Assessment of virus movement across continents: using Northern Pintails (*Anas acuta*) as a test

Trip Report
Capture and Marking of Northern Pintails in Japan
11-21 February 2007

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The USGS Alaska Science Center (ASC) recently initiated a cooperative study with Japanese scientists to assess the likelihood that migratory birds could transmit highly pathogenic H5N1 avian influenza virus from Asia to North America. The study proposal is available at the ASC website: http://alaska.usgs.gov/science/biology/avian_influenza/projects.html. The project will use Northern Pintails as a focal species because they frequently migrate across continental boundaries and because a relatively high proportion of pintails carry avian influenza strains. We are involving Japanese scientists because Japan is the main wintering area for Northern Pintails in east Asia. The study will include four components: (1) analysis of band recovery data to identify areas in Russia where pintails from North American wintering areas would likely come into contact with Japanese pintails during migration and nesting, (2) use of satellite telemetry to model spatial and temporal distribution of Japanese pintails during migration and nesting, and to estimate the likelihood that they occur in areas occupied by North American pintails, (3) assessment of transcontinental transmission of avian influenza by comparing non-H5N1 virus strains in pintails wintering in California to those from Japan, and (4) comparison of neutral nuclear and mitochondrial genetic similarities between Asian and North American pintails to evaluate the degree of reproductive isolation between these populations.

From 11—21 February, we worked with Japanese colleagues to mark Northern Pintails in Japan with satellite transmitters (PTTs), secure feather samples for genetic analysis, and to lay the groundwork for other components of the study. Our primary collaborator was Dr. Hiroyoshi Higuchi with the Laboratory of Biodiversity Science, University of Tokyo. Dr. Higuchi secured capture and marking permits, arranged for required testing and licensing of PTTs in Japan, and provided logistical support. The ASC has established a cooperative agreement with the University of Tokyo to reimburse them for costs.

We captured pintails near Izunuma and Uchinuma lakes in the Miyagi Prefecture in the northeast region of Honshu (Fig. 1). The capture site had been recommended by Dr. Higuchi because of the large numbers of wintering pintails in the region, and because pintails there are easily approached.

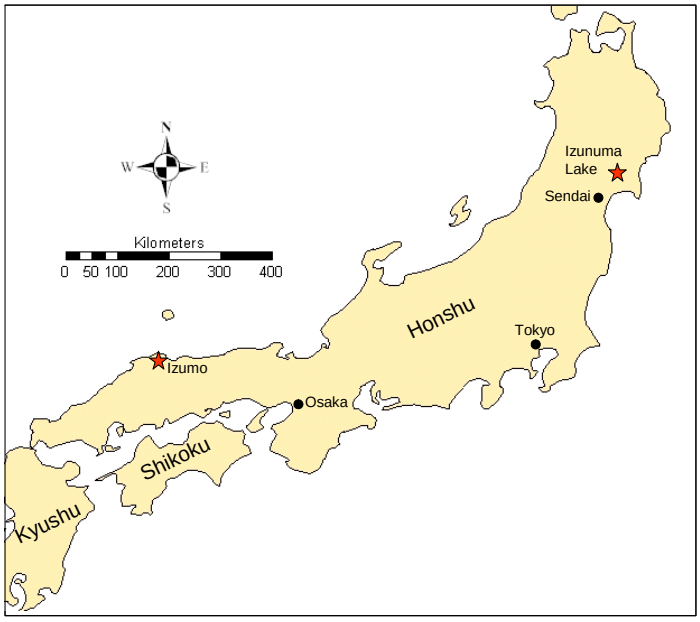

Figure 1. Areas in Japan where satellite transmitters were deployed on Northern Pintails (Izunuma Lake) and White-fronted Geese (Izumo), February 2007.

The area surrounding Izunuma and Uchinuma lakes is managed by the Japan Ministry of the Environment. Along with pintails, Whooper Swans, White-fronted Geese, Mallards, Spot-billed Ducks, Pochards, Tufted Ducks, and other waterbirds winter in the area. Hand-feeding of Northern Pintails and other waterfowl is a popular activity (Fig. 2) and is not discouraged by Japanese wildlife managers. We saw several areas where large groups (>500) of pintails gathered at roadside pullouts to be fed by people. Whooper Swans were also attracted to feeding sites and we observed one area where domestic ducks were intermixed. The very high concentrations of pintails and close proximity of people would be considered highly unusual in North America. Conditions appeared conducive to intra- and interspecific transmission of avian viruses.

Figure 2. Public feeding of Northern Pintails at Izunuma Lake, Japan

Figure 3. Capture of Northern Pintails at Izunuma Lake, Japan via a Japanese clap trap.

Dr. Higuchi assembled a capture team from the University of Tokyo and representatives of the Izunuma-Uchinuma Environmental Foundation, the Japan Bird Research Association, the Japanese Association for Wild Geese Protection, and Abiko City Museum of Birds. Capture of pintails was made via a traditional Japanese "clap trap" at one of the sites where birds were regularly fed (Fig. 3). A total of 158 pintails was captured in a single trapping event.

We weighed all pintails and collected feather samples from 80 individuals for genetic and isotopic analysis. We selected birds that were heavier than average mass for marking with satellite transmitters. We marked 16 males and 11 adult females with 18-g solar powered PTTs manufactured by Microwave Telemetry (Columbia, MD). Japanese scientists attached PTTs via a Teflon ribbon harness that centered the transmitter on the bird's back (Fig. 4). The PTT was mounted on stainless steel wire frame that held the PTT approximately 1 cm above the bird's back in order to insure adequate charging via the solar panel. The attachment method was similar to that which Japanese scientists have previously used to mark pintails and other duck species in Japan.

Figure 4. Attachment of a solar-powered PTT to a Northern Pintail at Izunuma Lake, Japan.

Following marking of pintails, we traveled to Izumo in the Shimane Prefecture in the southwest region of Honshu (Fig. 1) to assist with deployment of satellite transmitters on Greater White-fronted Geese. Japanese biologists requested our assistance because they had relatively little experience with rocket net capture of geese. Outbreaks of highly pathogenic H5N1 have occurred among poultry in the southern region of Japan, thus migration routes of waterfowl from that area are of interest.

We released marked birds at Izunuma Lake, 4-5 hours after capture. All 27 PTTs have provided locations since deployment and pintails have moved up to 80 km from their release site (Fig 5). Monitoring of pintails will continue throughout their migration, nesting, and molting periods. Solar-powered PTTs can provide data up to three years after marking.

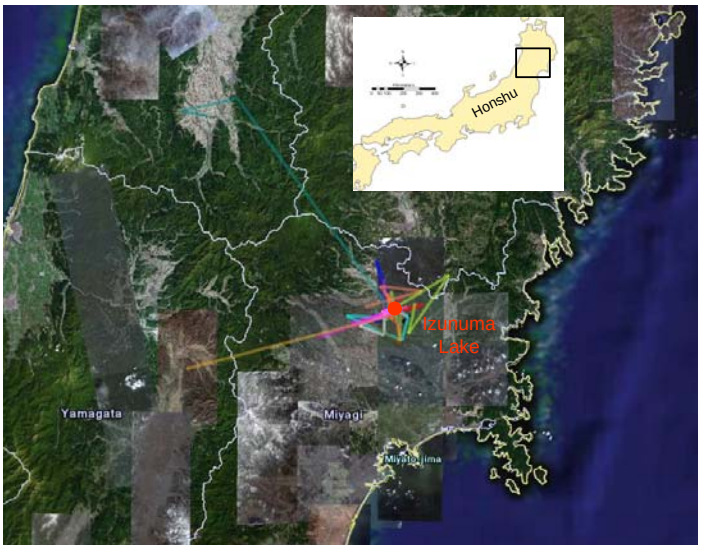

Figure 5. Movements from 20-26 February of Northern Pintails marked with satellite transmitters at Izunuma Lake, Japan. Area of movements is indicated in the inset map.

The leader of this effort was Dr. Go Fujita, a colleague of Dr. Higuchi's within the Laboratory of Biodiversity Science. In addition, Japanese scientists from the National Institute of Agro-Environmental Sciences (Ministry of Agriculture), National Institute of Infectious Diseases, Hokkaido Institute of Environmental Science, Environmental Management Division of Bibai City, and Wild Bird Society of Japan assisted. We demonstrated setup of rocket nets and captured a sufficient number of geese for Japanese scientists to deploy the eight PTTs that they had available for the project. Our Japanese colleagues were especially grateful for our assistance and indicated that they had expected a low likelihood of success without our involvement.

Overall, the trip to Japan was successful. We deployed PTTs on Northern Pintails as planned, collected samples for genetic analysis, and established a strong basis for collaboration in future years. Importantly, we gained a better understanding for the relationships among the various academic, governmental, and non-governmental institutions that are active in migratory bird research and conservation in Japan. Our interactions with Japanese colleagues were very positive, and clearly there was interest in continuation of the project in future years. This should facilitate our ability to expand the project to meet other objectives.