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学 位 論 文 内 容 の 要 旨

博士（環境科学）

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学 位 論 文 題 名

Comparative studies on recovery histories and conservation strategy for *Grus japonensis*
and *Grus americana*

(タンチョウおよびアメリカ・シロヅルの回復史と保全戦略に関する比較研究)

Southeast Texas/northern Alberta and northeast Hokkaido, Japan are homes to populations of two extremely similar species of cranes with similar conservation stories. The whooping crane of North America, specifically the Aransas-Wood Buffalo (AWB) migratory flock, and the red-crowned crane of Hokkaido were both pushed to the brink of extinction, with surviving populations numbering 21 and 33 individuals, respectively, in 1952 (US Fish & Wildlife Service; Japan Red-Crowned Crane Conservancy). Both species have been subjects of focused rehabilitation efforts led by advanced national governments. While both governments' conservation authorities relied on a variety of conservation methods throughout their programs' histories, the United States Fish & Wildlife Service (FWS) focuses mainly on habitat management, while in Japan the Ministry of the Environment (MOE) and its predecessors lean most heavily on a direct population management strategy via a long-standing winter artificial feeding program. The recovery histories of these two remarkably similar species provide a unique opportunity for comparing and contrasting the relative efficacy of two primary endangered species management approaches: habitat management vs. direct population management through artificial and supplemental feeding.

An initial review of these two case studies reveals indications that supplemental feeding in periods of lean food availability resulted in much faster overall population recovery in Japan, with the red-crowned crane population expanding at a rate roughly 20 percent faster than the AWB whooping crane population over the 70-year period reviewed in this study. Today, Japan's resident,

red-crowned crane population numbers more than triple that of North America's AWB whooping crane population: about 1,800 red-crowned cranes by 2022 according to the Red-Crowned Crane Conservancy (RCCC) vs. 543 AWB whooping cranes as of 2022 per FWS. These results suggest Japanese conservationists may have uncovered a method for ensuring faster population recovery in an endangered species: sustained long-term artificial feeding during times of least forage availability. Evidence in the academic literature further points to supplemental or artificial feeding's net positive effect on avian species' rates of reproduction and population growth. And other factors that may explain the variance in red-crowned crane vs. AWB whooping crane population recovery can be ruled out, as there is no evidence that the AWB whooping crane population has been experiencing higher mortality rates.

This study lays out in detail why the supplemental winter-feeding campaign in Japan best explains the faster rate of population growth witnessed in Hokkaido's red-crowned crane population. Evidence from the academic literature is drawn to support this conclusion. Furthermore, a detailed assessment of habitat management efforts in Japan is offered to assess Japan's options for managing and protecting the large Hokkaido population of red-crowned cranes moving forward. Finally, this study compares and contrasts international endangered species laws, including Japan's landmark endangered species statute, against the 50-year-old US Endangered Species Act to highlight how whooping crane conservation likely inspired the Endangered Species Act and influenced endangered species management throughout the world. This exercise also revealed important philosophical and culture differences between approaches to endangered species conservation in the US and Japan, differences arguably best explained by this tale of two cranes.