

SUMMARY OF MICROSCOPIC CHANGES AND VIRUS ISOLATION FROM CORMORANTS SUBMITTED TO THE NWHC DURING THE 1992 OUTBREAK OF NEUROTROPIC-VELOGENIC NEWCASTLE DISEASE IN CORMORANTS IN THE GREAT LAKES AND UPPER MID-WEST STATES. Carol U. Meteyer¹, Doug E. Docherty¹, J. Christian Franson¹, Dennis A. Senne², Linda C. Glaser¹. ¹National Wildlife Health Center, 6006 Schroeder Rd., Madison, WI 53711; ²Diagnostic Virology Laboratory, National Veterinary Services Laboratories, Animal and Plant Health Inspection Service, USDA, Ames, Iowa 50010.

An epizootic of neurotropic-velogenic Newcastle disease (NVND) occurred in double-crested cormorants (*Phalacrocorax auritus*) on lakes Michigan, Huron, Superior and Ontario and lakes in Minnesota, North Dakota, South Dakota, and Nebraska during summer 1992. We examined 85 cormorants at the National Wildlife Health Center. Gross lesions were not observed. Virus isolation was used to confirm presumptive histopathologic diagnoses of NVND. A high correlation was found between characteristic microscopic lesions in the brain and spinal cord of moribund cormorants and isolation of NVND virus. In the face of epizootic NVND histopathology provided preliminary evidence of the spread of NVND to new geographic areas - important information for governmental agencies and the public.

NEUROTROPIC VELOGENIC NEWCASTLE DISEASE IN CORMORANTS: PATHOLOGY AND VIRUS CHARACTERIZATION. Scott D. Fitzgerald¹, Willie M. Reed¹, Monty Banerjee¹ and Brundaban Panigrahy². ¹Animal Health Diagnostic Laboratory and Dept. of Pathology, College of Veterinary Medicine, Michigan State University, East Lansing, Michigan 48824 USA; ²National Veterinary Services Laboratories, Veterinary Services, A.P.H.I.S., U.S. Dept. of Agriculture, Ames, Iowa 50010 USA.

An epizootic of mortality occurred in a nesting colony of double-crested cormorants located on Snake Island, Michigan. Affected juvenile birds were dehydrated and emaciated. Most birds had subcutaneous edema and hemorrhage, petechial hemorrhages in the skeletal muscles and brain, mottled enlarged and congested spleen and liver, and atrophied thymus and bursa. Histologically, principal alterations were severe lymphocytic meningoencephalitis and myelitis, lymphoid tissue depletion, and multi-systemic perivascular hemorrhage. The paramyxovirus isolated was inoculated into chicken embryos, and inoculated by 3 different routes into 6-week-old chickens to calculate pathogenicity indices. This highly pathogenic Newcastle disease virus has appeared in numerous Great Lakes localities and poses a threat to the health of free-ranging waterfowl throughout the Mississippi Flyway.

PATHOGENICITY OF MALARIA (*Plasmodium relictum*) IN EXPERIMENTALLY-INFECTED HAWAIIAN FOREST BIRDS. C.T. Atkinson, N. Yorinks, K.L. Woods, R.J. Dusek, and W.M. Iko. National Biological Service, National Wildlife Health Center, Hawaii National Park, HI 96718.

Field studies have shown that avian malaria (*Plasmodium relictum*) is significantly limiting native forest bird populations in Hawaii, but little is known about the direct effects of malaria infections on morbidity and mortality. We conducted challenge experiments with juvenile Iiwi (*Vestiaria coccinea*, N = 33), juvenile Apapane (*Himantopus sanguinea*, N = 16) and adult Common Amakihi (*Hemignathus virens*, N = 30) to measure the impact of this disease on morbidity and mortality. Birds were divided randomly into treatment and control groups and exposed to multiple infective mosquito bites (high dose), single infective bites (low dose) and uninfected bites (control). Mortality ranged between 50% and 100%, depending on species and dose, and was caused by intense malarial anemia and secondary shock. Both sex and initial body weight had significant effects on survivorship of Iiwi and Amakihi. Behavioral observations of infected Apapane identified changes in activity budgets of infected birds, with significant increases in sedentary behaviors that paralleled increased parasitemias and decreased body weight and fat levels. These observations confirm the lethality of malarial infections in Hawaiian birds and explain some of the current elevational distributions of these species.

PATHOLOGIC CHANGES CHARACTERIZING TWO UNUSUAL BALD EAGLE MORTALITY EVENTS IN ARKANSAS AND WISCONSIN, WINTER 1994-95. Nancy J. Thomas, Lou Sileo, Carol Meteyer, Kim Miller, and Lynn Creekmore, National Wildlife Health Center, 6006 Schroeder Road, Madison, Wisconsin 53711.

During the winter of 1994-95, two bald eagle mortality events attracted public attention. In each event, deaths occurred in a restricted geographic site over a several week period. In each event, the deaths of multiple birds