Field Survey for Laramie Columbine

(*Aquilegia laramiensis*)

In the Rawlins Field Office

prepared for
the Wyoming Natural Diversity Database,
University of Wyoming, and
the Bureau of Land Management, Rawlins Field Office

by Hollis Marriott and Dennis Horning
Laramie, Wyoming

November 1, 2004

Acknowledgements

We thank botanist Bonnie Heidel and data manager/GIS master Tessa Dutcher of the Wyoming Natural Diversity Database, University of Wyoming, for overseeing the survey project, and providing GIS data and maps. Frank Blomquist of the Rawlins Field Office (BLM) quickly obtained the permission we needed to cross private land to survey sites of interest. We are grateful to the landowners that allowed access across their lands, and that shared with us their knowledge and appreciation of the area. Thanks once again to the staff of the Rocky Mountain Herbarium, University of Wyoming, for continued use of their fine facility.

Report Citation

Marriott, H. and D. Horning. 2004. Field survey for Laramie columbine (*Aquilegia laramiensis*) in the Rawlins Field Office. Unpublished report prepared for the Wyoming Natural Diversity Database, University of Wyoming, and the Bureau of Land Management, Rawlins Field Office.

Introduction

The Laramie columbine, *Aquilegia laramiensis*, is restricted to the Laramie Mountains in southeast Wyoming (Figure 1). It is listed as a Sensitive species by the Forest Service and Bureau of Land Management, and is ranked G2S2 by the Wyoming Natural Diversity Database (WYNDD), defined as "imperiled because of rarity" on a global and state basis (Keinath *et al*. 2003). The species was first collected in 1895 by Aven Nelson "at the foot of Laramie Peak" in the northern Laramie Mountains. He published a description of the species the next year (Nelson 1896). Nelson made more collections in 1900 and 1901, extending the known range to Ragged Top Mountain east-northeast of Laramie.

The next new records for the columbine were not reported until the 1970s and 1980s. All were in the northern Laramie Mountains in the general area of Laramie Peak. In 1993, C. Refsdal collected the columbine roughly halfway between Laramie Peak and Ragged Top Mountain. Several new records were found during general floristic surveys of the area (Packer 2000), including a range extension about 16 miles to the northwest in the vicinity of School Section Mountain by B.E. Nelson in 1997. By 2002, the species was known from 13 sites; two of these are considered historical without precise location data.

Systematic survey for the Laramie columbine began in 2003, on Forest Service lands in the northern Laramie Mountains (Marriott and Horning 2004). Twenty new sites were found, but the overall distribution remained limited, with most populations clustered in the northern part of the range. Survey was recommended for Bureau of Land Management (BLM) lands in the northern Laramie Range, based on the existence of known potential habitat for the species. In 2004, we entered into an agreement with the Wyoming Natural Diversity Database (WYNDD) to conduct surveys for *Aquilegia laramiensis* on lands managed by the Rawlins Field Office, with funding provided by the BLM.

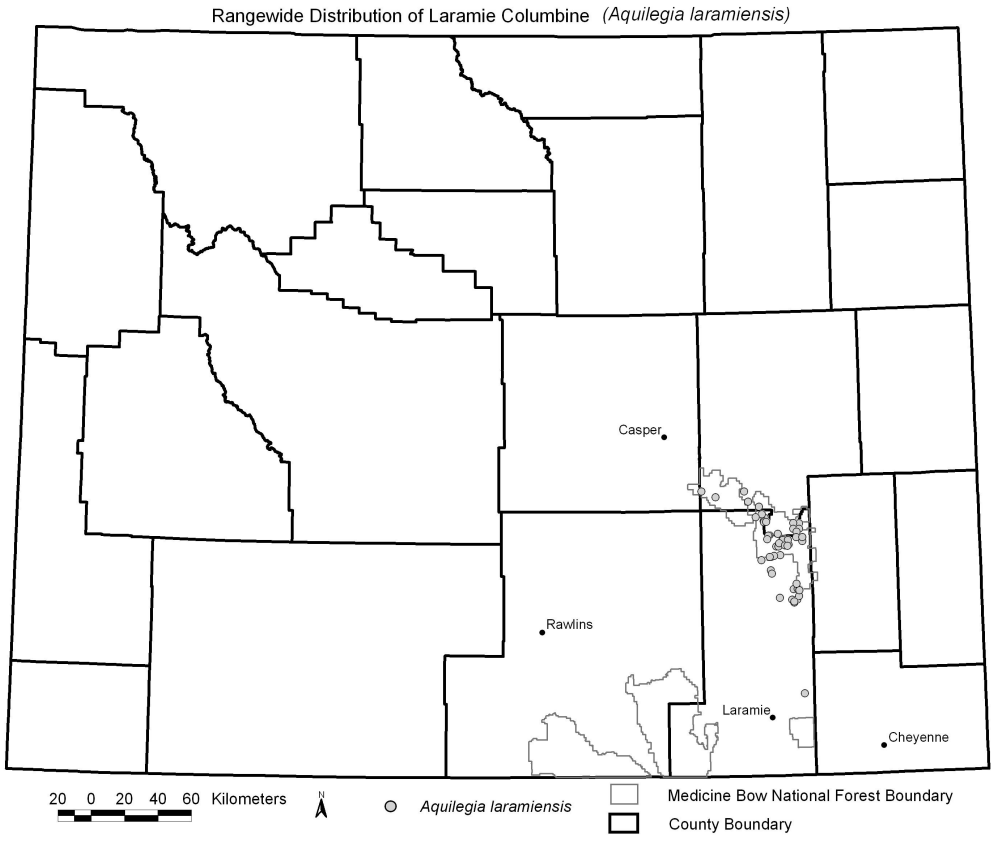
Study Area

The Laramie Mountains, in southeast Wyoming, extend north and then northwest from northeast Colorado near the Wyoming border approximately 140 miles, ending in the vicinity of Douglas, Wyoming. The range is typical of the Laramide mountain-building episode, when most of the Rocky Mountain ranges were uplifted. It is a broad anticline with sedimentary rocks exposed on the flanks. Precambrian intrusive and metamorphic rocks are found at high elevations (Blackstone 1996). Geology of the study area is described in detail in our previous report (Marriott and Horning 2004).

Many of the 2004 survey sites are within an area that has been called the Central Metamorphic Complex (Johnson and Hills 1976). Bedrock includes Archean (earlier Precambrian) metamorphic rocks, mainly gneiss. This is in contrast with the 2003 study area to the north, which is underlain by Archean

granite. The 2004 study area is lower in elevation, drier and has less tree cover compared to sites surveyed in 2003. Because *Aquilegia laramiensis* is associated with cooler, more mesic sites, there was less potential habitat to be surveyed.

Figure 1. Range of *Aquilegia laramiensis* (map by WYNDD).



Methods

Our primary goal was to document distribution and abundance of *Aquilegia laramiensis* on BLM lands. This basic information is required to determine whether Sensitive status is warranted for the species. If rangewide survey shows that special management is warranted, additional information should be collected for a better understanding of the species and its needs.

Survey Site Selection

Because there had been little survey for the columbine in the study area, we covered as many sites as possible well-distributed through the area to determine the range and rarity of the species. Field work was restricted to lands managed by the BLM, Rawlins Field Office, for the most part. Some State land was visited when in proximity. Private land was crossed occasionally with permission, but no surveys for Laramie columbine were made on private lands. Maps of survey sites are on file at WYNDD.

Aquilegia laramiensis usually is found on well-shaded sites with little vegetative cover. Our surveys in 2003 showed that large granite outcrops with steep northerly aspects were most likely to support columbine populations, and these were highest priority for survey in 2004. Less prominent outcrops were checked when easily accessed. Suitable outcrops were identified on topographic maps rather than aerial photos, which do not show vertical relief as well. Horning's familiarity with the area, specifically locations of large rock outcrops and access routes, was quite helpful.

Data Collection

Survey began on June 11 and continued through early July. Because the primary goal of this project was to visit as many potential sites as possible, data collection was kept simple. Generally, less than one hour was spent at a site, with access much more time-consuming. No effort was made to find every plant at a site; some populations may be significantly larger than documented.

Data collection was designed to accurately document locations, estimate population size, characterize habitat qualitatively, note any obvious threats or potential threats, and identify any unsurveyed potential habitat in the area. A sample survey form is included in Appendix A at the end of this report.

Photographs of plants and habitat are on file at WYNDD. All populations were sufficiently large to allow collection of voucher material. Specimens are deposited at the Rocky Mountain Herbarium (RM) at the University of Wyoming in Laramie.

Results

Twelve new occurrences of *Aquilegia laramiensis* were found in 2004, bringing the total known to 45. Two of these are historical records without precise location information. The known range of the species was expanded, mainly to the southeast, but its overall range remains limited (Figure 2).

Most Laramie columbine populations are small. Population size correlates with outcrop size and microsite availability, as was observed in 2004. Where there are extensive systems of rock outcrops with appropriate microsites, the Laramie columbine occurs as many patches. At such sites, several hundred above-ground individuals were estimated within areas surveyed, with total populations probably larger. Some of the outcrops where the columbine was found in 2004 are small and at lower elevations compared with 2003 survey sites. In these situations populations are quite small (20-30 plants).

Additional information on habitat was collected in 2004. The elevational range of *Aquilegia laramiensis* was extended down to 5400 ft (previously the lowest known site was at 6250 ft). As was seen in 2003, the species grows on most aspects, rather than just northerly as originally reported. All microsites were well shaded in some fashion. The columbine was found on several types of igneous and metamorphic rock, including granite, gneiss and peridotite. As was observed in 2003, it is absent from a reddish coarse-grained granite found in parts of the study area (see Marriott and Horning 2004 for additional information on rock types and habitat suitability).

After the 2003 field season, we reported that the rugged habitat of *Aquilegia laramiensis* is largely inaccessible, and that no significant threats to overall viability are apparent (Marriott and Horning 2004). Some sites surveyed in 2004 are more easily reached, including several with very small populations. Conservation needs are discussed below under **Conservation Status**.

Discussion

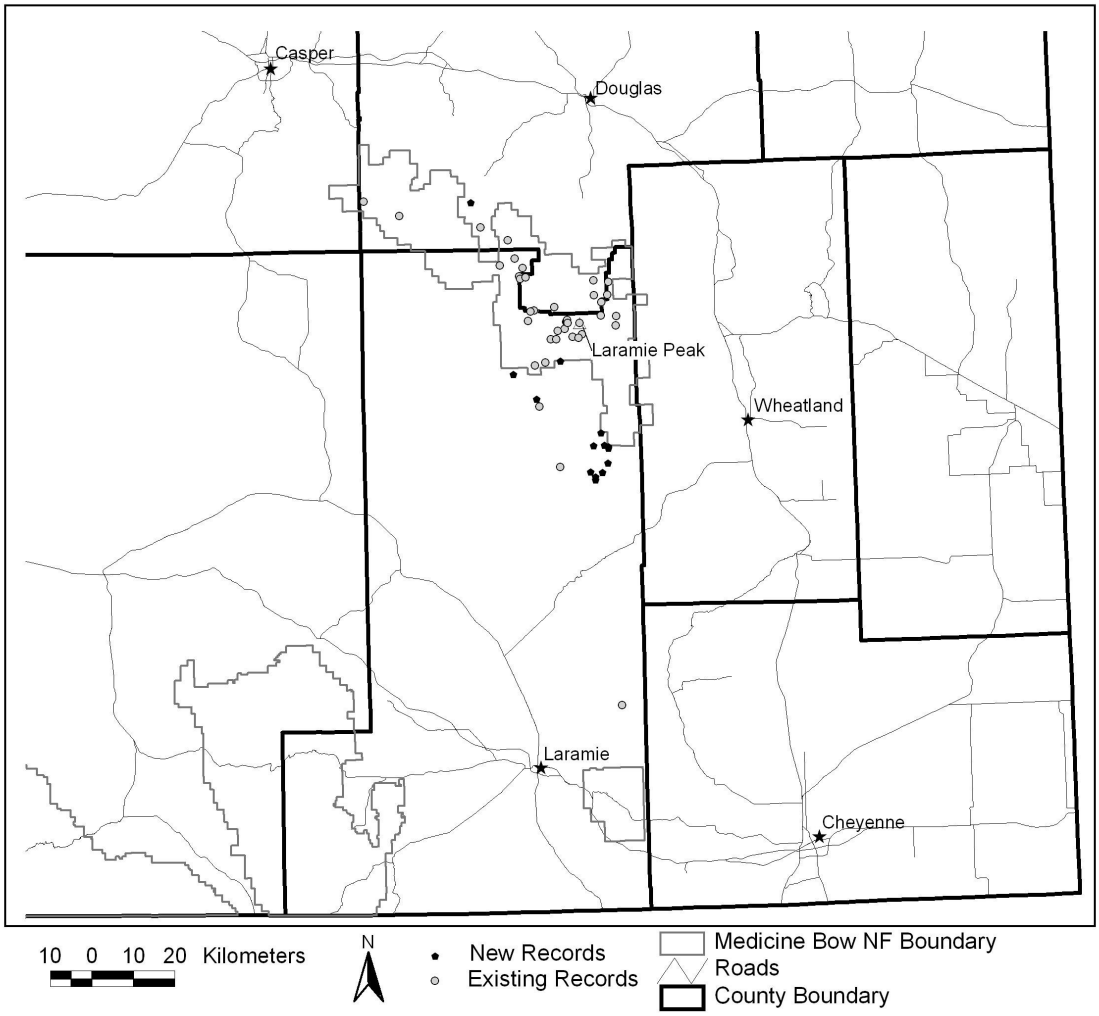
Additional Survey Needs

Surveys 2003 and 2004 significantly increased the information available regarding distribution and status of *Aquilegia laramiensis*. However there remain large areas of unsurveyed potential habitat, mainly large complex systems of rock outcrops on Medicine Bow National Forest in the northern Laramie Mountains. Most of these sites are difficult to access, and survey will take significantly more time compared with work done in 2003 and 2004.

There is additional unsurveyed potential habitat on BLM lands west and north of Medicine Bow National Forest. These are managed by the Casper Field Office, and were not included in the 2004 field project. Some sites are thought to have high potential for Laramie columbine, including lands immediately

adjacent to the northwest part of Medicine Bow National Forest where the species was documented in 2003 (Deer Creek).

Figure 2. Range of *Aquilegia laramiensis* in southeast Wyoming, showing new sites found during the 2004 field season (map by WYNDD).



Conservation Status

The Laramie columbine is now known from 43 sites, with two additional reports that are considered historical without precise location information. Most of the sites are in the northern Laramie Mountains, within an area approximately 35 air miles in length, with a few disjunct populations as far south as Ragged Top Mountain east-northeast of Laramie. The overall range of the species remains limited, and populations are small.

There are no obvious threats to overall viability of the Laramie columbine at this time. The rugged terrain of many sites makes access difficult. At more accessible locations, collecting for cultivation may be a concern, but has not been documented at this time. However, it is known that the species is of interest to gardeners (e.g. Nold 2003). Several sites documented in 2004 were on small outcrops at lower elevations. In these situations, populations are quite small, and collecting could significantly impact or extirpate the species.

Grazing, timber harvest and recreation do not pose obvious threats currently. Columbine populations appear to tolerate fire, mainly because there is little fuel on rock outcrops where the plants grow; shading is provided by aspect and topography rather than trees in most cases. A more thorough discussion of possible impacts and conservation needs is included in our earlier report, and remains relevant (Marriott and Horning 2004).

Literature Cited

Blackstone, D. L., Jr. 1996. Structural geology of the Laramie Mountains, southeastern Wyoming and northeastern Colorado. Rep. of Investigations No. 51. WY State Geol. Survey, Laramie.

Johnson, R.C. and F.A. Hills. 1976. Precambrian geochronology and geology of the Boxelder Canyon area, northern Laramie Range, Wyoming. Geol. Soc. of America Bull. 87: 809-817.

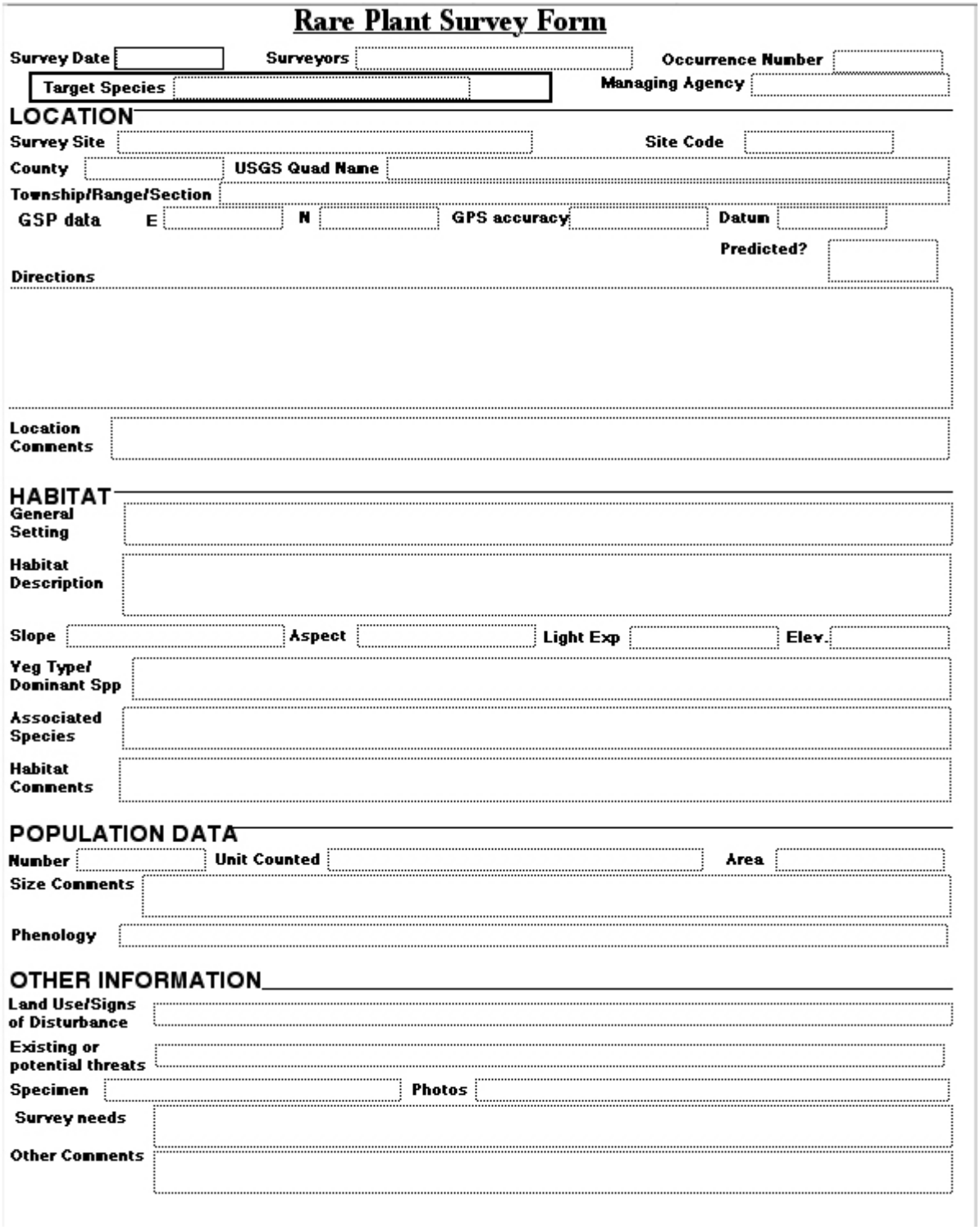
Keinath, D., B. Heidel and G. Beauvais. 2003. Wyoming plant and animal species of concern. Laramie, WY: Wyoming Natural Diversity Database, Univ. WY.

Marriott, H. and D. Horning. 2004. Status of Laramie columbine (*Aquilegia laramiensis*) and results of field survey. Unpublished report prepared for the Wyoming Natural Diversity Database, University of Wyoming, and Medicine Bow National Forest, Laramie, WY.

Nelson, A. 1896. First report on the flora of Wyoming. WY Agr. Exp. Sta. Bull. 28:78-79.

Nold, R. 2003. Columbines: Cambridge: Timber Press.

Appendix A. Field form used in 2004 surveys for *Aquilegia laramiensis*.



Rare Plant Survey Form

Survey Date | Surveyors | Occurrence Number

Target Species | Managing Agency

LOCATION

Survey Site | Site Code

County | USGS Quad Name

Township/Range/Section

GSP data E | N | GPS accuracy | Datum

Predicted?

Directions

Location Comments

HABITAT

General Setting

Habitat Description

Slope | Aspect | Light Exp | Elev.

Veg Type/ Dominant Spp

Associated Species

Habitat Comments

POPULATION DATA

Number | Unit Counted | Area

Size Comments

Phenology

OTHER INFORMATION

Land Use/Signs of Disturbance

Existing or potential threats

Specimen | Photos

Survey needs

Other Comments

Appendix B. *Aquilegia laramiensis* element occurrences and maps.