THE UTAH TRUMPETER SWAN REINTRODUCTION PROGRAM: PROPOSAL TO EVALUATE REINTRODUCTION SUCCESS

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ABSTRACT

We propose to reintroduce Trumpeter Swans (Cygnus buccinator) from the Rocky Mountain Population to Utah to encourage the establishment of a migratory pathway to southern wintering grounds. Our local goal is to evaluate whether wetlands around the Great Salt Lake, Utah, can serve as staging and/or wintering grounds and whether multiple translocations to Utah can support and enhance the long-term survival of Trumpeter Swans. We suggest a research program that will evaluate reintroduction success.

INTRODUCTION

Observed and projected increases in extinction rates within recent years (e.g. Myers 1988, Wilson 1989) focus attention on the value of biological diversity and techniques of conserving this diversity. Translocation, the "intentional release of individuals to the wild in order to establish, reestablish, or augment a population" (IUCN 1987, Griffith et al. 1989), of rare species appears to be an increasingly important conservation technique because habitats are becoming increasingly more fragmented due to human activity. Species with limited dispersal abilities or migratory knowledge are primarily affected by habitat degradation and fragmentation such that translocations may be the only solution for the conservation of those species (Griffith et al. 1989).

Reintroduction is the introduction of a species, obtained through a captive breeding program or captured in the wild, into its historical range (IUCN 1987). The goals of reintroductions are to:

1. enhance the long-term survival of the species,
2. reestablish an ecological and/or cultural keystone species,
3. increase or maintain biodiversity, and/or
4. provide long-term economic benefits to local people (Kleiman et al. 1994).

The conservation of species through reintroductions, however, can only be successful if certain criteria are met (Kleiman et al. 1994) and the introduced individuals are appropriately monitored after release (Sarrazin and Barbault 1996). Unfortunately, monitoring of reintroduced species usually does not occur or monitoring data are not published and, therefore, are not readily accessible.

Kleiman et al. (1994) suggested 13 criteria to plan and execute species reintroduction. They suggested that species introductions should only proceed if:

1. there is a need to augment the wild population,
2. the existing wild population is not jeopardized,
3. the released individuals are genetically similar to the original population, and
4. knowledge of the species' biology exists.

They also suggested that:

5. the causes of decline be removed,
6. the habitat is sufficiently protected and of good quality, and
7. the habitat is not saturated with potential competitors.

Finally, the authors suggested that:

8. the local human population should not be negatively impacted,

9. community support needs to exist,

10. government and non-government organizations need to be supportive and involved,

11. sufficient resources need to exist for the program,

12. reintroduction technology is known or in development, and

13. the program needs to comply with legislation and regulations.

Reintroductions should never be attempted without proper preparation (criteria evaluation), long-term monitoring, and follow-up data analysis. Much can be lost if the job is done haphazardly or introduction effects are not observed and analyzed for statistical and biological significance. Reintroduction programs contribute to ecology through conservation of species and extinction avoidance and through the understanding of ecological processes at the individual, population, and community level. Reintroductions, for example, create unique opportunities to assess the impact of introduced species on an established community (Sarrazin and Barbault 1996).

The persistence of the Rocky Mountain Population (RMP) of Trumpeter Swans (Cygnus buccinator) is still questionable, even though the population has increased from 66 recognized individuals in 1933 (Banko 1960) to approximately 3000 individuals in 1996 (U. S. Fish and Wildlife Service, pers. comm.). Apparently, 90 percent of the RMP winter in the Tristate Region (Subcommittee on Rocky Mountain Trumpeter Swans 1992), located at the junction of Idaho, Wyoming, and Montana borders. Because the RMP is concentrated during the winter, the persistence of the population is threatened by disease, harsh winters, and long-term deterioration of resources due to overgrazing by waterfowl and drought. Although the Tristate Region provides only limited resources during winter, most Trumpeter Swans apparently do not migrate further south to more favorable habitats.

We propose to reintroduce RMP Trumpeter Swans to Utah to encourage reestablishment of a migratory pathway to southern wintering grounds. We will evaluate whether the long-term survival of Trumpeter Swans is enhanced by multiple translocations to possible staging and/or wintering grounds in Utah. This is done by evaluating the reintroduction criteria as suggested by Kleiman et al. (1994) and by establishing a rigorous monitoring program. We suggest a proposal that will evaluate reintroduction success, keeping in mind that the reintroduction may not only positively or negatively affect Trumpeter Swans, but that Trumpeter Swans may positively or negatively affect the established local ecology of the Great Salt Lake wetlands.

METHODS

Study site

The Bear River Migratory Bird Refuge (BRMBR), located on the delta of the Bear River flowing into the Great Salt Lake, Utah, includes 74,000 acres of marshes, uplands, and open water areas. Dikes divide the refuge into five primary units that contain about 5000 acres each. Craner (1964) found that sago pondweed (*Potamogeton pectinatus*) and widgeon grass (*Ruppia maritima*) were the most abundant aquatic plants at BRMBR. Tundra Swans (*C. columbianus*) use the refuge as a staging area. Only a few Trumpeter Swans have been observed on BRMBR in the past.

Criteria evaluation

At this time, we propose a research program for criteria 5, 6, and 7, as listed above, because all other criteria are supported and do not currently need further research.

Criteria 5: Reintroduction of a species can only be successful if the causes of decline are removed.

Banko (1960) suggested that the RMP almost became extinct in the 1930s due to overharvesting of the swans for their valuable skins. Even though hunting may have been the primary cause for the decline, we cannot ignore alternative hypotheses for the low numbers in 1933, such as destruction of high quality breeding, staging, and wintering areas, or a catastrophic disease wiping out most of the population. Nevertheless, we will evaluate the vulnerability of Trumpeter Swans to hunting because Tundra Swans are hunted in Utah and Trumpeter Swans can easily be mistaken for Tundra Swans. Once Trumpeter Swan vulnerability to hunting is known, appropriate measures can be implemented in the Utah Tundra Swan hunting program.

We will examine Trumpeter Swan interactions with hunters by:

1. comparing vulnerability of Trumpeter and Tundra Swans to hunting and examining possible mechanisms for differential vulnerabilities,

2. examining if hunting pressure drives Trumpeter Swan movement patterns and habitat selection, and

3. examining hunter attitudes towards Trumpeter Swans and analyzing management options that minimize hunting mortality of Trumpeter Swans.

Criteria 6: Reintroduction can only be successful if the habitat is sufficiently protected and a quality food resource exists.

Trumpeter Swans are herbivorous (Mitchell 1994). Evaluation of the aquatic vegetation at BRMBR and vicinity is crucial to understanding whether the translocation site can support the swans during staging or wintering. We will examine habitat suitability for translocated Trumpeter Swans by analyzing their habitat selection and foraging patterns. This will be done by:

1. creating isocline maps of BRMBR, including coverage of emergent and submergent macrophyte species and density and biomass of sago pondweed tubers. Water depth will also be mapped because water depth determines the maximum sediment depth at which an individual can forage.

2. measuring environmental variables at Trumpeter Swan foraging locations, obtained through visual observation and radio-tracking collared birds, and comparing them to random points on the refuge, and

3. describing the carrying capacity of BRMBR for Trumpeter Swans by quantifying sago pondweed tuber biomass consumption to detect a potential bottleneck for survival in the annual cycle.

Criteria 7: Reintroduction of Trumpeter Swans can only be successful if the habitat is not saturated with potential competitors.

Ecological theory suggests that species with similar body sizes may not exist in the same habitat and feed on the same resources (MacArthur 1958, Hutchinson 1959, Brown 1984, Belovsky 1986, Wiens 1989). Rather, one species will always be slightly more efficient in exploiting the resources and will outcompete the other species when resources are limiting. Alternatively, similar species may not compete when resources are abundant. In this case, similar species will be indifferent to each other and are able to coexist. At this time, we do not know how abundant resources are at BRMBR (Criteria 4) and how Trumpeter and Tundra Swans will react to potential resource limitation. We do know that a minimum of 30,000 Tundra Swans staged at BRMBR in November 1996 and that up to 15,000 Tundras winter on the refuge (Utah Division of Wildlife Resources, pers. comm.). Tundra Swans, like Trumpeter Swans, feed almost exclusively on sago pondweed tubers when staging or wintering on the refuge. Thus, resources may become limiting, especially during the winter months when ice-up occurs. Hutchinson (1959) suggested that species need to differ by at least three percent in body size measurements for coexistence in a resource limiting environment. Trumpeter and Tundra Swans are quite similar in body size measurements, differing less than three percent in body size measurements (Limpert and Earnst 1994, Mitchell 1994). It is likely that the two swan species will negatively affect each other through competition when resource limitation occurs.

We propose to examine mechanisms for coexistence between Trumpeter Swans and Tundra Swans by:

1. determining if and when resources are limiting during the fall and winter months,

2. observing any direct behavioral interactions between Trumpeter and Tundra Swans that could cause active or passive displacement from a feeding area, and

3. identifying potential indirect competitive interactions by observing differences in foraging efficiencies and differences in resource exploitation patterns (Brown 1989a, 1989b).

Monitoring

We are monitoring Trumpeter Swans day and night on BRMBR and vicinity through direct observations and radio telemetry. We have contacted wildlife managers in Utah, Nevada, California, and Idaho to report any sightings of Utah-released birds. Sighting data will suggest if a migratory route has been established.

SUMMARY

We propose a research program that evaluates criteria for successful reintroduction of Trumpeter Swans to Great Salt Lake wetlands. We especially focus on evaluating food resources, observing interactions with Tundra Swans, and analyzing effects of Tundra Swan hunting on Trumpeter Swan survival. We also propose to monitor intra- and interstate migrations of Utah-released Trumpeter Swans to evaluate the establishment of a migratory path to southern wintering grounds.

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