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Canadian Cooperative Wildlife Health Centre

Centre Canadien Coopératif de la Santé de la Faune

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News from the CCWHC

Work Underway at CCWHC

The CCWCH's first full year of operation was 1993. Nationwide, we examined 1107 diagnostic cases. During the year, regional centres handled 2000 information inquiries and participated in several major consultations for federal and provincial agencies. Our caseload increased by nearly 60% over 1992 and will probably continue to increase throughout 1994.

The **Wildlife Disease Investigation Manual** is now complete and most orders for the manual have been filled. Demand for the manual exceeded expectations and most of the initial copies have already been distributed. A second printing of the manual is planned for later this summer. The number of manuals printed will depend on the number of orders we receive. If you want to purchase copies of the manual, please return a copy of the attached order form before August 1.

Forensic (medico-legal) examination is a part of the diagnostic service offered by CCWHC. Staff from Western/ Northern, Ontario and Atlantic Regional Centres attended a workshop on Wildlife Forensic Techniques at the Western College of Veterinary Medicine, February 23-25 to keep abreast of developing techniques. Instructors included Bill Adrian, Colorado Division of Wildlife; Bob McClymont, Alberta Fish & Wildlife Services and Gary Wobeser, CCWHC. Subjects ranged from proper handling of physical evidence, identification of wounds and animal parts, to use of DNA analysis and other methods for identifying individual animals. The 96 registrants for the course were from wildlife agencies in Manitoba, Saskatchewan, and the Yukon; Parks Canada (wardens from seven provinces, the Yukon and the NWT); Canadian Wildlife Service; Saskatchewan Agriculture and Food; Agriculture Canada; five universities/ colleges; one Aboriginal Tribal Council; as well as five private veterinary practitioners and a coroner.

A new book, entitled **"Investigation and Management of Diseasde in Wild Animals"** written by CCWHC Co-director Gary Wobeser, was released in April by Plenum Publishing, New York. The book is the first to discuss techniques used when dealing with free-living animals.

Wildlife Pathologists at CCWHC

Trent Bollinger

Dr. Trent Bollinger is a wildlife pathologist at the Western/Northern region of the CCWHC in Saskatoon. Trent completed a BSc (Hon) in biology at the University of Saskatchewan in 1984 followed by a D.V.M. from the Western College of Veterinary Medicine in 1988. During his undergraduate training, he worked on various waterfowl projects for the Canadian Wildlife Service. After a year in private practice, he enrolled in a D.V.Sc. program in veterinary pathology at the Ontario Veterinary College. Trent joined the CCWHC in the fall of 1992. In addition to his routine diagnostic duties at WCVM, Trent has initiated studies of health problems in lake chub and Canada geese. Trent's interests include pathology and epidemiology of disease in free-living wildlife. He can be reached at 306-966-5153 or by E-mail at: Bollinger@Admin3.USask.Ca

Doug Campbell

In September 1993, Dr. Doug Campbell joined the CCWHC as a wildlife pathologist at the Ontario regional centre. He holds degrees in biology (University of Guelph) and urban and regional planning (Queen's University) and worked as a land use and parks planner for the Nova Scotia government. Doug obtained a D.V.M. from the Ontario Veterinary College in 1987, and worked in mixed animal practices in Ontario and Nova Scotia for several years. In 1992, Doug completed a D.V.Sc., followed by a fellowship year at WCVM in Saskatoon. His particular interests are infectious and zoonotic diseases of wildlife.

Feature Articles

An Outbreak of Duck Plague in New York State

An outbreak of duck plague occurred in waterfowl overwintering on the Finger Lakes in western New York state. Large numbers of waterfowl overwinter in the Finger Lakes. Shortly after the outbreak began, an aerial survey estimated 11,000 mallards, 3,600 black ducks, 10,000 redheads, 44,000 Canada geese, and lesser numbers of mergansers, canvasbacks, bufflehead and goldeneye in the Finger Lakes region. Many more pass through during migration. No cases of duck plague were confirmed in Canada during this outbreak. However, the severity of the outbreak and its proximity to Canada caused concern about its potential spread to Canada with returning spring migrants.

Duck plague, also known as Duck Viral Enteritis (DVE), is an acute disease of ducks, geese and swans. It is caused by a herpesvirus which is spread by direct contact between birds and by viral contamination of soil, water and vegetation. Because sick birds die quickly, large numbers of dead birds may be the most obvious sign of an outbreak; other

signs include avoidance of light, extreme thirst, droopiness, incoordination, bloody discharge from the nose, and watery diarrhea. Common postmortem lesions include hemorrhagic or necrotic bands or disks within the intestine, large amounts of blood in the digestive tract, and cheesy plaques in the esophagus and cloaca. Most infected birds die within two weeks of exposure. Birds which survive exposure may become carriers and are thought to cause subsequent outbreaks; identification of carriers is difficult. All outbreaks of duck plague have involved captive or semi-captive waterfowl and occurrences in wild waterfowl are believed to be spillovers of disease from captive birds.

The largest outbreak of duck plague in wild waterfowl occurred at Lake Andes, South Dakota in January of 1973. Approximately 40,000 mallards and many Canada geese died. Most other outbreaks have involved small numbers of wild birds.

The Finger Lakes' outbreak was first noticed on 17 February in black ducks and mallards on Seneca and Keuka lakes. The Wildlife Pathology Unit of the New York Department of Environmental Conservation (NYDEC) necropsied carcasses and identified gross lesions typical of DVE. Tissues from suspected cases were sent to the National Wildlife Health Research Laboratory in Madison, Wisconsin, where the herpesvirus of DVE was isolated. Representatives of various organizations concerned with the problem, including the Canadian Wildlife Service and the CCWHC, met at Montezuma National Wildlife Refuge in March. A response plan was developed, and was coordinated through the NYDEC Wildlife Pathology Unit. The plan involved collection and removal of carcasses, necropsies of mortalities, submission of samples to Madison for virus isolation, sampling of local populations of feral waterfowl and hybrids in an attempt to identify carriers of the virus, and initiation of a ban on feeding of waterfowl by members of the public.

In total, 1,421 birds were collected, including 854 black ducks, 353 mallards, and 124 Canada geese. Duck plague was confirmed in individuals from these three species, but not in any other species of waterfowl examined. Since early March, the outbreak has gradually tapered off, as ice broke up on the lakes and waterfowl dispersed. Drs. Doug Campbell & Ian Barker - CCWHC.

Snowy Owl Mortality on the Prairies

During early October, Western/Northern Regional Centre received reports of many sick and dead snowy owls in Saskatchewan and Manitoba. On checking, the same situation was found to be occurring in Alberta. A special effort was made to have specimens submitted to a diagnostic laboratory for necropsy and a protocol was prepared to collect standard information from birds submitted for necropsy. This was forwarded to veterinary diagnostic laboratories and to Dr. Margo Pybus, wildlife disease specialist with Alberta Fish & Wildlife, Services.

In total, 111 owls were necropsied: 53 at CCWHC Western/Northern Region in Saskatoon, (40 from Saskatchewan, 10 from Manitoba, 2 from the NWT and 1 from the Yukon); 56 in Alberta in a cooperative effort between Alberta Agriculture and Alberta Fish & Wildlife Services; and 2 at the Provincial Veterinary Laboratory, Winnipeg. The

peak mortality occurred in October and November, with few birds submitted after Christmas. 84% of the birds were juveniles and only 1 adult male was necropsied. The male:female ratio was approximately equal. The cause of death was not determined in 4 birds; of the remaining 107, 47 (44%) died of emaciation/ starvation and 51 (48%) died as a result of trauma, primarily vehicular. Five owls in Alberta died of electrocution. Avian cholera was found in 4 owls from southern Manitoba. These birds probably became infected by feeding on waterfowl carcasses during an outbreak of avian cholera in an area north of Winnipeg. Birds that died of trauma were generally in good body condition. Among the owls examined at Saskatoon, the average weight of those that died of trauma was 1293 g for males and 1535 g for females, compared to 875 g for males and 1115 g for females that died of starvation.

The reason for the large number of owls on the prairies, and for the high mortality, this past winter is unclear. Dr. C. Shank, Renewable Resources, Yellowknife reported that lemming numbers were high in many places on the tundra in the spring of 1993 but that numbers may have declined during summer. He suggested that owls may have produced many young because of the abundant food in the spring and that the juveniles were then unable to find sufficient food prior to migration. The death from starvation of birds in early October as they arrived on the prairies appears to fit with this suggestion. Information was provided by Dr. Gary Wobeser, CCHWC; Dr. Margo Pybus, Alberta Fish & Wildlife Services; and Dr. Jim Neufeld, Manitoba Department of Agriculture.

Disease Updates

Atlantic Region

Cluster of bat rabies in red foxes in Prince Edward Island

In late November/early December 1993, rabies was identified in 3 red foxes within a radius of a 2 km, in central PEI. These animals, all in poor body condition, included two adult males and one adult female. The virus was identified by the Animal Diseases Research Institute (Nepean, Ontario) as a strain that usually occurs in bats and was similar in the three animals. Bat rabies occasionally spills over to terrestrial mammals, including humans, but does not become established in terrestrial wildlife. Light microscopic examination of a mandibular salivary gland from the third fox revealed a nonsuppurative inflammation. Immunohistochemical examination of this gland demonstrated the presence of rabies antigen, and, on ultrastructural examination, a few viral particles compatible with rhabdovirus could be found. These observations suggest that rabies virus of bat origin can occur in the salivary glands of terrestrial mammals, thus establishing a potential means for limited transmission among these animals.

Adenoviral encephalitis in a red fox

An adult female red fox in good body condition submitted in late 1993, had an acute encephalitis caused by an adenovirus. This was confirmed by ultrastructural examination of the brain. This viral infection also occurs in dogs where it is known as Infectious Canine Hepatitis, because it affects mainly the liver. In foxes, however, the infection typically centers around small blood vessels of the brain. As a result of widespread vaccination, this disease is now seen only sporadically among domestic dogs and ranch foxes. Therefore, its occurrence in a wild fox, particularly an adult animal which, normally, should have a higher resistance to the disease, is unusual.

Carbofuran poisoning in herring gulls in Nova Scotia

In early September, approximately 50 herring gulls were found dead or moribund at a landfill site. Two juveniles, one immature and one adult were submitted for necropsy. All were in good body condition. In three of them, the stomach contained variable amounts of a white pasty material. Toxicological analysis of the stomach content from one of these birds revealed the presence of carbofuran, a neurotoxic carbamate insecticide.

Protostrongylid infection in a Newfoundland moose.

Tissues from a yearling male moose that died of starvation were submitted by the wardens of Terra Nova National Park for microscopic examination. The animal had a mild multifocal granulomatous pneumonia, in which unlarvated parasitic eggs and a single nematode larva were identified. The average size of the morulae within the eggs was 30.96 ± 3.0 μm. Adult parasites were not identified in the pulmonary tissue. These lung lesions are consistent with infection by a protostrongylid nematode. The genera associated with this type of infection include Protostrongylus, Parelaphostrongylus and Elaphostrongylus. The size of the eggs and the inability to identify adult nematodes makes the involvement of Protostrongylus species unlikely. The only species of nematodes within the two other genera that have been identified in Newfoundland are P. andersoni and E. rangiferi, and these have been reported only from caribou. The size of the eggs found in thie moose are within the range previously reported for both of these species, suggesting the possibility of a patent infection in this moose. The prevalence and significance of these parasites has not been studied in moose of Newfoundland. Drs. Pierre-Yves Daoust and Scott McBurney - CCWHC.

Quebec Region

Lead Poisoning in two Blue Jays

In late January, two blue jays were found dead near bird feeders in the St. Hyacinthe area and were submitted for autopsy. Both were in excellent body condition. The first bird had an impaction of the gizzard and proventricle. The second bird had a gastric impaction and

a cloacal distention. The only other gross lesion observed in these two birds was diffuse hemoseridosis of the liver. Hepatic hemoseridosis, which is characterized by an accumulation of hemosiderin pigments (iron) in hepatocytes, is often seen in birds. Although the origin of this lesion is unknown, it is common in lead poisoned birds. Gastro-intestinal impaction is also suggestive of lead poisoning. Due to the presence of 8.2 ppm of lead in the first bird's liver and 29.3 ppm in the other bird's, lead poisining is strongly suspected. The source of the lead has not yet been identified.

Adrenal lesions in St. Lawrence Estuary beluga whale

A high prevalence of adrenal gland lesions has been found in stranded beluga whales. Of 30 carcasses from the St. Lawrence Estuary population examined between 1987 and 1993, 21 animals had mild to severe adrenal lesions. Hyperplastic nodules (up to 2 cm in diameter) were found in the adrenal cortex of 10 adult belugas. Bilateral cortical cysts and vacuolar cellular degeneration were observed in adrenal glands of 15 belugas. The cysts, filled with a cortisol rich liquid, affected both males and females. Belugas with adrenal cysts were significantly older than belugas without cysts and the severity of the lesions increased with age. Nodular hyperplasia of the medulla was observed in 7 of the examined belugas. These nodules were usually observed in older animals. A pheochromocytoma (benign tumor of adrenomedullary cells) was also found in a 27 year old male. Potential causes include:

1. The adrenal changes found in belugas could be part of the normal aging process.
2. Various xenobiotics (such as some PAHs, DDT metabolites and PCB congeners) have experimentally induced cortical degenerative lesions in different domestic species. These compounds could be responsible for the adrenal degenerative lesions observed in the more highly contaminated belugas.
3. Hypoxia caused by pneumonia or prolonged agony could be involved in the nodular hyperplasia seen in the medulla.
4. Stress, which produces adrenal hyperfunction, could be a cause for the hyperplastic adrenal lesions and cortisol filled cysts.

This report stresses the need to increase our knowledge in wild animal endocrine physiology and pathology in order to better understand and identify the possible effects of xenobiotics in animal endocrine homeostasis.

Cancer in a Red-Tailed Hawk and a Northern Goshawk

During the last few months two cases of birds of prey with tumours have been diagnosed at our laboratory. A renal cell carcinoma (malignant tumour of the kidney) was diagnosed in a red-tailed hawk which died of septicemia 3 weeks after being found in Lavaltrie (near Montreal). The tumour was small, (2mm in diameter) and probably asymptomatic. The second tumour was found in a northern goshawk from Stanstead. The bird was found alive but had respiratory problems and died shortly. The left thoracic air sacs contained a white mass which infiltrated almost the entire left lung. The mass consisted of a dense network of papillae supported by a thin conjunctive stroma and lined by a layer of

occasionally ciliated cylindrical epithelial cells. This tumour is an adenocarcinoma of the air sac epithelium (malignant tumour of the air sacs). To our knowledge, these two tumours have never been reported in these species. Neoplasms, especially malignant ones, are very rare in wild raptors; of more than 500 raptors (wild) autopsied at the Faculté de Médecine Vétérinaire of St. Hyacinthe since 1987, these are the first two cases of tumours. Drs. Stéphane Lair and Daniel Martineau, CCWHC - Quebec region.

Ontario Region

Winter Mortality in Birds in Ontario

The winter of 1993-94 was harsher than recent winters in Southern Ontario, and likely resulted in increased in mortality of overwintering birds. Post-mortem submissions supporting this speculation included a number of individual birds which either had lesions directly attributable to exposure to winter conditions (e.g. frostbite, icing) or were emaciated and found in unusual circumstances. Species represented in this category include mourning dove, kingfisher, wild turkey, red-tailed hawk, and red-eared grebes. Newspapers reported incidents of mourning doves freezing during periods of cold temperatures, and several rehabilitation centres dealt with large numbers of grebes. Two larger die-offs of waterfowl, at Pickering and Nanticoke were investigated in more detail.

Pickering die-off:
Over a period of several days in late January and early February, during which a sleet storm was followed by rapidly falling temperatures, volunteers from the Avicare Bird Rehabilitation centre in Bowmanville, retrieved many sick and dead birds, primarily mallards and Canada geese, from a small backwater pond and the shoreline of Lake Ontario in Pickering, east of Toronto. Approximately 25 birds were submitted to the CCWHC lab in Guelph, and a selection of these were necropsied. The mallards were in extremely thin body condition. Body weight averaged 800 g, and most birds had severely reduced pectoral muscle mass and no fat stores. Other findings were non-specific: gastrointestinal hemorrhage, low numbers of a variety of parasites, and pancreatic and hepatocellular atrophy. No significant bacteria were isolated and tissue lead levels were not elevated. Many birds were found frozen to the ice in resting postures and some were coated in ice. Death was attributed to exposure and hypothermia as a result of emaciation due to negative energy balance. The Canada geese were in similar poor body condition. However, in 4 of 5 birds examined (2 from this incident, and 2 birds found dead later in February), elevated tissue lead levels were detected. Kidney lead levels were as high as 150 ppm dry weight. The ice storm and cold temperatures likely precipitated death in birds which were already in extremely weakened condition.

Nanticoke die-off:
Between 19-24 February, two episodes occurred in which groups of waterfowl, primarily greater scaup but also including Canada geese, bufflehead, merganser and mallard, were found dead at the Ontario Hydro generating station at Nanticoke on Lake Erie.

Approximately 30 birds were retrieved and submitted to the CCWHC lab in Guelph for post-mortem examination. At post-mortem, the greater scaup were all emaciated. The digestive tracts were largely empty; a few contained small numbers of molluscs, but there was little evidence of consumption of the zebra mussels which are so common in this area. Researchers from the University of Western Ontario and the Long Point Bird Observatory are performing further examination of gizzard contents. No significant bacteria were isolated from the scaup, and tissue levels of lead, mercury and cadmium were not significantly elevated. The majority of the birds were very heavily parasitized, with Echinostome and Strigeid flukes, and with tapeworms, and there was hemorrhage into the gastrointestinal tract of many. The lone merganser available for examination had a disseminated fungal infection. The liver contained 26 ppm of mercury (dry weight), indicating exposure but not intoxication. One Canada goose was examined Naticoke. Significant levels of lead were found in both liver (84 ppm dw) and kidney (87 ppm dw). It would seem that in this incident, as with the one at Pickering, birds with a variety of disease conditions, or birds merely in extremely poor body condition, were congregated at a single site, presumably because of the open water and relatively sheltered conditions, and succumbed there to some final event, whether hypothermia, trauma, or chronic lead poisoning.

Lead Poisoning in Waterfowl

In addition to the cases of lead poisoning in Canada geese from the die-offs at Nanticoke and Pickering, there have been several other post-mortem cases from Ontario in which lead poisoning was confirmed. These involved 2 Canada geese from Erin, a Canada goose from Guelph, a mallard from Hespeler (Cambridge) and a mute swan from Delhi, for a total of 10 confirmed cases. Tissue lead levels in these birds ranged as high as 189 ppm dry weight.

As well, there have been numerous cases in which lead poisoning was strongly suspected, based upon gross necropsy findings of esophageal dilation or impaction, gizzard erosion and emaciation, but in which tissue lead levels were not significantly elevated. The OVC wild bird clinic also reports an increase in the number of birds treated for lead shot ingestion.

This would appear to represent a significant increase in the number of lead poisoned birds detected. In the previous 5 years, the pathology lab at OVC confirmed lead poisoning in a total of 16 birds. The cause of this apparent increase is open to speculation, whether it represents more assiduous collection of sick birds, or whether, due to the unusually harsh winter conditions, waterfowl have spent more time foraging in lead-contaminated areas that, for one reason or another, have stayed open.

Sarcoptic Mange

Numerous cases of mange due to infection with mites, Sarcoptic scabei, have been reported this winter. Three wolves from the Gogama area were submitted for post-mortem. All were extremely emaciated and had extensive areas of hair loss. Sarcoptic

mites in low numbers were found by skin scrapings or by histopathology in these animals. Even small numbers of mites can cause serious skin lesions due to the inflammatory response of the host. In these animals, there was marked follicular atrophy and failure to regrow hair, perhaps as a consequence of poor body condition. A wolf from the Kenora area had marked hair loss on all lower limbs and regrowing hair along its flanks. Although no mites were identified on this animal, it is likely that it was recovering from mange.

Dr. Ed Addison, wildlife disease specialist with the Ontario Ministry of Natural Resources, has received reports of mange in wolves from the Geraldton and Red Lake areas, in coyotes from Sault Ste. Marie, Renfrew, Tweed, Bancroft and Chatham, and in a fox from White River.

Epizootics of mange have been reported in wild canids from a number of locations, and it is possible that this is what is being seen in Ontario. Human scabies reportedly occurs in 30 year cycles (Annual Review of Entomology, 1989, 34: 39-161); it is not known whether an analogous pattern occurs in wildlife. It is hoped that the filing of incident report forms on sightings of wild canids with mange-like conditions will eventually provide an indication of the extent to which this is true of wildlife populations.

A subjective impression, based upon a small sample of submissions, is that there may be species differences between the wild canid species in how they respond to mite infestation. Foxes seem to be most severely affected, coyotes slightly less so, and wolves least affected by the mites. Systematic examination of a much wider sample of specimens, of course, is needed to test this hypothesis. Entire carcasses, pelts or even fixed and frozen samples of skin from suspected cases would all be welcome. Drs. Doug Campbell and Ian Barker, CCHWC-Ontario Region.

Western and Northern Regions

Crop necrosis and impaction in lesser canada geese

Approximately 50 lesser Canada geese with impacted crops were reported from southeastern Saskatchewan during the fall 1993. The first was found September 23 near the Saskatchewan-Manitoba border by a conservation officer of Saskatchewan Environment and Resource Management. This bird was emaciated and weak. The condition was then recognized in hunter-shot geese by operators of 2 plucking/cleaning stations near Last Mountain Lake and the Quill Lakes. Carcasses were submitted to the CCWHC by members of the Canadian Wildlife Service. The last case, on October 28, was an emaciated goose observed being attacked by a bald eagle and then shot by a hunter. In total 22 lesser Canada geese were necropsied, all with similar findings. Body conditions of these birds varied from very good to severe emaciation. Lesions in the crop and lower esophagus varied from multifocal necrosis of the mucosa with inflammation, to extensive ulceration and fibrosis. In some cases, lesions extended into the surrounding

the esophagus. Crops and esophagi were distended with grain and small quantities of aquatic vegetation but, in most cases, there was no ingesta in the lower gastrointestinal tract. The mycotoxin, HT-2, was identified at concentrations between 0.53 and 1.72 g/g in 4 of 10 crop samples analyzed. This toxin is most commonly produced by species of Fusarium fungi growing on waste grain under cool and damp conditions. Consumption of HT-2 contaminated grain is thought to have caused esophageal necrosis and inflammation which resulted in impaction. Dr. Trent Bollinger, CCWHC Western/Northern Region.

Black-tailed prairie dog mortality

Ten black-tailed prairie dogs were found dead by park wardens in Grasslands National Park, southern Saskatchewan, on January 11, 1994. Two of these animals were not yet frozen indicating recent death. No open burrows were observed in the vicinity and temperatures had consistently been cold, with daytime highs rarely exceeding -10 to -15o C. Necropsy results indicated the prairie dogs were in moderate body condition. The only abnormal findings were severe pulmonary congestion, edema and hemorrhage which suggested they had been exposed to an irritant gas. No pathogenic bacteria were isolated. Deaths of several prairie dogs above ground is uncommon and in this case still unexplained. Any suggestions as to possible causes would be appreciated. Dr. Trent Bollinger, CCWHC Western/Northern Region.

Poisonings of birds in British Columbia

Phorate, an organophosphate insecticide used on potatoes, was responsible for the acute poisoning deaths of at least 5 Bald Eagles in the Fraser River delta area in B.C. Other affected eagles were successfully treated and released by local wildlife rehabilitators. Poisonings occurred mid-December which is difficult to explain since the insecticide is supposed to be applied only once at spring planting. There has been an immediate, voluntary withdrawal of THIMET 15G (containing phorate) by the manufacturer in hope that this will prevent further poisonings.

At the beginning of February, in an area adjacent to the eagle die-off, at least 80 Mallard ducks were found dead in a field containing vegetable harvest waste piles (potatoes, squash and cabbage). There was no evidence of infectious disease. Brain cholinesterase ranged from 0.17 to 2.22 uM/g/min (normal values are 7.0-11.0 uM/g/min). Liver and crop content pesticide analysis is pending. Environmental samples yielded traces of fensulfothion and parathion. The farmer willingly plowed under the plant debris and no further deaths have been reported. Dr. V. Bowes, Ministry of Food and Agriculture, Abbotsford, BC.

Online @ http://wildlife1.usask.ca/newsletters/newsletter2-2.htm