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November 1978

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The Triumphant Trumpeter*

Paul A. Johnsgard

Once reduced to a few bevies, this magnificent swan is on the road to recovery

Largest of all the swans and heaviest of North American birds, the trumpeter swan is on the increase. Once common and widespread over much of the western United States, the bird was a winter resident of the lower reaches of the Mississippi Valley, Louisiana, and Texas. During the last century, however, trade in swanskins—used to make powder puffs and writing and drawing quills—and the sale of eggs to collectors had a heavy impact on the species. In the period from 1853 to 1877, for example, London sales of trumpeter swan-skins imported through the Hudson's Bay Company totaled nearly 18,000, an average of about 750 per year. Destruction of their prairie habitat and increased disturbance also took a heavy toll of these shy birds. By the time the species came under the complete protection of the Migratory Bird Treaty Act in 1918, many ornithologists believed that the species was doomed to extinction.

* Published in *Natural History* 87:9 (November 1978), pp. 72-77. Used by permission of the American Museum of Natural History.

Trumpeter swans fly over Grand Teton National Park, possibly in search of waters suitable for nesting. During a recent six-year period, the swans nested at eight sites within the park. (Photo by Paul A. Johnsgard)

Population surveys in the early 1930s gave estimates of from 37 to 97 surviving trumpeter swans, nearly all of them in Yellowstone National Park and the nearby Red Rock Lakes area in southwestern Montana. At that time, a large breeding population in Alaska was overlooked because it was believed that those birds were whistling swans, a species closely related to the trumpeters. Since the realization in 1954 that trumpeter swans nested in

Alaska, surveys have indicated that there are now at least 3,000 in that state. In addition, about 150 trumpeters survive in the marshes of western Alberta.

But in the 1930s, conservationists did not know how many birds existed north of the Canadian border, and the outlook for the species within the contiguous United States was grim.

The establishment of Red Rock Lakes Migratory Waterfowl Refuge in southwestern Montana in 1935 was doubtless the most significant factor in protecting the last remnant of breeding trumpeter swans south of Canada. The nucleus of birds at that refuge provided other parks and refuges with trumpeters to establish new flocks. The first such transplant was conducted in 1938, when four cygnets were placed on the National Elk Refuge, near Jackson, Wyoming. Six additional birds were released there in 1939 and 1941, and the first breeding occurred in 1944. Thereafter, nesting took place nearly every year, although no more than two nests were ever reported in any single year.

Presumably from these nestings, trumpeter swans colonized abutting Grand Teton National Park a few years after its establishment in 1950. (The protection from disturbance by ranching and other, related activities formerly in the area probably made colonization possible.)

One of the first areas to be occupied was Christian Pond, a thirty-acre marsh near Jackson Lake Lodge. Breeding occurred on that pond as early as 1954, and nesting attempts have been made every year since. During the eight-year period from 1969 through 1976, at least eighteen cygnets were raised by a pair using Christian Pond. Whether the same pair was involved every year is not certain, but it is possible: swans are long-lived; some have survived in captivity for more than thirty years.

Other areas in the park have also been used by trumpeter swans for nesting. In the six-year period between 1970 and 1975 a total of eight different sites had nests. Yet during that entire period only forty-three cygnets are known to have been reared, including those from Christian Pond. Considering that the usual clutch is four to six eggs, the reproductive success of the seven known pairs in the park each year was extraordinarily low; the average for all pairs was less than one young successfully raised per year.

Trumpeter swans have now been breeding in Grand Teton National Park for at least twenty-five years; yet the number of breeding pairs has not increased measurably in the last ten years. The question that arises is, What could be responsible for this bird's low reproductive rate and nonincreasing population in the park?

The reproductive potential of the trumpeter swan is typical of swans in general and might be considered a model for large waterfowl. Although some refuge-raised trumpeters have bred when they were approaching the end of their third year, wild birds often do not breed until their fourth year as a result of competition for suitable nest sites with older and already established pairs. Thereafter, the birds attempt to nest every year for as long as they live. The survival rate for trumpeter swans in the wild is still unknown, but in the related Bewick swan of Eurasia, it is about 85 percent per year. Likewise, the Eurasian whooper swan, often considered conspecific with the trumpeter, has an estimated annual survival rate of 83 percent. The potential longevity of trumpeter swans should result in a large number of offspring over their lifetimes. Why then is Grand Teton National Park not afloat in trumpeter swans?

To answer that question, one must examine not only the environment in terms of its carrying capacity for swans but also the efficiency of the swans' reproductive efforts.

Studies on the biology of trumpeter swans indicate that their reproductive needs are fairly simple. Territories of breeding pairs are almost always large to insure an adequate food supply for the adults and as many as six young. Rarely is a territory established on a pond or lake of less than five acres, and in Grand Teton National Park, as well as at Red Rock Lakes Refuge, the average territorial size is about thirty acres. Some marshes or small lakes as large as one hundred acres may be defended from intrusion by other pairs, particularly if the shoreline is open enough for unobscured vision. Both the white plumage and the extremely loud vocalizations of the trumpeter swan have apparently evolved as devices for proclaiming large territories by maximizing individual conspicuousness.

Other considerations besides a minimum water area are important in determining what constitutes acceptable nesting habitat. First, water levels should be stable, avoiding the possibility of the nest's exposure to territorial predators as a result of dropping levels or of flooding caused by a rise in water level. Second, much or all of the water in a territory should be from one to three feet deep, to allow for subsurface foraging while swimming, and the water should be quiet and wave-free, with an abundance of emergent, floating, and submerged plants. The emergent plants are primarily of value as cover and as foundation material for the nest, while the submerged and floating plants provide an adequate food supply for these large herbivores.

Given these considerations, that Grand Teton National Park does not have more nesting swans is not surprising. Many of its waters are deep, clear lakes, formed by glacial action, that offer

little food or cover for the birds. Christian Pond, however, as well as several of the other regular nesting sites in the park, is beaver formed, and its level is controlled by beaver dams. Like the moose, which feeds extensively on aquatic plants, and the greater sandhill crane, which nests in or around beaver impoundments, the presence of trumpeter swans in Grand Teton National Park is closely tied to the abundance and distribution of beavers.

A very high mortality of eggs or cygnets is the probable reason for the low reproductive rates. To avoid overestimating cygnet production, the National Park Service's annual count of swan families in the park is usually made in late August or early September, when the young birds are nearly fledged. Therefore, there has been no way of knowing if most mortality occurs prior to hatching or sometime thereafter. But during three summers spent in the park, I never saw a full brood of six cygnets and rarely saw more than two, even shortly after hatching. This would suggest that most mortality happens early, probably before the young are one to two weeks old. In any attempt to understand what the causes of such cygnet or egg mortality might be, the breeding logistics for a bird the size of a trumpeter swan have to be considered.

Trumpeter swans typically build large, mounded nests in marshes, well away from shore, in water about one to two feet deep. These nests are often constructed of bulrushes, cattails, or other emergent vegetation; at times beaver lodges or muskrat houses are also used. A week or more may be spent building a new nest or refurbishing an old foundation. Egg laying then begins and continues for ten days until a full clutch has been deposited. Incubation begins with the last egg and lasts an average of 36 to 40 days. Finally, the young birds have an extremely long fledging period, estimated at from 91 to 122 days in the

Montana-Wyoming population. Thus, a minimum of 142 days, and perhaps as much as 173 days, are required from the time nest construction begins until the young fledge. Since the frost-free period in the Grand Teton National Park area is less than 80 days, the bird's long reproductive cycle poses certain risks: the eggs might be fatally chilled before they hatch; the young cygnets might freeze before they develop adequate temperature regulation; and the water might freeze over before the juveniles fledge and thus lose their vulnerability to coyotes and other predators.

I believe this environmental factor is primarily responsible for the low reproductive success of trumpeter swans in the Grand Teton area. Originally adapted to breeding on prairie marshes in areas where the frost-free period is often 200 days or longer, trumpeters often succumb under the severe strains of breeding in montane areas. Even in southeastern Alaska, where the largest population of trumpeter swans now exists, the frost-free period is more than 120 days and thus far less likely to be a mortality factor. In Alaska, 80 to 85 percent of the cygnets survive at least to the age of two months.

If there is a lesson to be learned from this, it is that future releases of trumpeter swans into refuges should be done with some attention to the climatic characteristics of the area. A release in 1960 at Lacreek National Wildlife Refuge in South Dakota has been perhaps the most successful of the trumpeter transplants; the population there now numbers well over one hundred birds, and the swans have spread out and nested in ten counties in South Dakota and three in Nebraska. Limited releases have also been made in Minnesota and Nebraska. These areas have frost-free periods of at least 130 days.

There are now between 4,000 and 5,000 trumpeter swans all told. Without doubt, other refuges in the Great Plains could support breeding populations of this magnificent bird once its proper habitat—the remaining marshlands of the Great Plains, not some mountain lake—is recognized.

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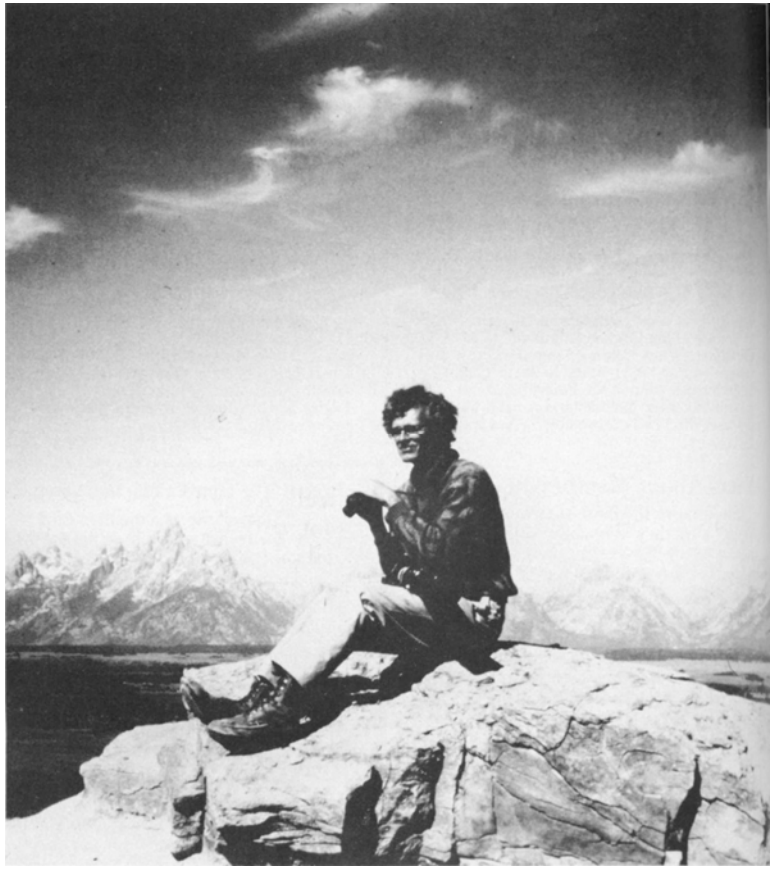
A pair of trumpeter swans has colonized one of the mountain lakes in Grand Teton National Park. Unfortunately, the lake is more suitable for the breeding of other waterfowl, foreground. (Jonathan Wright; Bruce Coleman)

An adult stands over a cygnet on the mass of vegetation that serves as the nest. Material for nest building is gathered from the emergent aquatic plants surrounding the site. (H. Engels; Bruce Coleman)

Although the early morning air temperature is subzero, two trumpeter swans, above, swim and preen in Yellowstone National Park's Firehole River, which is fed by warm springs. (J. Spurr; Bruce Coleman)

Right: Under prime conditions, trumpeter swans may raise up to six young annually. A long, frost-free period—at least 142 days—seems to be one of the key factors for a high reproductive rate. (Peter B. Kaplan)

Paul A. Johnsgard



Setting out to study the breeding habits of sandhill cranes, a project that extended over three summers in Jackson Hole, Wyoming, Paul A. Johnsgard eventually became more enamored of the area's trumpeter swans than the sandhills. In addition to making field observations of trumpeters, sandhills, and other bird species, Johnsgard serves as professor of zoology at the University of Nebraska and also churns out books. He is currently working on two ornithological tomes: one, to be published next year, on the breeding birds of the Great Plains states; the other, on which he is just getting started, will be on the shorebirds of the world. His last article for Natural History, *"Flight of the Sea Ducks," appeared in the August-September 1976 issue.* [p. 4]