patterns. If current information is any indication, it may be sparsely distributed across the Pole Mountain landscape.

Habitat in the state and in the study area: In Wyoming, *Gentiana affinis* var. *bigelovii* is found primarily in mountain big sagebrush (*Artemisia tridentata* ssp. *vaseyana*) or threetip sage (*A. tripartita*), usually with junegrass (*Koeleria macrantha*), Sandberg's bluegrass (*Poa secunda*), needle-and-thread (*Hesperostipa comata*), or slimstem muhly (*Muhlenbergia filiculmis*). Of all the seven species surveyed in Pole Mountain, it is least dependent on wetland habitat though it also occurs in moist meadows along streams. Soils are shady loamy to gravelly soils derived from Sherman Granite at elevations of 6500-8400 feet.

Pole Mountain notes: *Gentiana affinis* var. *bigelovii* appears to be a facultative upland species on Pole Mountain, more often in terrestrial habitat than wetland habitat. Sometimes, but not always, the upland habitats are located near wetland features or in moisture collecting settings, possibly having subirrigated conditions. It is the latest blooming plant among the seven surveyed species, and it seems as though its flowering activity is aborted among drought stressed plants. Its drought response, phenology and ecological amplitude are such that it has much less grazing pressure than the other six target species.

Table 9. Pole Mountain occurrences of *Gentiana affinis* var. *bigelovii*

#	Directions	Legal Description	Elevation ft (m)	USGS 7.5' Quad
003	Laramie Range; Sherman Mts, 14 subpopulations in 6 main areas (1) N side of Twin Mountain (2) 0.5 mi E of Twin Mt, ca 0.9 mi W of WY Hwy 210, 0.9 mi S of South Branch Crow Cr (3) head of South Branch Crow Cr, ca 0.25 mile E of Point Crawford (4) ca 0.1 mile S of Brady Rock on N side of Middle Crow Cr (5) base of peak 9055, ca 2 mi E of The Summit Rest Area on I-80, (6) 2.4-2.8 mi NE of Reynolds Mt, ca 11.5 mi SE of Laramie.	T14N R71W Sec. 2, 5, 6, 8, 9, 10, 11, 17, 18; T15N R71W Sec. 31	7960- 8400 (2426- 2560)	Sherman Mountains East, Sherman Mountains West
004	Laramie Range; vicinity of Hirsig, at junction of Vedauwoo Road, ca 1 mi W of Laramie County line.	T14N R71W Sec. 12, 13	7760 (2365)	Sherman Mountains East
008	Laramie Range; along Forest Service Road 713D, between North Branch Middle Lodgepole and North Lodgepole Crs, ca 0.7 mile NNW and 1.2 ca 9-10 miles ESE of Laramie.	T15N R71W Sec. 5, 8	7900- 8080 (2408- 2463)	Pilot Hill, Green Top Mountain
009	Laramie Range; South Fork Middle Crow Cr and southern tributary, ca 3.2-4.2 miles ESE of Vedauwoo, ca 15.5-16.5 miles SE of Laramie.	T14N R71W Sec. 25, 26	7760- 7840 (2365- 2390)	Sherman Mountains East
010	Laramie Range; southern headwaters of Middle Lodgepole Creek, ca 1.2 miles east-northeast of Telephone Spring, ca 2.25 miles north of The Summit.	T15N R72W Sec 14	8900	Pilot Hill

MARSH FELWORT (*Lomatogonium rotatum* (L.) Fries.)

Classification

Scientific name: *Lomatogonium rotatum* (L.) Fries

Common name: Marsh felwort

Family: Gentianaceae

Size of genus: The felwort genus is temperate, with about 10 species. Its center of distribution is in northern Eurasia (Hitchcock et al. 1959). There is just one species in the state (Dorn 2001) and in the Pole Mountain study area (Rocky Mountain Herbarium 2012).

Present legal or other formal status

U.S. Fish & Wildlife Service: none

U.S. Forest Service – Rocky Mountain Region: none

Global Heritage rank: G5

State Legal status: none

State Heritage rank: S2

Wyoming contribution rank: Conservation of Marsh felwort as a disjunct species in Wyoming signifies a medium-level contribution to rangewide conservation.

Description

General description: Marsh felwort is an annual or biennial forb with simple to branched stems 10-25 cm tall. Stem leaves are opposite, lanceolate to spoon-shaped, and 1-3 cm long. Flowers are borne singly or in clusters of 2-3 on slender stalks from the axils of the upper leaves. The 6-15 mm long corolla is whitish to light blue and deeply divided into 5 lobes. Each lobe has a pair of small, fringed appendages at the base. Stamens are fused to the base of the corolla tube. The narrow sepals are longer than the corolla. Fruits are ovoid capsules (Hitchcock et al. 1959; Dorn 2001; Figure 32).

Local field characters: The star-like flower is over 1 cm across and appears late in the growing season.

Similar species: Felwort (*Swertia perennis*) has dark purple or blue flowers. *Gentiana*, *Gentianella*, and *Gentianopsis* species have tubular-shaped corollas with short lobes.



Figure 32. *Lomatogonium rotatum*

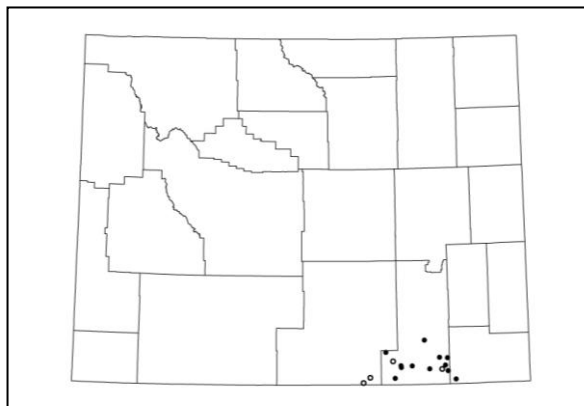
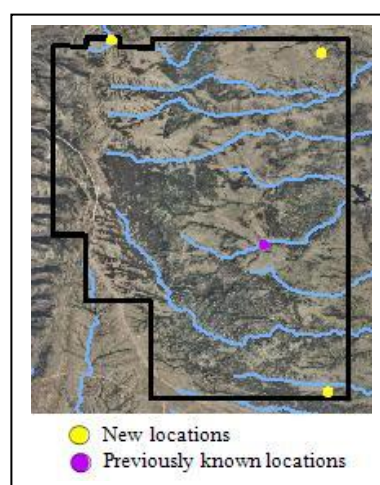


Figure 33. Distribution of *Lomatogonium rotatum* in Wyoming

Figure 34. Distribution of *Lomatogonium rotatum* in Pole Mountain



Geographic distribution

Range: Greenland to Alaska, south to Colorado. In Wyoming, known from the Sierra Madre, Medicine Bow and Laramie ranges and the Laramie and Saratoga valleys in Albany, Carbon, and Laramie counties (Figure 33).

Number of populations in the state and in the study area: There are 14 extant occurrences and two historic occurrences in Wyoming. Nine are on the Medicine Bow National Forest although only 5 extant occurrences and one historic occurrence are on that part of the Forest on Pole Mountain (Figure 34).

Additional species information

Size and extent: The only populations in Wyoming that have size estimates are less than 20 plants, with the exception of an occurrence on Sheep Mountain with numbers approaching 100 plants. Estimates might be low if flowering is not simultaneous, because it is difficult to find in vegetative condition.

Table 10. Pole Mountain occurrences of *Lomatogonium rotatum*

#	Directions	Legal Description	Elevation ft (m)	USGS 7.5' Quad
003	Laramie Range; wetland along South Branch of Crow Cr, southwest side of Wyoming Highway 210 (Happy Jack Road), ca 1.8 miles northeast of Twin Mountain, ca 12 miles east-southeast of Laramie.	T14N R71W Sec. 3	7920 (2414)	Sherman Mountains East
007	Laramie Range; along tributary of Middle Crow Cr, near Vedauwoo Glen. IMPRECISELY MAPPED	T14N R71W Sec. 17, 18, 19, 20, 29, 30; T14N R72W Sec. 13, 24	8280 (2524)	Sherman Mountains West
013	Laramie Range; southern tributary of South Fork Middle Crow Cr, ca 1.2 miles west of Laramie County line, ca 1.7 miles north of Buford, ca 3.5 miles east-southeast of Vedauwoo, ca 16.5 miles southeast of Laramie.	T14N R71W Sec. 25	7800 (2377)	Sherman Mountains East
014	Laramie Range; between North McKechnie and McKechnie Meadow, ca 1.9 miles west of mouth of McKechnie Meadow Cr, ca 3.5 miles northeast of Eagle Rock, ca 13 miles east of Laramie.	T15N R71W Sec. 1	7760 (2365)	Green Top Mountain
015	Laramie Range; west side of Horse Cr, immediately south of Forest boundary, ca 1.25 miles east-southeast of Pilot Hill, ca 6 miles east of Laramie.	T15N R72W Sec. 2	8240 (2512)	Pilot Hill

Habitat in the state and in the study area: In Wyoming, this species occurs along lakeshores, flooded meadows, moist hummocks within willow thickets and *Carex simulata* fen habitat at 7300-8960 feet.

Pole Mountain notes: It may be appropriate to re-survey it on the South Branch of Crow Creek, where it has not been sought since 1999, and where livestock have congregated late in the season many of the intervening years. There are no observations on direct affects of grazing, though it is possible this species is palatable.

OTHER SPECIES OF LOCAL CONCERN

Inland sedge (*Carex interior*) has Heritage ranks of G5/S3. In Pole Mountain it has been observed or collected in two wet woodland settings of aspen or spruce. It is also in seeps and thickets.

Bristlystalk sedge (*Carex leptalea*) has Heritage ranks of G5/S3. In Pole Mountain it has been collected in two wet woodland settings of aspen or spruce.

Tall cottongrass (*Eriophorum angustifolium*) has Heritage ranks of G5/S3. In Pole Mountain, it has been collected in at least three places before this study. One was described as wet aspen. Two collections were historic including one near the Happy Jack Campground. In 2012, it was only collected in McKechnie Meadow fen habitat.

Bog buckbean (*Menyanthes trifoliata*) has Heritage ranks of G5/S3. In Pole Mountain, it was only collected in McKechnie Meadow fen habitat. It grows in open water.

Marsh muhly (*Muhlenbergia glomerata*) has Heritage ranks of G5/S2. It was on the most current list of Wyoming plant species of concern as warranting specimen review, and possibly more widespread in the Black Hills than appropriate for WYNDD to track. It was collected in shrub fen habitat in Horse Creek. It does not have SOLC recognition. A previous report for it in the county (Heidel and Jones 2006) was later redetermined as *M. andina*, so the Pole Mountain collection appears to be the first authentic record for Albany County and the Forest.

Sweet coltsfoot (*Petasites sagittata*) has Heritage ranks of G5/S3. In Pole Mountain, it has been observed in wet and moist aspen.

Marsh arrowgrass (*Triglochin palustris*) has Heritage ranks of G5/S3. In Pole Mountain, it has been observed in fen habitat. It also grows in springs, seeps and alkaline meadows.

ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

Potential threats to currently known populations

Grazing: Livestock use is concentrated in wetland habitats of Pole Mountain, providing both forage and shelter. However, the use is dispersed along many miles of valley. There are at least two species that are palatable to livestock, hoary willow and autumn willow. The former is more vulnerable than the latter because it does not grow taller than cattle can reach.

Signs of grazing have not been observed on the rest of the target species, but grazing affects the habitats of all target species directly or indirectly. Indirect effects of grazing including trampling, hummock formation and associated desiccation of the wetland habitat, eutrophication, or forms of succession associated with these habitat changes. Moreover, grazing may also change the habitat such that it becomes unsuitable for new plants to become established. Grazing impacts can potentially be reduced by carefully-placed water tanks, incorporating beaver ponds in allotment planning, rotation, and dispersion over large areas.

Four target species are present on Horse Cr, where there is a study in contrast between grazed and essentially ungrazed areas on opposite sides of the Creek. Only one of the four

species is in the grazed side fully accessible to livestock, Hoary willow, where its numbers and vigor differ markedly in comparison to the ungrazed side.

Logging: Current forestry practices on Pole Mountain are limited to trail and campground maintenance and to firewood collecting permits. No signs of past or present logging were noted in surveying Sensitive species. The effects of historic logging on local wetlands would have been indirect on timbered slopes above the wetlands, especially on steeper slopes.

Roads: Construction of the Happy Jack Road (Wyoming Highway 210) was likely to have impacted two Sensitive species, altering hydrology if not filling occupied habitat. On one hand, most Forest Service roads avoid wetlands or have ample culverts installed at valley crossings. On the other hand, road systems run along valley bottoms in many cases, fostering recreational use that can be associated with erosion, litter, and spread of noxious weeds all along the valleys.

Offroad vehicle travel: No evidence of offroad vehicle use was observed in the habitats of target species. Elsewhere, some of the wetland zones are so subtle that they might be mistakenly presumed dry and solid. Rutted wetland habitats were observed at two among the 17 sites, but not in rare species habitat. Photographs are in the wetland survey forms accompanying this report.

Weeds: Dalmatian toadflax (*Linaria dalmatica*) was observed in high numbers at one streamside setting near the eastern Forest boundary on the South Fork of Middle Crow Cr. It was also observed repeatedly on widely-scattered roadcuts. Canada thistle (*Cirsium arvense*) is present in many areas, but in low numbers compared to conditions downstream on Crow Creek near the City of Cheyenne, where it forms swards that have had 100% cover in some past years of the past decade (Heidel., pers. obs.).

Fire: The possibility of wildfire may increase with death of trees to blister rust and bark beetles. There is tree mortality in moist valley settings as well as dry uplands. The wetland habitats have the least likelihood to burn, except under extreme drought.

Other: Beaver management is a special challenge to evaluate. The open water ponds created by beaver are valuable water sources for livestock, and take the pressure off of smaller open water pools, but also increase the local levels of livestock use. However, beaver dams in gentle valleys with low gradients also tend to inundate large areas of valley bottom. Six of the seven target species do not survive inundation and the target species populations on Horse Creek are sandwiched between beaver ponds. Lesser bladderwort grows as a submerged plant and the first collection of it in Pole Mountain was made in 1959, from the muddy shore of a beaver pond. It was relocated in a beaver pond in 2011 but could not be found right in beaver ponds in 2012; only in small standing water pockets between ponds.

The South Fork of Middle Crow Creek has water discharged into it, creating artificially constant, prolonged stream flow. A series of valley exclosures are in disrepair, and a series of piezometers to measure water table within alkaline meadows are present. Ideally, grazing data, water table data, and wetland habitat data are compiled and cross-referenced as they have bearing on a wide range of topics from Sensitive plant habitat suitability to City of Cheyenne water supply.

Other observations of manmade alteration to local hydrology were uncommon during the surveys. One site appeared to have a small ditch put in. McKechnie Meadow had a water tank installed some distance above Sensitive species habitat, possibly reducing the level of livestock use of the wetland.

Management practices and response

All occurrences are in areas of multiple-use land management. Like many other segments of national forests and national grasslands, Pole Mountain contains substantial groundwater resources that support not only sensitive species, but support the other uses and support off-site public uses (USDA Forest Service 2013).

Conservation recommendations

Recommendations regarding present or anticipated activities: There are at least three wetland areas with peat that might meet wetland size and fen definitions. These include Brush Creek, Horse Creek, and McKechnie Meadow. This study adds soil data to the limited body of information on peatland documentation in Pole Mountain (includes Heidel and Laursen 2003). The full attributes of peatland warrant expanded evaluation, as presented in Driver (2010). If Pole Mountain sites qualify as peatland, the policy of the U.S. Forest Service Rocky Mountain Region is appropriate to apply (USDA Forest Service 2011).

Weed control of noxious species new to the area is one of the most far-reaching preventative practices that can be carried out, realizing the central place of travel management planning, and the need for coordination with adjoining landowners and the Wyoming Highway Department.

Notification of U.S. Forest Service personnel of locations on National Forest: All target species are represented in GIS layers accompanying this report, for reference by U.S. Forest Service personnel.

Status recommendations: Sensitive species evaluation form updates have been prepared for the three Pole Mountain Sensitive species (Appendix C), whether or not they support status changes.

In addition, three prospective state rank changes and WYNDD tracking status are under consideration.

Summary: Three Sensitive and four other rare plant species are better documented on Pole Mountain as a result of 2012 surveys, tripling the number of occurrences for autumn willow (*Salix serissima*), previously known from only one location in the state, and documenting the ecological amplitude or level of persistence and resilience for species such as lesser bladderwort (*Utricularia minor*). Of the seven species, four are more numerous on Pole Mountain than any other public lands in the state, or are restricted to Pole Mountain, so their status on Pole Mountain has direct bearing on species' viability.

Survey work might be expanded on Middle Crow Creek and Middle Lodgepole Creek, which have the most extensive unsurveyed habitat. Coordinated surveys might also be pursued in collaboration with other public agencies on lands bordering Pole Mountain. In addition, new surveys in Pole Mountain might be warranted to focus on species that were not found, including flat-top fragrant goldenrod (*Euthamia graminifolia*) and Vasey rush (*Juncus vaseyi*), particularly in those stream segments in the northeastern corner of Pole Mountain that were not surveyed in 2012. Swale habitats generally supported common species as noted in 2012 surveys, and did not appear to harbor rare species.

Wetland plant species surveys on Pole Mountain are a springboard for many forms of wetland resource studies and a source of management-related information. Research might be expanded to pursue peatland studies of the most intact habitat. Peatland delimitation might be a priority for the U.S. Forest Service.

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