

AN ANALYSIS OF SEED PRODUCTION, VIABILITY, GERMINATION *IN SITU*,
AND GRAZING IMPACTS ON THE WESTERN PRAIRIE FRINGED ORCHID
(*PLATANThERA PRAECLARA*, SHEVIAK AND BOWLES)

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ABSTRACT

Alexander, Bonnie Jean Warner, Ph.D., Program of Natural Resources Management, Department of Animal and Range Sciences, College of Graduate and Interdisciplinary Studies, North Dakota State University, June 2006. An Analysis of Seed Production, Viability, Germination *in situ*, and Grazing Impacts on the Western Prairie Fringed Orchid (*Platanthera praeclara*, Sheviak and Bowles). Major Professor: Dr. Donald Kirby.

This study adds to what is considered a small body of scientific research on a federally listed threatened plant, the western prairie fringed orchid. There is little published information on many aspects of the orchid's biology, ecology, and phenology and on the impacts of cattle grazing in orchid habitat. This study documents aspects of the orchid's reproductive biology, phenology, and impacts of grazing on various growth stages of the orchid. Since published literature on the orchid is scarce, a comprehensive literature review on most aspects of the orchid was included. An analysis of seed production, viability, and phenology yielded an average of 9,825 seeds per capsule, with 80% of those seeds containing viable embryos. Measurements of seed capsules were correlated with seed number and viability; although the correlations were weak, several were statistically significant ($P < 0.05$). Capsule diameter demonstrated no significance as a predictor of seed number or viability, ($P = 0.76$). Data also suggested that seeds were undergoing maturation to the time of capsule dehiscence as evidenced by the increasing weight of seeds ($P = 0.03$) and the presence of larger embryos as the season progressed ($P < 0.05$). The data supported the current moratorium on mowing in orchid habitat until after capsule dehiscence in mid-September. Analysis of seed packets placed *in situ* for 1 year resulted in the production of 60 protocorms and 24 seedlings. No difference ($P = 0.3$) between germination rates in grazed versus ungrazed areas was found. A comparison was made of orchid survival, capsule production, and robustness (as gauged by plant height) between grazed and ungrazed areas over a 3-year period. The analysis identified

a significantly greater ($P < 0.05$) mortality rate of orchids, from flowering to capsule production in grazed areas; a depression in capsule production in orchids surviving the season in grazed versus ungrazed areas ($P < 0.05$); and a decrease in robustness as reflected by reduced plant height in grazed areas ($P = 0.0001$). Greater protection of the orchids was advocated in the study conclusion, suggesting the creation of protected orchid “nursery” areas within grazed pastures.