



Genetic comparison of trumpeter swan populations (*Olor buccinator*)
by Victoria Ann Barrett

A thesis submitted in partial fulfillment of the requirements for the degree of MASTER OF SCIENCE
in Zoology

Montana State University

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Abstract:

Three populations of trumpeter swans (*Olor buccinator*) (Alaska, Grande Prairie, Red Rock) were compared by starch-gel electrophoresis at 20 presumptive genetic loci. No significant differences were found among the populations in terms of mean heterozygosity (H) or occurrence of rare alleles. Trumpeter swans have a low level of genetic variability compared to other vertebrate groups in general, a finding similar to that of other avian taxa.

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Signature *Victoria Ann Barnett*

Date *April 10, 1980*

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POPULATIONS (*OLOR BUCCINATOR*)

by

VICTORIA ANN BARRETT

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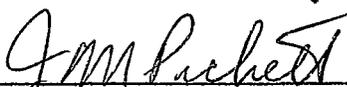
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ABSTRACT

Three populations of trumpeter swans (*Olor buccinator*) (Alaska, Grande Prairie, Red Rock) were compared by starch-gel electrophoresis at 20 presumptive genetic loci. No significant differences were found among the populations in terms of mean heterozygosity (\bar{H}) or occurrence of rare alleles. Trumpeter swans have a low level of genetic variability compared to other vertebrate groups in general, a finding similar to that of other avian taxa.

INTRODUCTION

Populations are the basic units of evolution harboring a wealth of genetic variation (Hubby and Lewontin, 1966). Any change in the gene pool associated with this variation is the mechanism by which evolution proceeds. Speciation, the cladogenic process in which one species splits into two or more species (Ayala *et al.*, 1974) is an important event which has led to the great diversity of life. The definition of the biological species as a reproductive unit (Mayr, 1963) means that the genetic diversity accumulated by an individual or a population is accessible to all descendents of the species, but not to any other species. Thus differences in the genetic variation among groups of organisms can be indicative of species classification.

Ayala *et al.* (1974) have discussed speciation in sexually reproducing organisms as primarily a two stage process involving geographic isolation. First, allopatric populations develop genetic differences primarily as a result of adaptation to different sets of environmental conditions. Populations separated, with little or no gene flow, develop genetic variation which may be amplified or maintained by drift and selection. The second stage of speciation involves subsequent sympatry of the populations with opportunity for interpopulation matings, the progeny of which have reduced fitness. Alleles favoring intrapopulation crosses will then be favored by natural selection enhancing the genetic differences between the groups. If species formation continues, the results will be separate species.

In this study, the amount of genetic variation present within trumpeter swan populations was examined to determine if the process of speciation might be occurring between allopatric populations.

The historic range of the trumpeter swan (*Olor buccinator*) extended across most of the North American continent from Alaska south to wintering grounds along the Gulf of Mexico (Walker, 1968) and east to Hudson's Bay (Alison, 1975) (Figure 1). The expansion of civilization had disturbed or destroyed trumpeter swan habitat to the extent that the species was considered to be nearly extinct early in this century. Today the species is contained in three populations, a large Alaskan population of about 3,000 birds and 2 remnant populations in the interior of the continent, one localized around Red Rock Lakes National Wildlife Refuge and one in the vicinity of Grande Prairie, Alberta.

The Red Rock Lakes population was founded by birds existent in the area (Hansen, 1973) surviving because of the relative isolation of the Centennial Mountains, a range of the Rocky Mountains in the area where the states of Montana, Idaho, and Wyoming meet (Figures 2 and 3). Estimated at 69 birds in 1932 (Hansen, 1973) the population has expanded to about 300 birds under the management of the United States Fish and Wildlife Service who have restricted hunting in the area and maintained habitat as well as continued a winter feeding program.

The Refuge was founded in 1935 under the provisions of the 1929

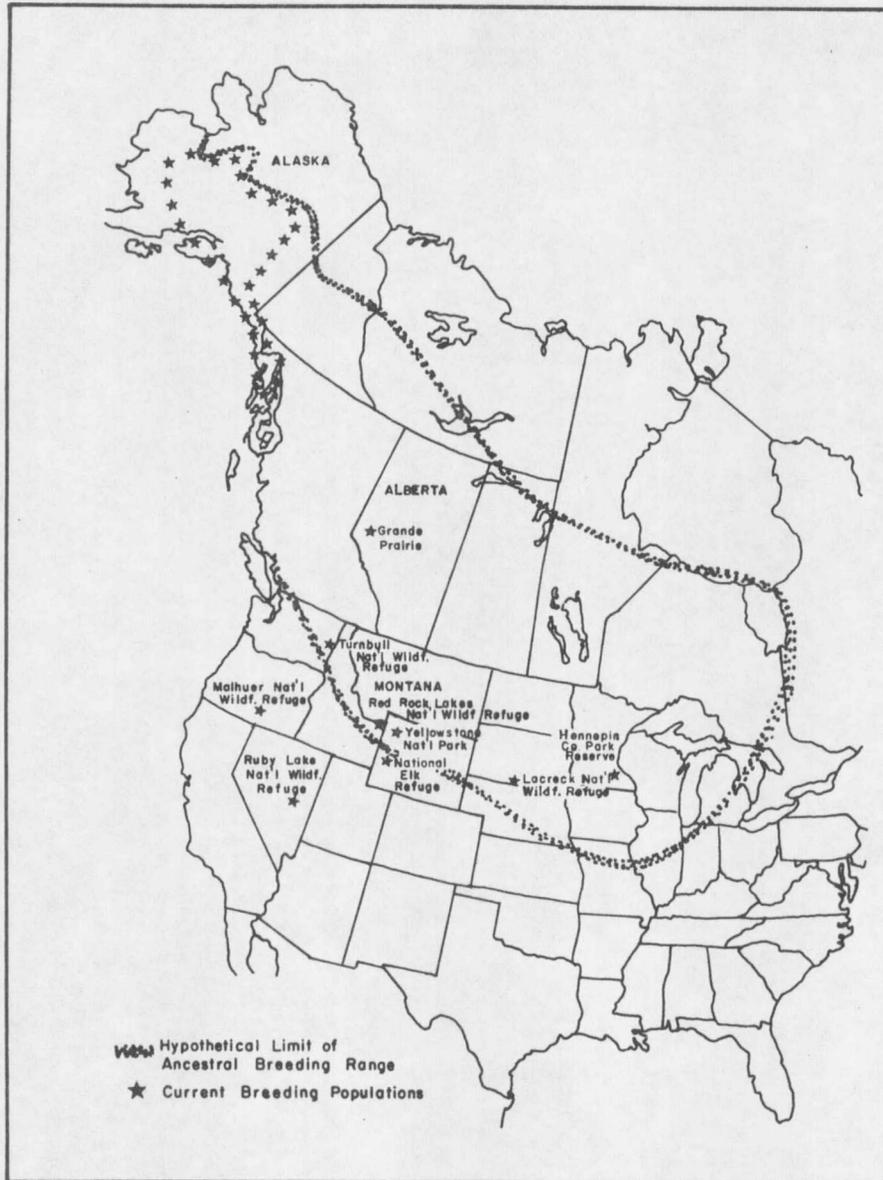
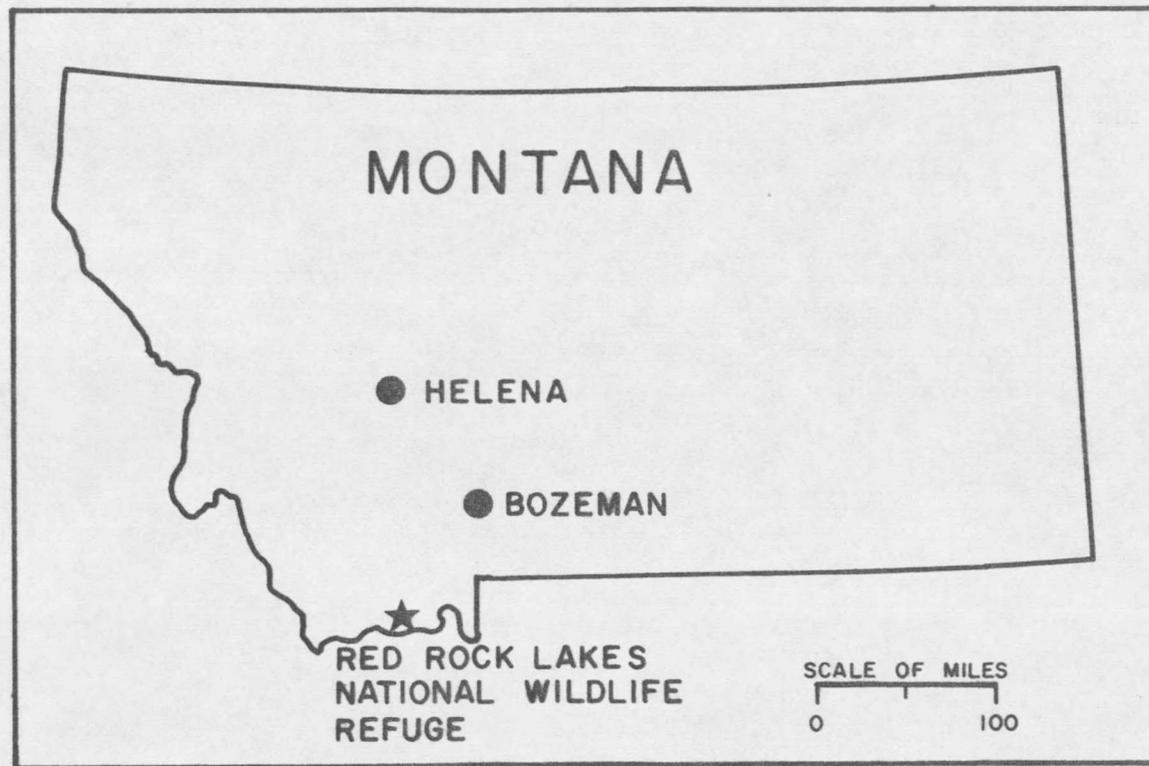


Figure 1. Historic distribution of *Olor buccinator* (Hansen, 1973)



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Figure 2. Red Rock Lakes National Wildlife Refuge.

