MONITORING OF CLUSTERED LADY'S SLIPPER ORCHID (*CYPRIPEDIUM FASCICULATUM* KELL. *EX* WATS.) AT APGAR CAMPGROUND, CLEARWATER NATIONAL FOREST

by

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INTRODUCTION

In 1987 and 1988, Steve Caicco of the Conservation Data Center did a field inventory of Forest Service sensitive plant species on the Clearwater National Forest (Caicco 1987, 1988). During this survey he discovered two subpopulations of clustered lady's slipper orchid (*Cypripedium fasciculatum*) in Apgar campground on the Lochsa River, Lochsa Ranger District. Information on this species was scarce at that time as no targeted survey work had been done. Trampling, and competition from dense growth of periwinkle (V*inca minor*) were perceived to be imminent threats to the population. Periwinkle is an introduced ornamental ground cover that grows to approximately 6 inches (15 cm). Because of these unusual circumstances, monitoring plots were set up in each of the two subpopulations to determine if and how the population would change over time. This is a report on the rereading of those plots in 1994. Included is a brief summary of our current knowledge of clustered lady's slipper orchid.

BACKGROUND INFORMATION

Latin name *Cypripedium fasciculatum* Kell. *ex* Wats.

Common name: Clustered lady's slipper orchid

Family: Orchidaceae

Similar species: *Listera* spp., *Habenaria orbiculata*

Status: C2 (USFWS); Sensitive (USFS Region 1); G3/S3, Conservation Data Center (rare or uncommon but not imperiled).

Land ownership: Mostly Federal Government (USFS)

Description: Plants perennial, 2 to 8 inches (0.5-2 dm); lanate-pilose below the point of leaf attachment. The simple stem bears a single pair of sessile, sub-opposite leaves well above midlength. Flowers (1) 2-4 in a somewhat tight cluster, subtended by conspicuous greenish bracts. Sepals lanceolate-acuminate, 0.5-1.0 inch (12-25 mm), greenish-brown or greenish-purple and usually purple-lined or -mottled, the lower pair fused completely or free at the tips only; petals similar to the sepals but usually somewhat broader; lip depressed-ovoid, shorter than the sepals, greenish-yellow with brownish-purple margins and often with purplish tinge. Fruits are papery, inflated capsules.

Phenology: Flowers in early May.

Global distribution: Nine distinct centers of distribution are widely dispersed across the northern half of the western US, including northwestern Montana, northern Idaho, the northern Sierra Nevada, Santa Cruz, and Salmon Mountains of California, the Coast Range of southwestern Oregon, the northern Cascades of Washington, the Uinta mountains of Utah, and

the Medicine Bow and Park Ranges on either side of the Wyoming/Colorado border (Brownell and Catling 1987). The species is widespread within each of these centers (Kagan 1990). It is considered rare and threatened in all states where it occurs except California.

Habitat: Globally, the habitat is mixed conifer forests. Given the wide range of the species, forest types and elevations are quite variable. In Utah, Colorado and Wyoming it occurs in spruce-fir forests. In Idaho and Montana it primarily occurs in western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) forest types. In northwestern Montana, habitats include lodgepole pine (*Pinus contorta*) forest. Canopy cover is usually dense and continuous.

In the Clearwater basin of Idaho, clustered lady's slipper occurs primarily in western redcedar habitat types including various successional stages from mixed stands of Douglas-fir and grand fir to old-growth cedar. The species often occurs as widely dispersed groups of one-to-several individuals. Even the densest populations have fewer than 20 individuals in a 0.1-ac (.04 ha) area.

Biology: Clustered lady's slipper derives its name from the fact that it often produces stems in tight clusters. These stems are connected underground by a short rhizome. As with other perennials it is suspected that plants can spend one or more years in dormancy without producing aboveground growth (Harper 1977). Orchids in general are dependent to varying degrees on mycorrhizal fungi associated with their roots. The small seed size and lack of endosperm in clustered lady's slipper orchid indicate that a fungal association is probably needed in order for germination to occur. Much of the following information on biology comes from R. Harrod, Botanist for the Leavenworth Ranger District of the Wenatchee National Forest in Washington.

Although self-compatible, clustered lady's slipper orchid requires a biotic vector for successful pollination (Harrod 1994). It is suspected that a species of bumblebee (*Bombus* sp.) is required as bumblebees have been observed on *C. montanum*, which has a similarly shaped flower. Preliminary genetic studies suggest the species is an outcrosser and that there is considerable gene flow between populations (Harrod 1994).

Cypripedium seeds are small and dust-like. However, a model of seed dispersal developed by Harrod and Everett suggests that, under conditions typical of the forest understory, seeds disperse only 1 to 2 meters from the parent plant (Harrod 1994).

Harrod (1994) has also found that small, non-flowering plants can be 12 or more years old. It may take up to 20 years for a seedling to reach reproductive maturity, as Harper and White (1974) have noted a period of 13-16 years for *Cypripedium calceolus*.

APGAR MONITORING PLOTS

Methods–1988

Monitoring plots were designed to census all plants present and to track each individual over time. One plot was established in each of two distinct subpopulations at Apgar campground. Methods and baseline data from Caicco's 1988 report are included as Appendix A. Plots were not revisited until 1994.

Methods–1994

In June of 1994 both subpopulations were still present in the campground. Plastic toothpicks used by Caicco to mark individual plants were not in evidence. The rebar stake used to mark plot 5 had apparently been moved and I replaced it based on the description given by Caicco (1988). At each plot two axes were laid out as closely as possible to their original positions and coordinates of each plant were measured to the nearest 0.1 meter. At first I attempted to relocate the plants on Caicco's diagram but it became clear that the distribution was very different. I am certain that some plants were missed since they were abnormally small and were well-camouflaged among the periwinkle stems. Stem height was measured from the ground to the point of leaf attachment, and total leaf spread was measured. Plants were past flowering, so the number of "flowers" recorded reflects the number of unset or aborted fruits.

Results and Discussion

Fifty-nine plants were located in all, 49 at plot 5 and 10 at plot 6. Field data are shown in Appendix B. Only ten plants had flowered, of which four produced capsules. Results from 1994 are compared to baseline data below:

	Plot 5		Plot 6	
	1988	1994	1988	1994
Total stems	26	49	28	10
Reproductive stems	24%	12%	18%	40%
Average height (to leaf attachment)	11.1	8.4	8.3	9.0

Plots of stem locations are shown in Appendix C, using the same scale as in Caicco's drawings (Appendix A). The distribution patterns bear little similarity between the two years.

The population of clustered lady's slipper at Apgar campground is highly unusual in that most individuals are small, single-stemmed and non-reproductive. The two plots exhibited opposite trends both in numbers of stems and proportion of individuals flowering. Plot 6, which is the closest to camper activity, had only a third as many plants in 1994 as in 1988, while plot 5 actually saw an increase in numbers relative to 1988. Considering the proximity of plot 6 to a heavily used campsite it is surprising that the species persists there. It may be important that the plant flowers very early before the camping season begins. The effect of competition from periwinkle can be seen in the small size of plants in plot 5 and the much lower proportion of flowering plants than in plot 6 without the periwinkle.

The very different distribution patterns observed in 1988 and 1994 suggest that both mortality and reproduction have occurred. This is in contrast to other permanent plots where plants bolt rather dependably year after year and reproduction has been minimal or absent over a 4-year period (Lichthardt 1992). Mortality is difficult to quantify because orchids may spend one or more years in underground dormancy (Harper 1977). Even though numbers of plants were very different between the two years they were measured, the areal extent of each subpopulation did not change much, probably because seeds were not widely dispersed. Suitable mycorrhizal fungi may also be limiting.

Observation of these two plots after a 6-year period shows the ability of clustered lady's slipper to persist and continue to reproduce under unnatural conditions of disturbance and competition. Unfortunately, the level of disturbance is not quantifiable. It also demonstrates the tendency of subpopulations to remain localized.

Recommendations

Although the two plots at Apgar campground have yielded interesting information, they remain anomalies due to the invasion of periwinkle, and their long-term use remains in jeopardy due to the threat of physical disturbance. Populations more representative of those known on the Forest would be more useful monitoring subjects. Several metapopulations of clustered lady's slipper have been found on the Lochsa Ranger District by District Botanist Karen Gray. I recommend that further monitoring focus on one of these populations and include a control population that will be protected from intentional human impacts. Since the Apgar populations have been documented in detail, I think it would be worthwhile to revisit the plots every 2-3 years and

conduct a lower-level monitoring such as a simple census of reproductive and nonreproductive plants.

There is a need for coordination among the various monitoring projects underway for clustered lady's slipper on the Clearwater National Forest. Habitat of the species is threatened by timber harvest in many areas where it is found. Monitoring of both affected and unaffected populations has been undertaken on both the Lochsa and Powell Ranger Districts in response to specific projects. In addition, a permanent plot located in Aquarius RNA on the North Fork District has been monitored for four consecutive years (Lichthardt 1992).

I suggest that District botanists meet in spring of 1995 to discuss and share monitoring methods and results. This meeting should result in clear monitoring objectives and a more concerted approach to data gathering. Copies of monitoring methods and data should be filed annually with the Conservation Data Center.

In the future, for demographic monitoring, at least 3 consecutive years of baseline data should be taken to allow for plant dormancy and the problem of plant markers becoming lost.

Finally, long-term monitoring projects such as the one described here underline the need, in Forest Policy, for designated areas of specifically botanical interest. Areas of rare plant habitat often do not qualify for Research Natural Area status and the RNA system cannot cover all examples of unique habitat. Because Special Interest Area (SIA) designation is based on recreational use, it is not appropriate for preservation and study of rare plants.

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NOTE: APPENDICES NOT AVAILABLE ON WEB PAGE; CONTACT THE IDAHO CONSERVATION DATA CENTER FOR THIS INFORMATION

APPENDIX A

METHODS AND RESULTS FROM CAICCO'S 1988 REPORT

APPENDIX B

FIELD DATA SHEETS

APPENDIX C

PLOTS OF PLANT LOCATIONS (1994)