

swans from Alaska (PCP), Red Rock Lakes NWR (birds of the Tri-State Area flock of the RMP), and Grande Prairie, Alberta (Canada-nesting RMP). All three groups of swans shared a common allele for all loci surveyed, and the mean heterozygosity of the three groups was not different. However, the Alaskan birds possessed alternate alleles at several loci, suggesting that the Alaskan group may differ somewhat from the Grande Prairie and Red Rock Lakes NWR birds. The genetic distance among the three groups was identical, indicating a close genetic relationship among the groups, and led the authors to conclude that the groups sampled were "virtually identical based on the index of genetic distance."

Marsolais and White (1997) studied Band-Sharing Coefficients (BSCs) of birds sampled from the PCP, RMP (both Tri-State- and Grande Prairie-nesting birds), and the IP (Ontario flock, comprised of translocated birds from mixed PP/RMP lineages). They found that the IP and RMP birds had much higher BSCs than those of PCP birds, suggesting less genetic diversity in the former two groups. They hypothesized that the low genetic diversity could have been the result of these groups experiencing population "bottlenecks." That is, as the range of the trumpeter swan decreased in the 1800s, the few spatially disjunct groups that remained established at that time were composed of birds with similar genetic traits.

However, as the petitioners (Biodiversity Legal Foundation *et al.* 2000, quoting Marsolais 1994) stipulate, "the fact that the tristate and interior Canadian populations did not have significantly different mean BSCs, suggests that the tristate population is not less genetically variable than the interior Canadian population." Marsolais (1994) goes on to state that genetic differences may exist and could be detected using other techniques. However, subsequent studies to address this latter contention have not been conducted.

Pelizza (unpub. ms.) studied allele frequencies among birds sampled from the PCP, Tri-State-nesting birds, and the High Plains flock of the IP. His results indicated that some differences existed between the PCP birds and those from the latter two groups, but that birds from

the Tri-State Area and the High Plains flock were essentially identical. He did not collect samples from the Interior Canada flock.

Thus, although several studies have been conducted, only one has examined directly the genetic relationship between the Canadian- and United States-nesting segments of the RMP. Although that study suggested no differences between the groups, the methods used (starch gel electrophoresis) are dated compared to contemporary techniques using mitochondrial DNA and microsatellites. Thus, Oyler-McCance and Quinn (2001) have initiated a study to better assess potential differences among the two groups of birds. This current study should document the extent of interchange between the Canadian and Tri-State Area flocks of the RMP. The proposed techniques recently have been used to distinguish among sage grouse populations (Oyler-McCance *et al.* 1999).

On the basis of the foregoing discussion of current trumpeter swan genetic information, we conclude that available information does not provide evidence of genetic discontinuity within the meaning of our DPS policy.

(3) *Only surviving natural occurrence*—A population segment may be significant under the DPS policy if it is the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range. This is not the case with the Tri-State Area trumpeter swan flock.

(4) *Gap in range*—If the Tri-State Area flock were lost, there would not be a significant gap in the range of this species because extant breeding and wintering trumpeter swans are dispersed across North America. The creation of a gap in a species' range can have bearing on gene flow and the demographic stability of a species as a whole. Further, peripheral populations may have genetic characteristics essential to the overall long-term conservation of the species (*i.e.*, they may be genetically different than more central populations) (Lesica and Allendorf 1995). Thus, the consideration of the species' range and the potential for creating a gap in that range can be significant to the

conservation of a taxon. However, in this case the potential loss of the Tri-State Area flock is unlikely to have any such effects. Managers have repeatedly established or re-established breeding flocks of trumpeter swans in various areas of the United States and Canada. Restoration flocks derived from exclusively Tri-State Area-nesting swans have been established at several locations, and the loss of a nesting flock in one area would not affect the conservation of the taxon within the meaning of our DPS policy. In addition, several restoration flocks were established with swans from both the Tri-State Area flock and the Pacific Population. Further, RMP swans from Canada winter in the Tri-State Area; thus, trumpeter swans would occur in the area for at least a portion of every year, and may attempt to pioneer vacant areas (note previously mentioned observations of the Interior Canada flock birds in the Tri-State Area during the summer).

Our DPS policy identifies these factors as examples of the types of information that may demonstrate the significance of a population. There may be other considerations we have not explicitly addressed here. However, we do not find another basis to support a conclusion that the Tri-State Area flock is significant to trumpeter swans in North America such that it warrants listing under the Act. In particular, these facts indicate the opposite: (1) The Tri-State Area flock represents only 1 to 3 percent of all trumpeter swans in North America, (2) it has been highly manipulated to the extent that it is probably the least "natural" of all trumpeter swan flocks, and (3) a high percentage of restoration flocks outside the Tri-State Area include descendants of Tri-State Area birds that are likely to be genetically similar to those in the Tri-State Area. As previously mentioned, Congressional guidance states that the authority to list DPSs is to be used "sparingly" while encouraging the conservation of genetic diversity. We considered the available scientific evidence regarding the Tri-State Area flock's importance to the taxon to which it belongs and conclude that it is not significant.

TABLE 1.—INCIDENCE OF TRUMPETER SWAN HARVEST DURING SWAN SEASON IN THE PACIFIC FLYWAY

Year	Utah		Montana (PF) ¹		Montana (CF) ¹		Nevada	
	Swans examined	Trumpeters detected	Swans examined	Trumpeters detected	Swans examined	Trumpeters detected	Swans examined	Trumpeters detected
1994	474	0	219	1 (juvenile)	31	0	78	0