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178 mtn goat/OLYM
report

1980 ANNUAL REPORT

Title: Evaluation of Mountain Goat Use on Three Plant Species Unique to the Olympic Mountains.

Investigators: Dr. Chas. H. Driver, and Mr. Doug. Pike

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To aid in the development of a program for the practical management of non-native mountain goats using the delicate native subalpine ecosystems within the Olympic National Park the following study was conducted.

A comparative evaluation was made to determine the effects of Mt. goat use with respect to the maintenance of selected critical plant species within delicate habitats. In the process of studying such effects it became necessary to erect a more critical definition of ecosystem carrying capacity; therefore the following definition is proposed:

--Critical Ecosystem Carrying Capacity--

That point at which the use of the ecosystem by a non-native animal induces a significant decline in the most delicate plant species within the plant community. Further use of this most delicate plant species will likely lead to a permanent reduction in the abilities of the species to maintain its position within the ecosystem.

With this definition in mind a series of studies was conducted on three plant species unique to the Olympic Mountains and thought to be heavily impacted by mountain goat use.

The Olympic Mountains apparently have been isolated from neighboring mountain ranges, evidenced by unique floral and faunal forms and absence of common Cascadian forms. Thirteen plant taxa are endemic to the Peninsula, with 63 additional taxa considered rare and/or endangered.

appears to be most common in all three species and therefore insures their maintenance within the delicate habitats.

Other endemics were qualitatively examined. Synthyris pinnatifida lanuginosa and Astragalus cottonii are apparently negatively affected by mountain goats. Pedicularis bracteosa and atro sanguinea and Erysimum arenicola arenicola could be positively affected, since they are not actively grazed and have less competition from associated species which are intensively grazed by the goats.

In conclusion, it appears that the major species studied in this case, C. piperi, S. neowebsteri and A. paucicapitatus are not responding in a critical manner to be good indicators of the "Critical Carrying Capacity" for use at the present stage of session for plant community-impact evaluations.

Actually, it appears that a stage of "critical carrying capacity" may have already been exceeded at the Klahhane study site. In this case, another plant species should be employed to measure the more commonly applied range carrying capacity of the ecosystem.

However, special effort should be made to apply the "Critical Carrying Capacity" determinations at sites now beginning to be invaded by the expanding population of mountain goats within the Olympic National Park.

As a continuing part of our research, studies on Klahhane site will continue; and will be focused on further mountain goat use impact evaluation, in respect to physical effects and plant community changes on heavily impacted micro-sites.

Mountain goats are not indigenous to the Olympics. Twelve were introduced in the 1920/s. The population is now estimated at 700, with nearly 170 concentrated on Klahhane Ridge.

Effects of grazing and trampling on three species of flowering plants, in the area of most intense goat use, were contrasted with plant populations in low goat use areas. Tyler Peak was selected as the low goat use study site, because habitats of the three species were comparable to those at Klahhane. Exclosures prevented goat grazing, allowing control and simulated grazing treatments.

Two species, Campanula piperi and Senecio newwebsteri, are endemic. The third species, Aster paucicapitatus, is also found on Vancouver Island. Their respective habitats are restricted to: rock outcrops ($> 1500^{\text{m}}$), steep scree slopes on north aspects, and south-facing meadows (1600-1850m). Mountain goats intensively graze all three species. Grazed individuals had significantly reduced leaf length, flower stalk length, and number of flowers compared with ungrazed individuals. Grazed Aster individuals produced >100 additional branches per ramet, but had less cover than ungrazed individuals. Grazed Senecio individuals had less leaves per ramet than ungrazed plants.

Sexual reproduction is apparently infrequent for these species. The loss of flower and seed production to foraging, probably has a minimal effect on population stability. At the present level of mountain goat use, all three are long-lived perennials, and do not appear immediately threatened with drastically declining populations. However, individuals which have been eliminated from less stable or protected microsites will be replaced slowly. Asexual reproduction

A complete 133 page statement containing the data and analyses leading to the above discussion is included in Mr. Douglas K. Pike's Masters Thesis. Copies of this thesis have previously been submitted to the Superintendent of the Olympic National Park and the Northwest National Park Regional Headquarter.