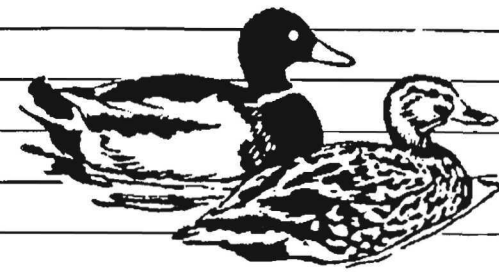
Research
Information bulletin
U.S. DEPARTMENT OF THE INTERIOR
NATIONAL BIOLOGICAL SURVEY



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Proventricular Infection by a Nematode in the Endangered Laysan Duck

The endangered Laysan duck (*Anas laysanensis*) is found only on Laysan Island, part of the Northwest Hawaiian Islands National Wildlife Refuge. Laysan Island, about 1,450 km from Hawaii, encompasses about 365 ha and has a large, shallow brine lake in the center. Depending on ocean influx and rainfall, the lake area varies from 40 ha to more than 81 ha.

The ducks are generally found near the lake feeding on brine flies on the lake edge, larvae of various native moths in surrounding vegetation, and brine shrimp within the lake. Although the lake is mostly saline, ducks congregate near several freshwater seeps along the edge of the lake. Laysan duck populations have fluctuated from 50 to 450 individuals depending on the time of year censuses are taken.

Laysan Duck Die-off

In October 1993, 27 adult Laysan ducks were found weak or dead around the lake. The water level of the lake was unusually low due to an ongoing drought, and the brine fly population was believed to be lower than normal.

Thirteen ducks were necropsied and blood was collected from 10 ducks. Necropsy revealed severe emaciation, a thickened proventricular wall with excess mucus and a rough mucosa, and variably sized nodules along the proventricular and intestinal walls. Clinical pathology results from blood samples revealed a response compatible with that found in severe emaciation and parasitic infection.

Marked hyperplasia of the proventricular mucosa was seen on microscopic examination of tissues sampled from all 13 Laysan ducks necropsied. The architecture of proventricular submucosal glands was severely distorted with marked dilation and atrophy of the glandular epithelium. Cross-sections of numerous nematodes migrating through the wall of the proventriculus were observed. The nodules associated with the small intestine were filled with debris and bacteria. Their origin remains undetermined, and tuberculosis was ruled out as the cause.

Parasitologic examination of three gastrointestinal tracts revealed numerous (more than 100 in each bird) slender nematodes 5.0 mm

long firmly embedded within the mucosal surface of the proventriculus. The proventricular nematodes were identified as *Echinuria uncinata*.

Echinuria uncinata has been reported as a cause of listlessness, emaciation, and sometimes death in wild and domestic ducks and in birds living in zoological gardens. *Daphnia* sp. (Order: Cladocera), commonly known as the water flea, serves as intermediate host for this nematode. Waterfowl become infected with *Echinuria uncinata* by consuming infected *Daphnia* sp. while drinking or while feeding on aquatic food items. After the infected *Daphnia uncinata* is eaten by a susceptible bird, the nematode matures in about 51 days.

Nematode Burden Could Have Contributed to Mortality

Decreased lake level, aggregation of ducks around freshwater seeps, and subsequent nutrient loading could have caused a zooplankton bloom that increased the exposure of ducks to *Echinuria uncinata*. The combination of a severe worm burden and a lack of an alternate food source other than brine flies was probably enough to cause death.

We have much to learn about the Laysan duck. Monitoring the Laysan duck population for the presence of *Echinuria uncinata*, along with examining zooplankton and monitoring nutrient levels in Laysan Lake, is necessary. In addition, more work is needed to determine the seasonal diet of Laysan ducks.

For further information contact

Rebecca A. Cole or Carol U. Meteyer
National Wildlife Health Center
6006 Schroeder Road
Madison, Wisconsin 53711
(608)271-4640

or

Thierry Work
National Wildlife Health Center
Honolulu Field Station
3 Waterfront Plaza, Suite 580
500 Ala Moana Boulevard
Honolulu, Hawaii 96813
(808)541-3441