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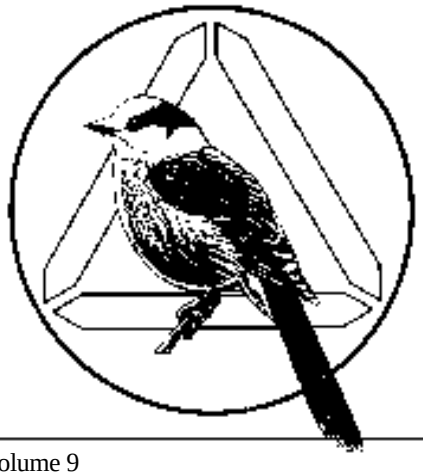

Wildlife Health Centre Newsletter

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Technical Bulletin: ***Drug Residues in Wild Meat - Addressing a Public Health Concern***

CCWHC Board Charts New Path Forward

A bigger and better CCWHC, with an expanded, more effective program for all sponsors and new capacity to respond to urgent disease issues is the vision that was endorsed on September 25th by the Federal-Provincial/Territorial Wildlife Ministers Council, meeting in Halifax. This approval by the Ministers marks a milestone in a path charted by the CCWHC Board of Directors at its annual meeting in May 2001. Recognizing that wildlife disease issues are growing in social importance and that the capacity of the CCWHC is severely over-taxed by the associated increase in demand for services, the Board asked that a management consulting firm be engaged to review the CCWHC and to prepare a business case for an organization that would meet national requirements. This work was completed in February 2002 and the general direction outlined in the business case was approved by the Board and by Canadian Wildlife Directors in May, by the Council of Wildlife Deputy Ministers in June, and by the Ministers in September.

The first step in this expansion plan has been the appointment of Ted Leighton to the newly-created position of Executive Director. Ted was a CCWHC Co-Director, together with Gary Wobeser, from the establishment of the CCWHC in 1992 to July of this year when he was appointed to this new position. New funds to support a full-time executive director were provided by the Canadian Wildlife Service and by the four veterinary colleges that are home to the CCWHC. The Executive Director position was created specifically to move the renewal initiative ahead. Meetings with sponsors to assess the current and

future service needs of each have already begun and will be the foundation for a Business Plan for the renewed organization. For their part, the Wildlife Ministers and their Deputy Ministers have undertaken to facilitate the establishment of interdepartmental arrangements within their respective governments whereby both the benefits and the costs of the expanded CCWHC program will be shared among government departments with public responsibilities in environment, wildlife, fisheries, agriculture and public health. These intergovernmental arrangements and the Business Plan are to be in place by March 2003 so that implementation can begin in the 2003-2004 fiscal year. A four-fold increase in activity is to be phased in over four to five years.

The staff of the CCWHC are keenly aware of the high demand for wildlife health services currently addressed to them, and they look forward with great enthusiasm to the new resources and personnel that will permit them to do better and more timely work, and to respond to urgent matters quickly and effectively. There also will be new opportunities in the renewed organization to provide advanced education to wildlife health specialists who will be needed by sponsoring agencies and others in increasing numbers to meet future challenges in wildlife health management.

The CCWHC, as a national partnership among multiple governments and the national system of veterinary education, is unique in the world. The integrated nature of the CCWHC, serving simultaneously as an academic centre of excellence in the biomedical sciences applied to wildlife and as a service centre for programs in federal, provincial and territorial governments offers combinations of sound science dissociated from policy, leveraged benefits from financial contributions and cost-efficiency that are unmatched elsewhere. Nowhere else has the national veterinary educational infrastructure embraced so firmly its social responsibility to apply its expertise to health and disease issues at the interface of wildlife, agriculture and public health. The path charted by the Board of Directors of the CCWHC and now actively endorsed by the Ministers is far sighted and visionary. The staff of the CCWHC are committed to this path and to this service to society.

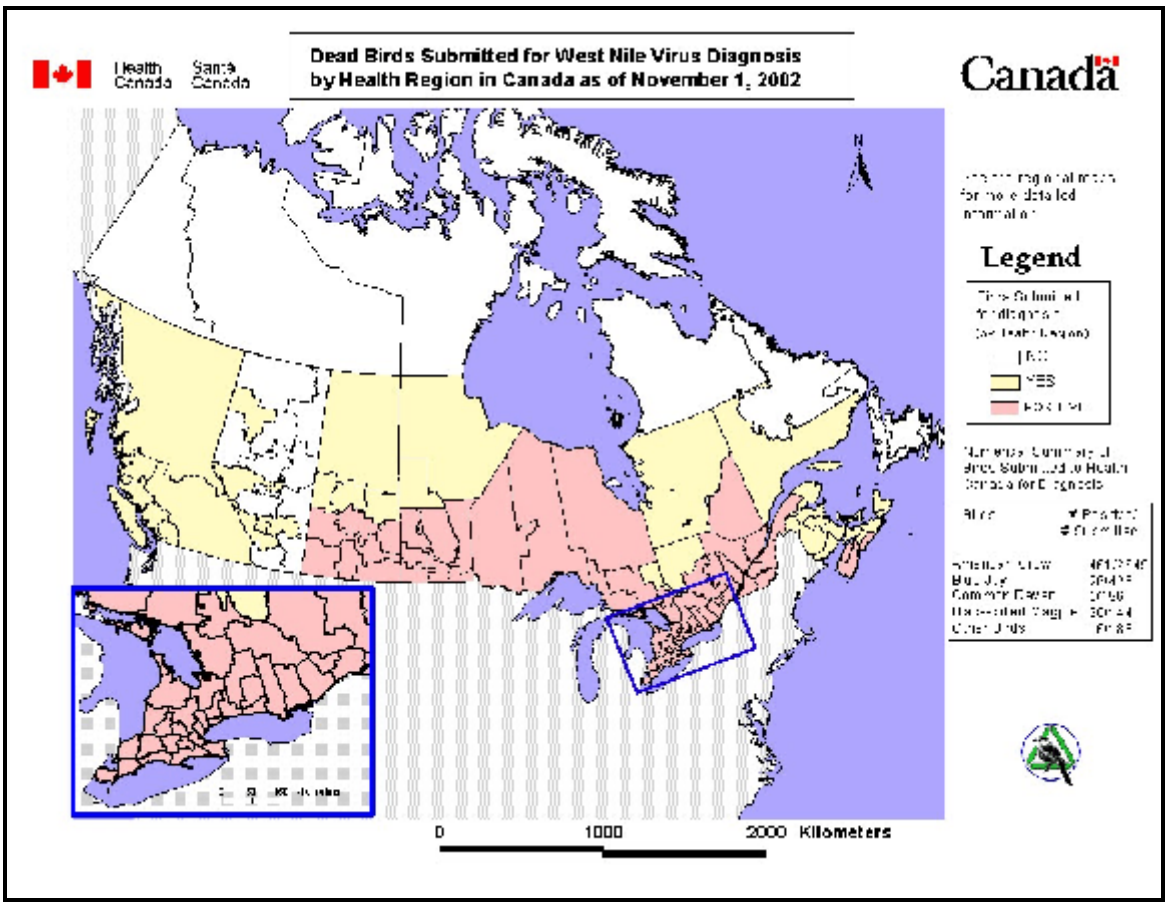
West Nile Virus Surveillance in 2002

The National Surveillance Program

Surveillance for West Nile virus (WNV) in wild corvids (members of the crow family) was carried out across Canada in 2002 through a multi-agency program coordinated by the CCWHC and including Health Canada and all provincial governments. As of November 1st, the program was nearly complete for the year, with active collection of birds continuing where mosquito activity persisted in southern British Columbia and with test results from some birds already sampled still pending.

The first bird positive for WNV in Canada in 2002 was an American Crow found dead in southern Ontario on May 19th, almost three months earlier than in 2001. As of November 1st, 3395 birds had been tested and positive birds had been identified in Nova Scotia (4 of 342 tested), Quebec (136 of 712), Ontario (256 of 985), Manitoba (88 of 494), and Saskatchewan (44 of 334). No positive birds had been identified in
Prince Edward Island (69 tested), New Brunswick (322 tested), Alberta (47 tested), or British Columbia (110 tested). Newfoundland was vigilant for corvid mortality but had no specimens requiring testing. Overall, 15% of birds tested in 2002 in Canada were positive, compared with 3.3% in 2001.

The wild bird surveillance program identified the locations of WNV activity weeks to months in advance of any infections that occurred in humans (or in horses). Thus, the program was highly successful in its primary purpose of giving health authorities ample lead time to implement appropriate public health responses to the virus.



(Aussi disponible en français)

West Nile Virus in Non-Corvid Species of Wild Birds and Mammals

There have been a number of articles recently in the popular and scientific press (Macleans, Science, ProMed) on the occurrence ofWest Nile virus (WNV) infection in non-corvid species of birds, especially raptors. During September, the Ontario & Nunavut Regional Centre of the CCWHC in Guelph received more than 30 raptors for autopsy. WNV has been detected in a number of these birds, although final confirmation of WNV still is pending for many of these. Thus far, WNV infection has been found, tentatively or definitively, in the following species:

Red-tailed Hawk	Great Horned Owl
Sharp-shinned Hawk	Blue Jay
American Robin	Great Black-backed Gull
Canada Goose	Ring Billed Gull

In addition to these wild birds, there have been a number of cases confirmed in birds held in captivity. These include Loggerhead Shrikes and several species of owls (Boreal, Snowy and Great Grey). In addition to these avian cases, WNV infection has been detected in Grey Squirrels by both PCR and immunohistochemistry and in a Muskrat by immunohistochemistry only.

There has been much speculation and many questions raised about the occurrence of WNV in free-ranging birds in North America this year, the most important of which are: which species are being affected; are there differences in species susceptibility; and will there be effects at the population level? None of these questions can be answered at this time. Differences in species susceptibility to WNV may become apparent over time, through laboratory or field studies. At present there are insufficient data to draw any conclusions. Questions also have been raised, particularly with regard to raptors, whether transmission of virus by modes other than mosquito bite can occur. One infected Red-tailed Hawk was found in winter in Connecticut when mosquitos were not active, thus suggestive that ingestion of infected prey may be a route of transmission. Bird to bird transmission has been demonstrated experimentally in crows, and may occur in other species that are shedding virus in body fluids or excreta and sharing roost sites. The role of parasitic hippoboscid flies as vectors of the virus also has become a topic of speculation and investigation. Hippoboscid flies have tested positive for WNV and are likely capable of transmitting the virus mechanically from bird to bird. These flies appear to have played a role in transmission of virus among birds at one rehabilitation centre where substantial

losses occurred this summer. Whether hippoboscid flies play a similarly important role in wild populations is not known.

Effects of WNV at the population level is even more difficult to assess. Population estimates for most wild species are approximate at best and only very large population declines due to any cause could be detected. Census programs and data from years without WNV may exist for certain populations, particularly for some endangered species, and this may enable assessment of the effects of WNV on these populations. During the winter of 2002-2003, some international meetings are to take place to consider the effects of WNV on wild species and lay plans for cooperative scientific assessment of this issue. (Doug Campbell - CCWHC)

DISEASE UPDATES

Atlantic Region

Brain disease in Newfoundland Moose infected with the "muscle worm" of caribou.

In early March 2002, an adult moose was shot south of St. John's, on the Avalon Peninsula, Newfoundland, after having been seen walking erratically in circles for about a week. This moose was in moderate body condition. The only abnormality observed on dissection was the presence of some free blood over the left side of the brain. Microscopically, however, there was a severe widespread inflammation of brain tissue (encephalitis) with a pattern suggesting migration of a parasite. A single cross section of a nematode worm was found in one of 12 sections of brain examined. The diameter of this nematode (about 185 µm) was compatible with that of *Elaphostrongylus rangiferi*, the "muscle worm" of reindeer and caribou that, in North America, is present only on the island of Newfoundland..

On the mainland of North America, lesions in the brain of this moose would suggest infection by the 'brain worm" or "meningeal worm" of white-tailed deer (*Parelaphostrongylus tenuis)*. However, there are no white-tailed deer in Newfoundland and the "brain worm" typically is 200-250 µm in diameter. Another similar parasite does occur in Newfoundland: the nematode worm *Parelaphostrongylus andersoni*. However, the adult stage of *P. andersoni* is only about 100 µm in diameter and typically is found in connective tissues around muscle. In its common hosts, caribou and white-tailed deer, pathological changes caused by this parasite have been found in muscles and lungs, but not in the brain.

This represents the first recognized case of natural disease caused by *Elaphostrongylus rangiferi* in wild moose of Newfoundland. This parasite was introduced into Newfoundland in the early part of the twentieth century through reindeer imported from Norway. To date, it has not been found on the mainland of North America. Adults of this parasite normally are found on the surface of various skeletal muscles and also in and around the brain. It is a well-known cause of neurologic disease in reindeer and domestic livestock in Scandinavia, and in Newfoundland caribou, particularly on the Avalon Peninsula. In moose in Newfoundland, adults of *E. rangiferi* occasionally have been identified in muscle. Neurologic disease, as in this case, has been produced experimentally in moose with *E. rangiferi.* (Hugh Whitney, Animal Health Division, Department of Forest Resources and Agrifoods, Newfoundland/Labrador; Pierre-Yves Daoust, CCWHC)

Insecticide poisoning in starlings and secondary poisoning in a bald eagle in Nova Scotia

On January 30, 2002, a bald eagle was found alive but very weak in Antigonish county, Nova Scotia, near a farm where seeds treated with carbofuran, a carbamate insecticide, were thought to have been used to kill pigeons (rock doves). The eagle died overnight. On February 12, a few starlings and a crow were found dead about 15 km southeast of where the bald eagle had been found. The crop content of one starling submitted for toxicological analysis contained 2,740 ppm of carbofuran. The brain enzyme acetylcholinesterase in this starling and in the crow showed a 90% reduction of activity, typical of poisoning with carbamate and organophosphate insecticides. The brain acetylcholinesterase activity in the bald eagle was depressed by 33%; its crop contained the remains of a starling and 3.5 ppm of carbofuran, also indicative of lethal exposure to carbofuran, most likely from treated seeds in the starling's digestive system. The use of insecticide-treated seeds to poison small birds in farm yards may have been widespread at that time in the region.

Secondary poisoning of carnivores and scavengers by a variety of poisons is a well recognized problem. In a similar instance in January 1992, 15 red-tailed hawks and 2 northern harriers were found dead in Kings County, Nova Scotia, as a result of having consumed starlings deliberately poisoned with carbofuran (see "Hawks killed by pesticide". JS Boates. *Conservation* - Nova Scotia Department of Natural Resources, vol 16, no 1, spring 1992). (Mark Pulsifer, Nova Scotia Department of Natural Resources; Pierre-Yves Daoust, CCWHC)

Extreme chronic injury caused by a snare in a coyote in Prince Edward Island.

In late February 2002, a 2 year old coyote was found alive but severely debilitated in Kings county, PEI, and was shot. Postmortem examination revealed that this animal had been caught in a snare, probably several weeks previously, and had managed to break the wire. It appeard that the snare had malfunctioned and the animal had then been able to turn its head and chew off the wire. The coyote was in poor body condition and its whole digestive tract was empty. A large area of the skin along the ventral side of its neck was missing and had been replaced by scar tissue. The snare wire had gradually cut its way deeply into the ventral neck and had passed completely through the wind pipe (trachea). The severed wind pipe had completely healed, but the inside diameter of the healed area was only **a** of its original size. At the time of the original capture, there must have been much pressure exerted by the wire on the soft tissues of the neck in order to drive it through these tissues. The main blood vessels of the neck, the carotid arteries and the jugular veins, were completely blocked by scar tissue. In coyotes and other members of the dog family, other arteries and veins are able to carry enough blood to and from the head to compensate for obstruction of these major vessels. The vagus nerves, essential nerves that pass through the affected area of the neck, were examined microscopically and appeared normal in general structure.

The exact cause of debilitation in this coyote was not clear. The marked reduction in size of its wind pipe may have reduced its stamina and prevented it from foraging efficiently. Its poor body condition, combined with the demands in energy imposed by the winter season, may have been sufficient to bring it to a moribund stage.

No method of harvesting wild animals can guarantee a humanely acceptable process every time. It is also very difficult to determine, with each method, the exact proportion of animals that end up undergoing prolonged suffering, either by chance (or lack of it) or as a result of inappropriate application of the harvesting method used. This case likely is a very unusual one. Nonetheless, it emphasizes the need for continued attention to appropriate training of hunters and trappers, in order to ensure that the humane harvesting techniques are used consistently to minimize undue suffering. This case also illustrates the extreme resilience of coyotes. (Pierre-Yves Daoust, CCWHC; Peter Nicholson, Atlantic Veterinary College, UPEI

Région du Québec

Racoon Distemper in Montréal

Urban racoons on the West Island of Montréal may have been hit hard this summer by canine distemper, a viral disease caused by a paramyxovirus that affects many species including skunks and dogs. Many dead raccoons were reported from Pointe-Claire and Beaconsfield on the West Island, Baie-d'Urfé on the South Shore

and l'Île Bizard on the North Shore, all located close to the shoreline of the St Lawrence Seaway or Lac des Deux-Montagnes (l'Île Bizard). Municipal workers collected dead racoons throughout these cities. Beaconsfield reported a total of 92 dead racoons between July and early November and Pointe-Claire reported 68 carcasses. 20 dead racoons were collected on a golf club located on Île Bizard. These 20 animals all were negative for rabies when tested by the CFIA. Two racoons from Beaconsfield were examined by the CCWHC – Québec Regional Center. Canine distemper was confirmed.

Canine distemper causes periodic epidemics in raccoon populations. Apparently no unusual numbers of dead racoons were reported in the eastern portion of Île Bizard. Racoons within a large park in this section of the city periodically are vaccinated by municipal employees against rabies, distemper, leptospirosis and are marked with an electronic implant. (André Dallaire, Stéphane Lair and Geneviève D'Amours, CCWHC - Quebec)

2001 Epidemic Mortality of Common Carp in the St Lawrence River

One of the largest recognized freshwater wildlife die-offs in recent Canadian history occurred in summer 2001 in the St. Lawrence River. From June 28 to July 31, 25,000 dead common carp (*Cyprinus carpio carpio*) were removed from the shores between Montréal and Québec City (approximately 200 km of shoreline). Total fish mortality was much higher, since shores were cleaned only in inhabited areas. The majority of affected fish were spawning adults of both sexes. Unusual environmental factors during this period included very high air and water temperatures and very low water levels.

Autopsies were performed by André Dallaire and Sébastien Monette at the Québec Regional Centre of the CCWHC and by Alain Laperle at the L'Assomption Provincial Diagnostic Laboratory (MAPAQ). Poisoning was considered unlikely because only one species was affected, and toxicological analyses for heavy metals and pesticides were negative. In approximately 40 fish examined, abnormalities were found in the gills and skin, and consisted of proliferation of tissue, inflammation and necrosis. In addition, inflammation of the brain was present in approximately half of fish examined. The Fish Pathology Group at the Atlantic Veterinary College (AVC) was consulted and considered these lesions unusual and not typical of any known disease of carp. Some kind of virus was suspected, but no virus could be identified in tissues from these fish examined at AVC.

Diagnostic work on the die-off has continued at the CCWHC. In the summer of 2002, an experiment was performed by Sébastien Monette, Elemir Simko (University of Saskatchewan) and André D. Dallaire (Université de Montréal), in order to determine if an infectious agent was involved in the mortality. Fourteen healthy spawning common carp were inoculated with tissues from sick carp from the 2001 die off. Six carp were used as controls and were treated only with sterile fluid. Mortality was significantly higher among the inoculated fish (36%) than in the control group (0%). Results are now being analysed to determine if the experimental carp had a disease similar to those from the St. Lawrence die-off. (Sébastien Monnette, Elmir Simko, André Dallaire, Alain Laperle)

Ontario Region

Epidemic Type E Botulism in Fish Eating birds – 4th Consecutive year

Type E botulism caused extensive mortality on both the Canadian and the U.S. sides of the Great Lakes again in the fall of 2002. While most mortality has occurred on Lake Erie, in 1999 and now again in 2002 there was significant mortality on Lake Huron. Species dying in the 2002 outbreak include common loons, red-breasted mergansers, red-necked and pied-billed grebes, gulls and shorebirds. Outbreak locations in 2002 included Kincardine on Lake Huron (the first episode on Lake Huron since 1999 and the furthest north yet), Rondeau in western Lake Erie (estimated 120 birds) and at Long Point in the central basin (estimated 500-600 birds, mergansers predominating).

Winter Songbird Deaths due to Salmonellosis

High mortality due to infection with the bacterium *Salmonella typhimurium* occurred in songbirds throughout central and mid-northern Ontario during the period of January to March 2002. Cases were initially reported from Grey and Bruce County, but over the succeeding weeks affected birds were reported and submitted from a broad geographic area extending from Lake Huron in the west through to the eastern tip of Ontario and northwards to the Parry Sound district. There was relatively little mortality reported in southern Ontario. Common redpolls were most often reported, but white-winged crossbills, house finches and pine siskins also were affected.

When dead birds were examined, the most common effect of infection was marked inflammation of the crop and stomach (proventriculus). The phage type (PT) U284 strain of the bacterium was isolated consistently from these birds. This phage type was last seen in a common redpoll from the Kenora area in 2000. PT 40 strain has been the predominant strain of bacterium in outbreaks involving redpolls in the past and also was found in a small number of birds from this year's epidemic. PT 160 is the strain which has been associated with house sparrows and it was found this year in a number of house sparrows and other birds from southern Ontario.

The factors that contribute to these periodic eruptions of salmonellosis in passerine birds are not known. Speculation has centred on factors such as warmer, wet weather, increased susceptibility to infection due to high population densities of birds, and increased rates of transmission due to artificial crowding at bird feeders. People reporting these events at backyard feeders were advised to discard feed in the feeders and to disinfect the feeders using a mild solution of chlorine bleach. Many people chose to discontinue feeding, particularly when cases occurred late in the winter. This infection also is transmissible to cats and dogs that may eat infected birds and to people if they do not take basic sanitary precautions (water-proof gloves, washing well with soap and water) when handling infected birds or cleaning feeders. Two cats that were vomiting and had fevers were found to be infected with the PT U284 strain during the Ontario outbreak in song birds and similar sharing of infections among birds, cats and people was reported in 2000 in Sweden (*Journal of Small Animal Practice, 2000, 41: 339-341)*. Doug Campbell (CCWHC Ontario) , Bob Gray (MNR, Owen Sound), Jeff Robinson (CWS, London)

Late spring deaths of purple martins due to cold weather

In late May, many purple martins died across a wide band of southern Ontario, from Lake St. Clair eastward across southern Ontario. People with martin houses reported seeing birds that were sick, weak and listless and died shortly thereafter. A number of dead martins were examined at the CCWHC laboratory in Guelph. The most significant finding was severe emaciation. Birds weighed an average of approximately 30g (normal weight is about 55g). In addition to severe muscle wasting and total absence of fat, none of the birds had eaten recently, and their upper digestive tracts contained dark red-brown fluid, suggestive of gastric bleeding.

Southern Ontario experienced a cold, wet spring and there was likely a severe shortage of insects. Purple martins eat only insects which they catch on the wing. According to people familiar with purple martins and who maintain colonial bird houses to attract these birds, purple martins will not accept substitutes for live, flying insects, and are thus poor candidates for rehabilitation or supplementary feeding during inclement weather such as occurred this year.

More information on purple martins, including emergency feeding measures, can be found at **www.purplemartin.org.** Doug Campbell (CCWHC, Ontario)

Collision of migratory songbirds with a radio tower

Personnel from CFB Trenton, at the eastern end of Lake Ontario, collected and submitted through the Ministry of Natural Resources, a total of 74 songbirds found dead at the base of a radio tower one morning in early May. The birds collected included 3 species of thrush, 6 species of warbler, a yellow-bellied flycatcher, grey catbirds, a rose-breasted grosbeak and a scarlet tanager. All birds had severe traumatic injuries, including fractured long bones and sternum, hemorrhage in the skull, and extensive hemorrhage and bruising of soft tissues.

Collision of birds with towers and their supporting cables is a problem which is well documented. It has been estimated that millions of songbirds are killed annually by collisions with communications towers. Collisions are thought to occur by two separate mechanisms. In blind collisions, birds simply do not see the tower and its cables and fly into them. Other collisions occur because the birds are actually attracted by the tower lights. On overcast nights when stellar cues

are not available to guide the birds' navigation, they may be attracted by the lights of communication towers, and collisions occur as more and more birds congregate in the area.

Mortalities of this sort have been regularly monitored for years at some tower sites in the United States. The same sort of phenomena occur at tower sites in Canada, but have not been as regularly recorded. The Fatal Light Awareness Program (FLAP) of Toronto has been monitoring songbird deaths due to collision with office towers for several years, and has attempted to raise public awareness of this issue. Many new communication towers are being built because of demands for cellular telephones and high-definition television, so it is possible that the bird mortality from tower collisions is increasing. More information on communications towers and bird collisions may be found at**: www.towerkill.com.** Doug Campbell (CCWHC, Ontario), Michael Friar (CFB Trenton) and Monique Pigeon (MNR, Kingston)

Western/Northern Region

Range Extension for Chronic Wasting Disease in Wild Deer in Saskatchewan

Chronic Wasting Disease (CWD) has been detected in two wild mule deer (Odocoileus hemionus) shot by hunters in the fall of 2002 near the South Saskatchewan River north of Swift Current. This is a new location for CWD in wild deer in the province and is approximately 250 km from the location where CWD was diagnosed in the past in three wild mule deer. Diagnosis in the most recent cases was based on demonstrating abnormal prion protein in tonsils. In one deer, lesser amounts of abnormal prion protein was detected in the obex of the brain, whereas in the other deer, brain tissue was not available for testing. Research has shown that testing of tonsils and specific lymph nodes in the head of white-tailed deer and mule deer are equal to, if not superior to, testing brain. This does not appear to be the case in elk. The option of testing tonsil, lymph node and/or brain has meant that more hunter shot animals are suitable for testing. This new occurrence indicates that CWD in wild deer in Canada is not restricted to a single geographic location and highlights the importance of continued surveillance in order to determine the geographic range and movement of this disease. Kevin Omoth - Saskatchewan Environment, Keith West, Prairie Diagnostic Services, Trent Bollinger - CCWHC

Lead Poisoning in Trumpeter Swans in British Columbia

At least 360 swans died from ingesting lead shot on the Sumas Prairie, British Columbia and Whatcom County in adjacent Washington State during the two winters of 1999-2001, and at least 326 died in the winter of 2001-2002. During the winter of 2001-2002, the Canadian Wildlife Service (Environment Canada) coordinated an international initiative among 14 stake-holder groups to locate and neutralize the source of lead shot and stop the swan mortality. Swans were captured and fitted with radio-collars upon arrival on these wintering grounds and were followed to identify major foraging areas. The most highly used forage fields and roost sites were examined for the presence of lead shot.

Seventy-two percent of swans found dead were recovered in Washington State. An average of 34 shot pellets was found in each gizzard of the 78 dead swans examined; one swan had 328 pellets. Of shot samples examined thus far, the majority is lead, followed by steel, tungsten-matrix and some bismuth. Size of shot suggests that skeet shooting and upland game hunting are not likely sources. Results obtained to date suggest that the main source of lead is located on the Washington State portion of the study area.

Significant progress has been made towards locating the source of the lead responsible for the swan mortalities through the dedication and hard work of many individuals and organizations, including the Central Valley Naturalists (particularly Johanna Saaltink, Gerry

Powers, Dick and Margaret Bunbury, Maria-Carmen Brackhaus, Glen Ryder, Norma York, Lynn Miller) and other local naturalists (Annabelle Remple, Darlene Mawson, Gloria Bannister) who conducted many of the population surveys. The project will continue in the winter of 2002-2003. (Abstracted from the Newsletter of the Central Valley Naturalists provided by Laurie Wilson, CWS, Delta BC; used with permission.)

High Moose Mortality from Winter Tick - Spring 2002.

In the winter and spring of 2002 there were significant losses of moose in certain regions of western Canada and in other parts of North America. And, as is often the case, winter ticks were involved in some way. Qualitative information presented here also suggests that losses in some areas may have exceeded the losses reported in the last major die-off period, winter 1998 – 1999 (*The Moose Call*, volume 11, May 2000; *Canadian Cooperative Wildlife Health Centre Newsletter*, Winter 1999 issue, Volume 6, Number 2). Here are some provincial summaries:

In British Columbia, Helen Schwantje reported relatively low losses overall. In Alberta, Margo Pybus and Ann Hubbs canvassed the province and report significant mortality in local moose populations, but nothing like losses in 1998 – 1999. Mortality was concentrated along the southern boreal fringe and in central aspen parklands. Many losses, lots of hair loss and many ticks on moose were reported near Athabasca, Barrhead, Evansburg, and the usual hotspot regions of the northwest, Peace River – Grande Prairie. Many calves died, most in late April and well into May.

In Saskatchewan, moose died in strange places - for example near Kindersely in the southern grain belt. The number of reports of moose with little hair due to ticks in the Porcupine Plain area was well above average, and in neighboring areas mortality estimates of up to 50% of the local population were reported. As is often seen in early spring die-offs of moose in the west, affected moose were found in woodsheds, under decks, among yard shrubs, in cattle shelters, and in small dugouts. Most such animals later were found dead . Most mortality was reported between mid-March and late April, but some reports came in during most of May also.

In Manitoba, Vince Crichton reported that many moose died from the ravages of ticks in western Manitoba from the Turtle Mountain area in the south to the Porcupine Mountain area further north. Well in excess of 150 reports of dead moose were received and indicate that adult bulls, cows and yearlings all were affected. During fall 2002, there have been many reports from the Turtle, Riding, Duck and Porcupine Mountains about the small number of moose being seen by hunters. In Riding Mountain National Park, where, in the past, fall counts during week-long observation periods made after 15 September have shown highs of 110 and lows of 60 moose, this year's fall count was only12 moose. Maine and New Hampshire also reported considerable moose mortality associated with heavy winter tick infestations.

Compiled by Bill Samuel (University of Alberta), Vince Crichton (Manitoba Conservation) and Ted Leighton (CCWHC) from information provided by Ty Andrychuk (Saskatchewan Environment), Vince Crichton, Margo Pybus (Alberta Wildlife Branch), Helen Schwantje (B.C. Wildlife), Bill Samuel and Ted Leighton.

Avian Cholera in Double-crested Cormorants

In August 2002, outbreaks of avian cholera (infection with the bacterium *Pasteurella multocida*) occurred in at least two large nesting colonies of Double-crested Cormorants (*Phalacrocorax auritus*) in the southern boreal forest of Saskatchewan. Colony sites affected were on Heron Island on Lavallée Lake in Prince Albert National Park, and on Island A on Doré Lake, about 100 Km to the northwest. Both sites are monitored regularly for occurrence of Newcastle Disease (ND). The Doré Lake site was visited on May 30, July 28, August 16 and August 31. Only minor mortality, and none due to avian cholera, was evident on the first three visits. However, on August 31st , 1081 dead cormorants were counted on the island, together with 110 dead American white pelicans, and 33 California and herring gulls. Approximately 90% of the dead cormorants were fully-grown young of the year and 10% were adults. Multiple specimens of all species were examined, and *Pasteurella multocida* was isolated from most individuals.

The Lavallée site was visited on 19 August and over 100 dead cormorants were seen together with a few dead pelicans and one dead ring-billed gull. *Pasteurella multocida* was isolated from dead specimens of all three species. On a visit to the site on 28 September, 1079 dead cormorants were counted. These carcasses were too decomposed for diagnostic examination.

At both sites, cormorants were the main species affected. Total mortality could not be estimated accurately. At Doré Lake, dead cormorants were found floating in dense emergent vegetation distant from the colony site and it is likely that many birds died away from the sites. From 1994 to 2000, the average population of nesting adult cormorants on Island A has been about 13,000 birds, and, on average, 1.2 young fledge from each nest (data from T. Kuiken). Thus, the average total cormorant population on Island A in August would be approximately 21,000 birds. If it is assumed that the dead birds counted on Island A represent one quarter or one half of total mortality, then mortality rates were 50% or 25% for young of the year and 3.3% or 1.7% of adults.

Avian cholera occurred in similar epidemics on Island A and at neighbouring colony site (Kazan Lake) in 2000. (Dan Frandsen, Parks Canada; Ted Leighton, CCWHC)

***Bartonella* in Ground Squirrels in Saskatchewan.**

Bartonella spp. are Gram negative bacteria that parasitize the red blood cells of their host. Members of this genus are the causative agents of a variety of human diseases including trench fever (*B. quintana*) and cat scratch disease (*B. henselae*). *Bartonella* spp. have been isolated from a variety of wild animals including rodents, and there is increasing interest in rodent associated *Bartonella* as emerging human pathogens. High titers to rodent associated *Bartonella* have been found in people from Manitoba with undiagnosed fever and hepatitis. A preliminary survey of Richardson's ground squirrels (*Spermophilus richardsonii*) was undertaken to see if *Bartonella* occurred in rodents in Saskatchewan. Twenty-five (43%) of 57 ground squirrels sampled in the summer of 2002 were infected with an as of yet unidentified species of *Bartonella*. Work is currently underway to characterize the isolates that were found and relate them to species of *Bartonella* that have been found elsewhere. (Claire Jardine, CCWHC)

ANNOUNCEMENT

The 2003 annual scientific meeting of the **Wildlife Disease Association** will take place in Saskatoon, SK on August 11th to 14th. In addition, there will be a preparatory course for examination candidates offered by the **American College of Zoological Medicine** on August 10th and an **International Workshop on Chronic Wasting Disease** on August 15th. For complete information, check the conference web site in January 2003 <**http://wildlife.usask.ca/WDA2003>.**

The Canadian Cooperative Wildlife Health Centre was established and is supported by: Environment Canada; the Provincial and Territorial wildlife departments; the Ontario Ministry of Health; Heritage Canada; the Max Bell Foundation; the Canadian Wildlife Federation; Ducks Unlimited Canada; DowElanco Canada Inc.; Novartis Crop Protection Inc.; AgrEvo Canada Inc.

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INDEX OF RECENT BACK-ISSUES

Vol 6-1 a) News b) "Emerging Diseases" *Disease Updates: Atlantic* - Spinal cord degeneration in a bald eagle - Common loon killed by a bald eagle - Mass stranding of long-finned pilot whales on PEI - Congenital limb deformity in a red fox; *Quebec* - Mycoplasmosis epidemic in evening and pine grosbeaks - Fatal *Sphaeridiotrema pseudoglobulus* infection in lesser scaups; *Ontario* - Aspergillosis in mallard ducks - Septicemic Pasteurellosis in elk - Trumpeter swans in Wye Marsh - Long-eared owls - Canada Geese, Unusual Cases; *W/N Region* - Poisoning of Bohemian Waxwings - Polioencephalomalacia in deer and pronghorns - Brucellosis in marine mammals of Arctic Canada

Vol 6-2 a) News b) West Nile Virus and other Zoonotic Arboviruses in North America *Disease Updates:* Canada-wide Epidemic of Winter Tick in Moose *Atlantic* - Mortality among great black-backed and herring gulls in the Maritime provinces - Intraspecific killing in common loons; *Quebec* - Pox virus and multiple tumors in a grey squirrel - Circovirus infection in a rock dove - Fatal *Sphaeriotrema* sp. Infection in lesser scaup - part II; *Ontario* - Botulism type E in fish-eating birds, Lake Erie and Lake Huron - Gull Mortality - Kitchener; *W/N* - Pneumonia and septicemia in Dall's sheep, Mackenzie Mountains, NWT, 1999 - Mountain sheep in British Columbia.

Vol 7-1 a) News b) Dorsal-spined Larvae in Cervids *Disease Updates*: *Atlantic* - Organophosphate pesticide poisoning of seagulls - St. John's, Newfoundland - Successful euthanasia of a juvenile fin whale - Psittacosis in wild rock doves; *Quebec* - Walleye myopathy - The St-Lawrence beluga whale: summary of lesions detected in stranded individuals submitted for necropsy during 1999; *Ontario* - No articles available; *W/N* - An epizootic of iridovirus in Oregon spotted frog tadpoles (*Rana pretiosa*) - Epidemic avian cholera in cormorants in Saskatchewan - Winter ticks in Stone's sheep - California bighorn sheep in British Columbia.

Vol 8-1 a) News b) Radio-telemetry for detecting and understanding disease - Update on West Nile Virus in North America *Disease Updates: Atlantic* - French heartworm in red fox and domestic dogs in Newfoundland - Raccoon rabies reachew New Brunswick - Neurological disease in moose in Nova Scotia - *Quebec* - Brain abscesses in white-tailed deer - *Ontario* - Suspected predation by ravens on nesting painted turtles - *W/N* - Marine mammals in British Columbia - Chronic wasting disease in free-ranging mule deer in Saskatchewan

Vol 8-2 a) News b) Research Group for Arctic Parasitology (RGAP): Heading North with CCWHC. Enhanced

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passive surveillance for West Nile Virus infection in wild birds in Canada - 2001. *Disease Updates: Atlantic* - Barbiturate poisoning in a bald eagle - Newcastle disease in pigeons, PEI - Avian tuberculosis in a thick-billed murre - Lyme Disease in Newfoundland; *Quebec* - Type C botulism outbreak on the shore of the St. Lawrence; - *Ontario* - Suspected cyanide poisoning in birds - Ethylene glycol - zinc phosphide - Type E botulism, Lake Erie - Parvovirus in raccoons - Canine distemper virus in mustelids; *W/N Region* - Newcastle disease and avian cholera in cormorants without epidemic mortality - polioencephalomalacia in wild ungulates

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PUBLICATIONS

1. ***Wildlife Health Centre Newsletter/Bulletin du centre de la santé de la faune***
2. ***Wildlife Disease Investigation Manual/Manuel d'enquête sur les maladies de la faune ($15)***
3. ***Surveillance of Wild Animal Diseases in Europe ($10)***

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