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Wildlife Health Centre Newsletter

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International Polar Year 2007/2008 – What's in it for Wildlife Health?

International Polar Year (IPY) is an internationally coordinated research campaign focused on the Arctic and Antarctic regions. Lasting from March 2007 until March 2009 (to cover 2 full annual polar cycles), it is an intense period of interdisciplinary research that will provide a record of the state of the polar regions during this time period. Co-sponsored by the International Council for Science & the World Meteorological Organization (WMO), IPY involves thousands of scientists from over 60 countries. Research projects are focusing on the physical, biological and social states of the Arctic & Antarctic regions. This is the fourth International Polar Year, with previous IPYs in 1882/83, 1932/33, and 1957/58.

IPY is timely - it is occurring during a time of abundant and rapid change in the polar regions. From a global perspective, the North has seen some of the fastest warming in recent decades. According to the Arctic Climate Impact Assessment, the mean annual surface air temperature over the past 50 years has increased 2 to 3°C (3.6 to 5.4° F) in Alaska and Siberia, and the mean annual surface air temperature over the Arctic region (north of 60° latitude) is projected to increase 2°C (3.6°F) by 2050 and 4.4°C (8° F) by 2100. Reductions in the extent and mass of glaciers, area, timing and duration of snow cover, and extent and thickness of sea ice all have significant and immediate consequences for the local wildlife and human populations. While these changes are having significant impacts on local populations, the effects are far from local – the consequences will be felt globally.

Objectives of IPY

- Data collection – create a baseline of the current state of the polar regions and lay a foundation for major scientific advances
- Increase public awareness of the polar regions
- Actively engage young earth scientists in polar research
- Create international scientific research networks
- Leave a legacy of observation sites, scientific facilities and systems for ongoing research

Structure of IPY Projects

There are 166 scientific research projects and 52 education and outreach projects that are endorsed internationally by IPY. Projects focus on the Arctic, Antarctic, or both regions. The categories for the scientific projects are earth, land, people, ocean, ice, atmosphere and space.

Within each endorsed project, there are many related studies led by individuals or teams from a multitude of countries. This structure has been established to increase the networks, sharing of information and collaboration between scientists internationally. For a comprehensive list of internationally endorsed projects, see <http://classic.ipy.org/development/eoi/>

Canada's Role in IPY

Canada is a host nation for IPY, and is the lead country in 46 of the 228 endorsed projects. In addition, Canadian researchers are participating in a majority of scientific, education and outreach projects (see IPY honeycomb chart for details <http://www.ipy.org/ipycharts/ipychart5.canada.pdf>)

Projects funded by the Government of Canada focus on two main areas – 1) science for climate change & adaptations, and 2) health and well-being of northern communities. There are 44 IPY projects funded by the Government of Canada (www.api-ipy.gc.ca/intl/index_e.html) and 11 IPY projects funded by the Natural Sciences and Engineering Research Council (NSERC). (<http://www.outil.ost.uqam.ca/CRSNG/Outil.aspx?Langue=Anglais>)

Endorsed IPY Wildlife Health Projects with Canadian Participation

Several IPY projects investigate the dynamics of natural sciences and the influence of climate change. Polar bears, seals, beluga whales, caribou and birds are a few of the key species investigated with a view to compose an accurate picture of the health of the polar ecosystems, as well as the effects of climate change on these systems and the animals within them. The following funded IPY projects directly address wildlife health issues and have Canadian

participation. The CCWHC is a partner in these studies, and serves as a resource of expertise in wildlife health as well as providing access to its national wildlife disease database.

Project Title: Engaging Northern Communities in the Monitoring of Country Food Safety (IPY 186) Activity Leader: Manon Simard, Makivik Corporation, Kuujjuaq, Quebec

Summary: Objectives of this project are to create Arctic community-based laboratories to provide rapid diagnosis of *Trichinella nativa*, *Toxoplasma gondii*, Anisakidae worms and *E.coli* O157:H7, and to increase knowledge on the safety of harvested country foods. We propose to achieve this goal by providing training and equipment to northerners in order to facilitate local testing for these diseases. Communication of results will be prepared in collaboration with the regional public health organizations to provide recommendations on food safety in relation to traditional practices. These data will also contribute to baseline information on the distribution and prevalence of these parasites. Over time, this monitoring will be better able to assess the effect of climate change on these diseases. When this system is in place, it will provide a template for future wildlife health and zoonosis projects. Link: <http://classic.ipy.org/development/eoi/proposal-details.php?id=186>

Project Title: Starting the clock for the CARMA (CircumArctic Rangifer Monitoring and Assessment) Network: Impacts on Human-Rangifer Systems in the Circumarctic (IPY 162) Activity Leader: Don Russell, Environment Canada, Canada

Summary: The CARMA Network is an international, interdisciplinary network of scientists, wildlife managers, and community representatives whose goal is to better understand the impacts of changes in the Arctic on *Rangifer* (wild caribou and reindeer) herds and the people who depend on them. Throughout IPY, the CARMA Network will work to improve understanding of the vulnerability of human- *Rangifer* systems to climate change and other anthropogenic and natural change. Comprehensive health assessment and comparison among different *Rangifer* populations around the Arctic during IPY will provide a set of natural experiments that will help unravel the various factors influencing the health of human-*Rangifer* systems. Link: <http://classic.ipy.org/development/eoi/proposal-details.php?id=162>

Project Title: Validation and Application of Dried Blood on Filter Paper Techniques for Surveillance of Infectious Diseases in wild Caribou and Reindeer (affiliated with IPY 162)
Activity Leader: Susan Kutz, Faculty of Veterinary Medicine, University of Calgary and CCWHC

Summary: Infectious diseases play an important role in the health and dynamics of caribou and reindeer populations around the Arctic and, in turn, on the people who depend on wildlife for sustenance. This project focuses on developing and applying simple and user-friendly techniques for ongoing, community-based, disease detection and surveillance in wild *Rangifer* populations. In remote regions and under harsh conditions (environmental extremes), collection of blood samples on filter paper is far more practical than collection of blood in test-tubes and subsequent processing. The use of 'blood collected on filter' technique will be validated for pathogen surveillance in caribou, and local hunters will then be trained and employed to use filter paper to collect blood samples from caribou that they harvest for subsistence purposes. This work complements the CARMA project and will facilitate widespread, comprehensive, community-based sampling effort of wild *Rangifer* for infectious diseases during IPY and beyond.

Project Title: Polar Ecosystems in Transition: An Interdisciplinary Investigation into the Impacts of Climate Change on Polar Bears (affiliated with IPY 134) Project Leader: Elizabeth Peacock, Government of Nunavut

Summary: This project's objective is to gather scientific and Inuit knowledge on changes in polar bear ecology. The project will examine foraging ecology (changes and variations in terrestrial feeding, and the correlation of seal and polar bear growth) in four populations. The study will also record Inuit knowledge related to the subject in one of the populations. Finally, the study will examine how the accumulation of contaminants in one population has changed with increasing temperatures.
Link: (www.api-ipy.gc.ca/intl/index_e.html)

This study contributes to the broader IPY project Polar bear (*Ursus maritimus*) Circumpolar Health Assessment in Relation to Toxicants and Climate Change led by Denmark
Link: <http://classic.ipy.org/development/eoi/proposal-details.php?id=134>

Project Title: Effects of Global Warming on Polar Bears, Seals & Whales
(Affiliated with IPY 26 and 155) Activity Leader: Steven Ferguson, Fisheries and Oceans Canada

Summary: This research project will investigate the ability of marine mammals to adapt to global warming and to survive into the future. The project team will study the relationship between climate warming and the survival and reproductive success of polar bears, seals, and whales. The team will use satellite telemetry to investigate movement, tissue samples from hunters to determine diet, and new technologies like genetics and modeling to better understand impacts of change on these species. Knowing how polar bears, seals, and whales adapt to shrinking sea ice may provide clues for their conservation. Link: (www.api-ipy.gc.ca/intl/index_e.html)

This study contributes to two broader IPY projects lead by Norway: *Ecosystem Studies of Subarctic and Arctic Regions (ESSAR)* (<http://classic.ipy.org/development/eoi/proposal-details.php?id=155>) and *The Pan Arctic cluster for Climate forcing of the Arctic Marine Ecosystem* (<http://classic.ipy.org/development/eoi/proposal-details.php?id=26>)

Project Title: Health of Arctic and Antarctic Bird Populations IPY 172
Activity Leader: Maarten Loonen, Arctic Centre, University of Groningen, The Netherlands

Summary: The polar regions are considered to have relatively low levels of pathogens, parasites and pollution. Migratory birds linking temperate regions with the Arctic are potential vectors of diseases as shown by the recent spread of West Nile virus and Avian Influenza, diseases which are threatening domestic animals and humans. Using individually marked wild birds, this project will examine immune function and the occurrence of pathogens, antibodies, parasites and pollutants in wild birds in the Arctic and Antarctic.
Proposal Link: <http://classic.ipy.org/development/eoi/proposal-details.php?id=172>
(For Canadian consortium members of this project, please see the proposal link)

The previously-mentioned studies will contribute significantly to a comprehensive picture of the current state of wildlife and human health in the Arctic. Together with other IPY studies on the physical, biological, and social states of the polar regions, this research campaign will leave a legacy of knowledge, networks, and infrastructure on which future generations can build.

Relevant web sites

International IPY site www.ipy.org/

Canadian IPY site www.ipy-api.ca/

IPY database search engine <http://classic.ipy.org/development/eoi/>

Natural Sciences and Engineering Research Council of Canada (NSERC) <http://www.nserc-crsng.gc.ca/>

(Laura Skorodenski and Sue Kutz, CCWHC, University of Calgary)

Viral hemorrhagic septicemia virus (VHSV) type IV 'b' in the Great lakes - an update.

VHSV was discovered initially in Lake Ontario in 2005 associated with a mortality event in freshwater drum (Lumsden et al. 2007) and during 2005-2007 has been subsequently identified in Lakes Ontario, Erie, St. Clair, Huron and, most recently, in Lake Michigan. It also recently has been detected in inland fresh water bodies in New York, Michigan and Wisconsin, and, most recently, in the Thames River in Ontario. This latter sample was part of the Canadian VHSV surveillance effort by CFIA/ DFO (Canadian Food Inspection Agency/Department of Fisheries and Oceans) and OMNR (Ontario Ministry of Natural Resources) that is to be performed over 2007/8. From archived samples of muskellunge from Lake St. Clair, the virus is now known to have been present since at least 2003 (Elsayed et al. 2006). VHSV IV'b' is genetically approximately 96% similar to VHSV IV'a', which is considered to be endemic along the Pacific coast of North America. VHSV type IV is also present on the Atlantic coast of Canada and these strains are more closely related to the 'Great Lakes strains' but are not identical (Gagne et al. 2007). This suggests that it is less likely that a very recent translocation from Atlantic Canada to the Great Lakes has occurred. All of the strains of IV'b' isolated in the last two years from the Great Lakes are virtually identical (K. Garver, DFO, Nanaimo, pers. comm.) however, which does support either a recent arrival of the virus or recent dispersion of a behaviorally altered strain.

The most important pathogenic feature of this virus is its very broad host range, with dozens of species now known to be susceptible to infection. Most recently, infected brown and rainbow trout have been detected, with few specimens of the former species clinically affected. To date, freshwater drum, yellow perch, muskellunge, gizzard

shad and the round goby seem to have been most significantly impacted.

Clinically affected fish typically have widespread pinpoint hemorrhages, bulging eyes, and blood-tinged fluid internally. However, fish may die with few gross lesions. A target tissue seems to be cells lining the blood vessels, with a resulting inflammation of blood vessels and multi-organ involvement. Microscopic lesions vary among species, however, and confirmation of a diagnosis requires virus culture on special cell lines and confirmation by polymerase chain reaction (PCR) or other OIE (World Organization for Animal Health) -approved test.

Assessment of the true impact of the virus will require the sustained efforts of fisheries agencies on both sides of the border, as population surveys are performed and year-class recruitment numbers are generated, particularly for high profile or commercially important species like muskellunge and yellow perch.

The presence of the virus has had a substantial effect on the day-to-day operations of baitfish harvesters, aquaculture and fish enhancement activities, on anglers, and on the fish health personnel around the Great Lakes. VHSV is an OIE list disease, and detection of each new affected species or new area has an effect beyond the direct clinical impact on a fish species. To a greater or lesser extent, regulatory agencies have been unprepared for the downstream effects of the detection of this virus. The National Aquatic Animal Health Programs in both the USA and Canada were not sufficiently developed to properly deal with the presence of a new OIE list agent, like VHSV in the Great Lakes. Fortunately, progress towards the implementation of the program in Canada, at least, has been spurred on by the detection of this virus.

Elsayed E, et al. (2006) Isolation of viral hemorrhagic septicemia virus from muskellunge, *Esox masquinongy* (Mitchell), in Lake St. Clair, Michigan, USA reveals a new sublineage of the North American genotype. *Journal of Fish Diseases* 29: 611-619

Gagne N, et al. (2007). Isolation of viral hemorrhagic septicemia virus from mummichog, stickleback, striped bass and brown trout in Eastern Canada. *Journal of Fish Diseases* 30: 213-223.

Lumsden JS, et al. (2007). Mortality event in freshwater drum (*Aplodinotus grunniens*) from Lake Ontario, Canada associated with viral hemorrhagic septicemia virus, type IV. *Diseases of Aquatic Organisms* 76: 99-111.

(John Lumsden, CCWHC, Pathobiology, OVC, University of Guelph)

DISEASE UPDATES

Atlantic Region



“Flesh-eating Disease” in two Raccoons due to *Streptococcus* group G infection.

In 2006, two raccoons from PEI submitted to the CCWHC Atlantic Region had postmortem findings consistent with necrotizing fasciitis, a severe and rapidly progressive bacterial infection known in human medicine as “flesh eating disease”. This is a potentially life-threatening infection that spreads underneath the skin and between the muscles. It has been reported in people and dogs but, to our knowledge, not in raccoons. In human cases, the most commonly isolated bacteria are group A beta-hemolytic *Streptococcus*, while canine cases are usually due to bacteria of group G. In dogs and humans, these bacteria are common residents on the skin’s surface, and the disease is usually initiated by a minor penetrating injury that introduces the bacteria into deeper tissues. Subsequently, the bacteria proliferate and cause extensive tissue death, eventually killing affected individuals by toxic shock syndrome.

The raccoons described in this report were both males in good body condition (one adult and one young of the year). They were submitted for necropsy at separate times of the year from different locations on PEI and were lethargic or behaving strangely. One died overnight while in captivity, and the other was euthanized. Both had ulcerated and crusting skin lesions associated with underlying bone fractures, one in the lower back, and the other in the jaw. In both cases, the microscopic appearance of the lesions and the isolation of *Streptococcus* group G confirmed the diagnosis of necrotizing fasciitis. The good body condition of the raccoons is consistent with the rapid onset of necrotizing fasciitis, and the associated fractures suggest trauma, likely involving a penetrating wound, as the possible route of infection. Since the bacteria isolated in these cases were similar to those associated with necrotizing fasciitis in dogs, it is tempting to relate the traumatic injuries in both raccoons to a dog bite or attack. However, similar to dogs, the bacteria could simply be a resident on the skin surface of raccoons, opportunistically invading the underlying tissues when the skin is damaged.

(María Forzán and Scott McBurney, CCWHC, Atlantic Region)

Avian Cholera in Open Ocean Seabirds of Atlantic Canada

Early in January 2007, sick and dying gulls were observed on the Hibernia Oil Field drilling platforms and floating production, storage and offloading vessels in the North Atlantic Ocean, approximately 315 km southeast of St. John’s, NF. The most severely affected birds were incapable of flight and had neurological signs (circling, stumbling and inability to stand). An adult male Great Black-backed Gull, an immature male Great Black-backed Gull and an adult female Black-legged Kittiwake were submitted by the Canadian Wildlife Service to CCWHC Atlantic Region for examination. These individuals were in excellent body condition and had no gross lesions. Microscopically, blood vessels of most organs were packed with Gram negative bacteria (i.e., bacteremia), and a heavy growth of *Pasteurella multocida* was isolated from the lung, liver and/or brain. *P. multocida* is the pathogen responsible for Avian Cholera, a disease well described as causing outbreaks in many bird species, but to our knowledge, there are no previous reports of large scale mortalities associated with this disease in North American seabird populations, particularly those inhabiting an open ocean ecosystem. Therefore, in collaboration with the Newfoundland and Labrador Department of Natural Resources (Animal Health Division) and Nova Scotia Department of Natural Resources, mortality surveillance in seabird populations was enhanced, and submission of sick or dead seabirds for examination was encouraged. As a result, the geographical extent of the outbreak was found to be quite large, involving not only Hibernia but also the eastern Avalon Peninsula of Newfoundland and coast of Labrador; the drilling platforms of the Sable Offshore Energy Project near Sable Island, Nova Scotia, and the southwestern shore of Nova Scotia. The primary species involved were Great Black-backed Gulls, Glaucous Gulls, Icelandic Gulls and Black-legged Kittiwakes. Other species represented by much smaller numbers included Ivory Gulls (an endangered species), Herring Gulls, Thick-billed Murres and Common Ravens. For obvious reasons, the open ocean is difficult to monitor, so the exact number of dead birds in the outbreak is unknown. However, based on the number of dead birds recovered, a conservative estimate suggests the mortality was in the order of several hundred. Due to the location, it was also not easy to determine the longevity of the problem. Using identification of dead birds as an indicator, the mortality appeared to decline in early March 2007. As the

outbreak progressed, the birds dying of Avian Cholera continued to be in good body condition, but gross lesions became increasingly evident. They consisted primarily of thick layers of exudate covering the surfaces of the heart, airsacs and abdominal organs, as well as an enlarged and inflamed liver and spleen. *P. multocida* was cultured from all of the affected birds, and 75 bacterial isolates representative of the different bird species and geographical locations involved in the outbreak were sent to United States Geological Survey (USGS) National Wildlife Health Center for further characterization. Serotype analysis revealed that all of the isolates were serotype 1, and the working hypothesis is that these isolates are most likely capsular type A. This finding is consistent with Avian Cholera in wild waterfowl where *P. multocida* serotype 1, capsular type A is the pathogen most commonly involved in disease outbreaks. Further research will be conducted as part of a larger study of Avian Cholera in wild bird populations in Canada and will involve DNA typing of the isolates. This research should enable a much better understanding of the epidemiology of Avian Cholera in various bird populations across the country, including the potential relationships among outbreaks. In addition, while there is some level of understanding of the epidemiology of Avian Cholera in wetland bird species affected by it, this is not true of the disease in off-shore or pelagic ecosystems. Therefore, there is much left to discover in terms of transmission, maintenance and ecology of Avian Cholera among pelagic seabirds.

Scott McBurney, CCWHC Atlantic Region; Hugh Whitney, Newfoundland and Labrador Department of Natural Resources (Animal Health Division); David Blehert, USGS National Wildlife Health Center; Ron Dunphy, Private Veterinarian; and Greg Robertson and Sabina Wilhelm, Canadian Wildlife Service

Cerebellar Abiotrophy in a Moose

Moose are designated as an endangered species on mainland Nova Scotia. This past winter, a closely monitored adult female moose was euthanized near the Liscomb Game Sanctuary in Nova Scotia due to minimal movement over a two month period that was associated with neurological deficits and declining physical condition. Parelaphostrongylosis (brainworm infection) was assumed to be the underlying problem, but the most significant post mortem finding in this case was cerebellar abiotrophy. Cerebellar abiotrophy is a progressive degenerative condition (i.e., the animal's neurological function will not return to normal and will worsen over time eventually resulting in death) affecting a part of the brain known as the cerebellum.

The use of the term abiotrophy implies that the premature neuronal degeneration is not caused by infectious agents or toxins, but rather is the consequence of an intrinsic metabolic disorder usually associated with an inherited defect or copper deficiency. Cerebellar abiotrophy is reported in a wide variety of domestic animals, including dogs, cats, cattle, sheep, horses, pigs, primates and rodents, and the age of onset varies from birth to late in adult life. In those animal cases where primary or secondary copper deficiency is not the underlying cause, a genetic basis for cerebellar abiotrophy (i.e., an inherited defect) is most often implicated. Reports of this disease in free-ranging wildlife species are very rare, but a single article describing cerebellar abiotrophy associated with copper deficiency in a moose is present in the literature (Rehbinder, C. and L, Petersson. 1994. Cerebellar abiotrophy in a moose related to copper deficiency. A case report. Acta. Vet. Scand. Vol 35(1): 103 -106). Overgrown hoof walls (i.e., possible abnormal hoof wall keratinization), an additional finding in this case, has been reported in an Alaskan moose population affected by copper deficiency. Abnormal antler growth and poor reproductive success, other indicators of copper deficiency in moose, have also been previously identified in the moose population of mainland Nova Scotia.

The liver from this case was submitted for copper analysis, but copper levels were found to be within normal limits. Other minerals such as molybdenum, sulphur and iron can interfere with proper copper utilization in the body despite the availability of adequate amounts of copper (i.e., secondary copper deficiency), and, since these mineral levels were not assessed, secondary copper deficiency cannot be ruled out in this case. Also, food type, and the interaction between food type and dietary mineral composition, can affect copper utilization by the body, with secondary copper deficiency as a potential result. Unfortunately, in free-ranging wildlife populations, cause and effect relationships can be difficult to determine, particularly in metabolic conditions involving complex interactions between several factors such as those described above. Therefore, the exact etiology of the cerebellar abiotrophy identified in this moose will probably be difficult to ascertain.

(Scott McBurney, CCWHC Atlantic and Mark Pulsifer, Nova Scotia DNR)



Besnoitiosis in caribou herds (*Rangifer tarandus*)

An episode of mortality of undetermined magnitude was detected in autumn 2006 by outfitters guiding caribou hunters in northern Quebec, as well as by First Nations hunters. The safety of caribou meat consumed by different users of this resource is a constant preoccupation for government authorities in charge of wildlife management and public safety. Representatives of the Chibougamau MRNF, Quebec’s Natural Resources and Wildlife Management Ministry, traveled to the location in order to evaluate the situation. A search was carried out, by helicopter, for sick animals displaying what hunters described as “dark markings” on the fur. Very few sick or dead animals were observed on the ground. Only four emaciated caribou displaying cutaneous lesions, all males, were detected among several thousand individuals. The changes detected on the scrotums of the first three individuals were similar to those observed on the tissues of the first specimen submitted for biopsy by a First Nations hunter, i.e. inflammation of the skin tissue of the scrotum caused by the presence of the protozoan, *Besnoitia* (figure 1).

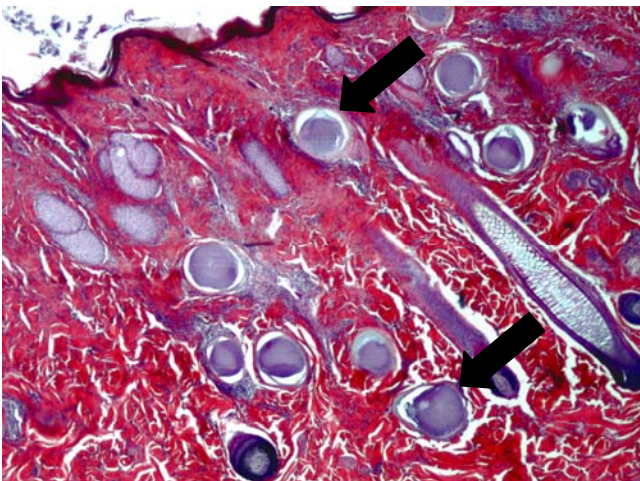


Figure 1. Numerous cysts of the protozoan *Besnoitia* spp. In the scrotal skin of a caribou with grossly-evident skin lesions. (Photo credit: André Dallaire)

This intracellular parasite can lodge in the connective tissues in various places throughout the animal but is frequently associated with significant skin lesions in ruminants. Following a heavy infection by *Besnoitia*, the skin becomes thick, forming a crust which can cause the skin to fissure and become crevassed, thereby creating opportunities for infection with bacteria (figure 2).



Figure 2. Thick crusts on the skin over joint articulations of a caribou. (Photo credit: André Dallaire)

The first three caribou autopsied also had hepatic parasites (the Giant Liver Fluke: *Fascioloides magna*), and pulmonary parasites (round worm, species to be confirmed) were found in one individual (figure 3).

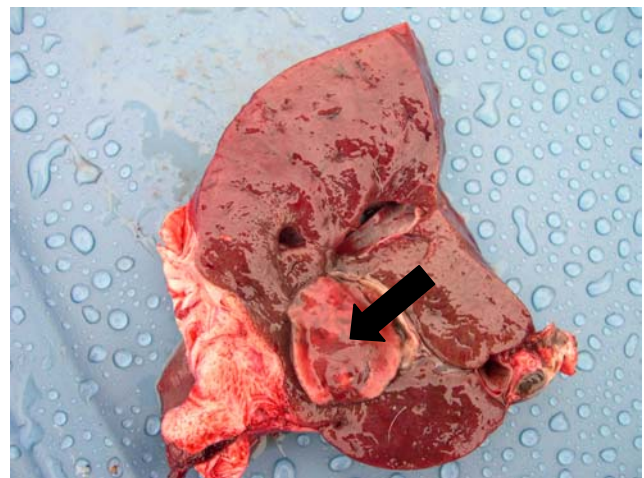


Figure 3. A large fluke extracted from a cavity embedded deeply in a caribou liver. (Photo credit: André Dallaire)

Although the liver flukes were well confined in two of the individuals, in one of the animals, a large area of liver had undergone necrosis (cell death) resulting from the presence of flukes affecting more than one third of

the liver. An abscess in the abdominal lining was found in the fourth caribou (most likely resulting from fighting). No macroscopic lesions compatible with brucellosis were observed in the caribou, nor were there any organisms belonging to the genus *Brucella* spp isolated from the samples submitted to a reference laboratory. The macroscopic changes observed on site by the hunters as well as the autopsy results suggest that the Riviere aux Feuilles herd was affected by an acute episode of besnoitiosis. The animals detected at the time of the visit to the site exhibited chronic lesions which were in the process of healing naturally.

Besnoitia infection occurs widely among caribou and reindeer in Canada and Eurasia. Most often it is not associated with important disease or lesions but in some animals can be severe and life-threatening.

(Andre Dallaire, DVM, MSc, DACVP. CCWHC—Centre regional du Quebec)

Incursion of raccoon rabies in the province of Quebec

The raccoon rabies virus variant was found for the first time in Quebec during the summer of 2006. Four diseased raccoons were detected in Southeastern *Montérégie* (next to the Vermont border) during the surveillance and control program. To follow the evolution of this disease, an enhanced surveillance program was put in place by the gov-

ernment of Quebec in collaboration with the CFIA and the *Faculté de médecine vétérinaire de l'Université de Montréal* (CCWHC Quebec regional center) in 2007. A point infection control (PIC) was also instituted by the provincial agencies during the summer of 2007. The goals of this PIC were to collect raccoons and skunks carrying the virus (either sick or during the incubation period), to reduce the density of raccoons in the infected area, and to trap, vaccinate, and release raccoons, skunks and stray cats in the surrounding areas. As of August 17, 2007 a total of 47 rabid raccoons and three rabid skunks had been found in Quebec. The affected animals were collected in South-eastern *Montérégie* in the *Municipalités régionales de comté* of *Brome Missisquoi* and *Haut Richelieu*. In order to contain this outbreak, baits with oral rabies vaccines have been air-dropped in the affected areas.

Raccoon rabies is present in most of the eastern etates of the United-States, including Vermont, from which the present epidemic in Quebec seems to have originated from. Incursions of this disease had been observed in 1999 and 2000 in Ontario and New Brunswick respectively. Results of surveillance programs in these provinces suggest that these two foci of infection are under control. The high density of raccoons in urban areas increases the risk of transmission of this virus, which is highly fatal to people and domestic animals (Louise Lambert, Institut national de santé publique du Québec and Stéphane Lair, CCHWC- Quebec).

Ontario & Nunavut Region



Canine Distemper Virus in Sled Dogs – Nunavut and NT

There was an outbreak of Canine Distemper Virus (CDV) in sled dogs in the Canadian arctic this past winter and spring. It has been difficult to obtain detailed information on dates and locations where the disease has been active. Samples from cases from 4 different communities - Holman Island (NWT), Hall Beach, Resolute Bay, and Igloolik (Nunavut), representing a broad geographic reach, were sent to the CCWHC laboratory in Guelph, where the disease was confirmed. It is highly likely that the epidemic reached a much broader geographic area beyond communities in which it has been confirmed. We have received reports of sick and dead dogs from other communities and it seems likely that CDV has been involved in many of these episodes as well. The earliest case received was from late February, 2007 and the most recent was from early May. However, it appears that dog

deaths were still occurring in some communities as recently as early July. Efforts to document the full geographic extent of the outbreak are continuing.

Clinical signs reported in the dogs included vomiting and diarrhea, discharges from the eyes and nose, and neurological abnormalities. Diagnostic possibilities that were considered, but ruled out, included rabies, parvovirus, and antifreeze, Vitamin A, and lead poisoning. CDV was confirmed by immunohistochemistry. Viral antigen was found in a wide variety of tissues, as is often the case with CDV. In dogs that died during the more acute phase of infection, antigen was variably found in lung, tonsil, kidney, spleen, and stomach. In one animal, antigen was present in uterus and ovary. In the dog with a longer history of illness, antigen was detected primarily in the brain.

CDV epidemics have occurred previously in the arctic. In the winter of 1987-88, a CDV epidemic occurred over a broad geographic range (Canadian Veterinary Journal, 1988, 29: 299). It was estimated that 326 dogs died during this outbreak. Concurrent with this event, an outbreak of CDV occurred in dogs in Greenland, in which mortality as high as 80 percent was reported (Arctic Medical Research, 1989, 48(4): 195-203).

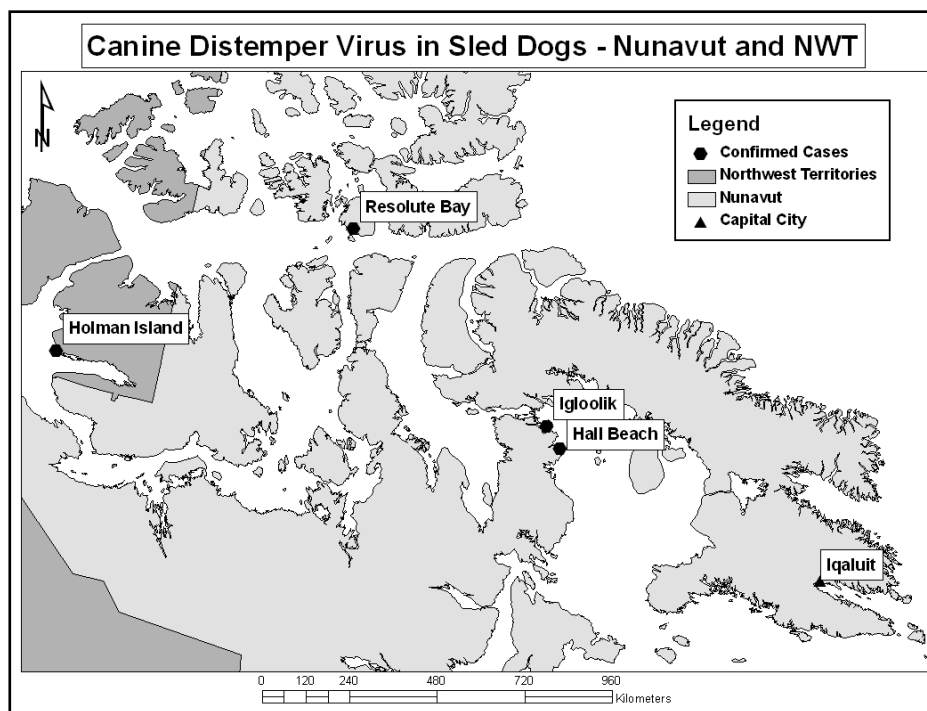
CDV is a worldwide disease, affecting all families of terrestrial carnivores, and also seals. The virus is spread by close contact, through respiratory exudates and other bodily discharges. As may be seen from the sites where virus antigen is localized, the virus may be shed in feces, urine and uterine discharges as well as from the respiratory tract. It is highly contagious and causes epidemics with high morbidity and high mortality in susceptible populations. A high density population of domestic dogs, unprotected by vaccination, is very much at risk should an outbreak begin.

Since the virus is not particularly hardy in the environment, and spread is primarily through close contact between affected and susceptible animals, it is not clear how an epidemic such as this one, with occurrence in widely separated locations, occurs. It is possible that there is movement of dogs between communities. There is also a possibility that the virus may survive sufficiently well at low temperatures that it could be spread indirectly by contaminated objects. It has been suggested that arctic foxes are the source of virus in each of these communities.

However, this presupposes that there is a concurrent epidemic in the arctic fox population. In this instance, at least, there have been no reported occurrences of CDV in foxes, and the CCWHC has received no samples from foxes.

This epidemic illustrates problems in the provision of both wildlife disease surveillance and veterinary care in the arctic. The absence of reporting networks and the difficulty and cost in delivering samples from the arctic to southern diagnostic laboratories make it difficult to obtain reliable information on the occurrence of disease in wildlife populations. In this case, we have used domestic dogs as a sentinel species for the detection of an agent that may be affecting arctic foxes and wolves. These species are theoretically at risk in this epidemic, but we have no information to confirm whether or not they were actually affected. The epidemic also illustrates the difficulties in providing veterinary care for the large number of dogs that live in arctic communities. At a minimum, it is desirable that these dogs be vaccinated against rabies, CDV and parvovirus and receive regular dewormings. These are basic veterinary and human public health measures. However, at this time, there is no system in place that will deliver these vaccines and medicines to the dog population of the arctic.

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CCWHC Seeking Increased Submissions of Reptiles and Amphibians

It has been recognized for some time that populations of reptiles and amphibians are declining worldwide. Decline in many species has been noticed in Canada, and some species have disappeared from their historical range in this country.

The reasons for declines likely vary according to region and species, but there is a growing acceptance that infectious diseases may be playing an important role. Several species of bacteria have long been associated with septicaemia (“red leg”) in amphibians and have been implicated in mass mortality in various species. Bacteria also have been implicated in Post-metamorphic Death Syndrome, which kills newly metamorphosed individuals in large numbers, and causes mass mortality in larval frogs and salamanders.

In recent years, a growing body of evidence indicates that emerging infectious diseases (EIDs)—diseases that have recently increased in range, are affecting new hosts or are newly discovered—may be playing an important role in the recent declines. Two of the most important EIDs at this time are Ranavirus (an Iridovirus) and the fungus, *Batrachochytrium dendrobatidis* (“Chytrid” fungus). In North America, Ranavirus has been responsible for disease outbreaks in several species of frogs and salamanders. In many cases, several hundred individuals were killed. Chytrid fungus is thought to be responsible for population declines in Australia, Central America, and elsewhere. Other wildlife health issues affecting amphibians include parasites (intestinal coccidia, trematodes (flukes) associated with limb deformities), other viruses (adenovirus enteritis—reptiles may be more susceptible than amphibians) and toxic chemicals.

The role of these agents is still poorly understood and it appears that they can be present in some populations without causing widespread disease or population declines. Filling in the gaps in our knowledge would be invaluable, both in predicting risk and designing conservation strategies.

Over the years, the CCWHC has been involved in the investigation of disease in amphibians such as the investigation of Ranavirus-related mortality in Saskatchewan, limb deformities in Quebec, and mass mortality of mudpuppys in Ontario. We have also investigated many cases of disease across the country in reptiles and amphibians whose conservation status has made disease issues particularly important. Of the roughly 5,000 submissions and reported incidents in the national CCWHC database in 2006, there were only 4 snakes, 6 turtles, and 31 amphibians (27 of those from a single incident). These numbers do not reflect either the level of interest of the CCWHC in these taxa, or the importance of disease issues to their conservation. The gaps in our knowledge make it particularly important that large die-offs be investigated thoroughly in a way that can identify previously unknown pathogens and/or contributing factors, and information can be collected to contribute to the identification of relationships among agents that might help predict risk.

The CCWHC is actively trying to encourage submissions of both incident reports and samples from mortality in free ranging reptiles and amphibians by building relationships with conservation groups, researchers, and government agencies in the hope that we can expand our involvement in this important area.

Western/Northern Region



Update on Bovine Tuberculosis in the Riding Mountain National Park Area.

Riding Mountain National Park (RMNP) is a 3,000 km² protected area in southwestern Manitoba. Maintaining the ecological integrity of a National Park that is surrounded by agricultural land presents several challenges. Wildlife

movements, habitat fragmentation, and maintaining natural processes such as fire are a few issues that have resulted in managers of RMNP taking a broader regional ecosystem approach. One of the more complex management issues in and around Riding Mountain National Park

RMNP) in recent years has involved disease, namely Bovine Tuberculosis. *Mycobacterium bovis* (*M. bovis*), the bacteria that causes Bovine Tuberculosis was identified in the RMNP region in Gray Wolves in 1978, in domestic cattle (*Bos taurus*) in 1991, in wild Elk (*Cervus elaphus manitobensis*) in 1992, and in White-tailed Deer (*Odocoileus virginianus*) in 2001. Six separate outbreaks of Bovine Tuberculosis in cattle in the RMNP region resulted in over 2,000 cattle being destroyed, and over 60,000 cattle being tested in the Riding Mountain Eradication Area (RMEA). In 1997, RMNP initiated a wildlife health surveillance program and, since that time, a total of 2,900 hunter-killed elk samples and 5,000 hunter-killed white-tailed deer samples have been examined from areas around RMNP. In addition, a live capture and blood test program was developed in 2002 and to date, 650 elk in and around RMNP have been tested. In total, there have been 35 elk and 7 white-tailed deer confirmed positive for *M. bovis*. While apparent prevalence levels of *M. bovis* in these wildlife populations remain low, the presence of the disease represents an ongoing threat to the region's cattle industry.

Management actions have focused on reducing interaction between wildlife and cattle through the use of ungulate-proof fences around hay storage areas, fencing high risk cattle feeding areas, enforcing regulations that prohibit the feeding and baiting of wildlife, and, recently, the use of livestock guard dogs. It is the cooperation of the land-owners surrounding RMNP and the partner agencies that make up the Manitoba Bovine Tuberculosis Task Force Team (Parks Canada, Canadian Food Inspection Agency, Manitoba Agriculture Food and Rural Initiatives and Manitoba Conservation) working together that has resulted in the RMEA re-gaining Bovine TB-free status in cattle in 2006.

(Doug Bergeson, Parks Canada—Riding Mountain National Park).

Sheep-associated malignant catarrhal fever in moose.

Malignant catarrhal fever (MCF) is a sporadic, often fatal, disease of ruminants caused by certain types of herpes viruses. In North America, the most common virus is carried by domestic sheep, and recently, a closely related virus has been found in domestic goats. Disease is most frequently reported in cattle, bison and deer. Susceptible animals develop MCF after close contact with infected sheep or goats. Wild moose in Scandinavia have died from both sheep-associated and goat-associated MCF¹, but no similar cases have been reported in North America.

On August 21, 2006, conservation officers euthanized a sick, thin and dehydrated adult bull moose near Brownlee in southern SK. The moose's eyes were cloudy and ulcerated, and several ulcers were seen in the intestine and urinary bladder. Microscopically, there was severe inflammation within and around blood vessels, a hallmark of MCF. Herpesvirus DNA that was 99% identical to sheep-associated strains of MCF was detected in affected organs. To our knowledge, this is the first case of MCF in free-ranging moose in North America. These findings prompted a review of past cases, and a second adult moose collected in southwestern Saskatchewan in 2003 also died from MCF.

These two cases of MCF demonstrate that at least some moose come into contact with domestic livestock. The majority of southern SK is made up of cultivated prairie, and moose numbers in these areas have increased in recent years. Cases of MCF, as well as other diseases shared between livestock and moose, may become more prevalent in moose as a result of this population expansion into agricultural prairie.

(Aleksija Neimanis, CCWHC—W/N Region)

¹Vikøren et al., 2006. Malignant catarrhal fever in free-ranging cervids with OHV-2 and CpHV-2 DNA. *Journal of Wildlife Diseases*. 42(4): 797-807.



Announcements

CCWHC Named OIE Collaborating Centre

In May 2007, the CCWHC was designated a *Collaborating Centre for Wildlife Disease Surveillance and Monitoring, Epidemiology and Management* of the World Organization for Animal Health (OIE). The CCWHC was nominated for this designation by the Government of Canada (Canadian Food Inspection Agency). The CCWHC thus has become the first *Collaborating Centre* of the OIE specifically for wildlife disease issues. *Collaborating Centres* offer expertise, planning advice, training opportunities and other assistance to OIE member countries in their areas of competence. Designation as a *Collaborating Centre* presents new opportunities and challenges to the CCWHC to participate in wildlife health and disease issues on a global scale.

New Edition of the CCWHC *Wildlife Disease Investigation Manual*

The CCWHC *Wildlife Disease Investigation Manual* was updated in August/September 2007, and now is available on the CCWHC Website <http://wildlife.usask.ca> and for purchase in printed format as a 20 cm x 34 cm field manual (\$15 per copy). The content has been updated but it has not been fundamentally changed. Contact information for agencies, wildlife health expertise, regional centres and laboratories is current to 1 September 2007. For more information, call 1-800-567-2033

Managing Disease at the Interface—Short Course/2008

February 27 to 29th, 2008, in Saskatoon, the Western College of Veterinary Medicine and the Canadian Cooperative Wildlife Health Centre are presenting a short-course entitled “Managing Disease at the Interface”. This short course will examine the complex issues involved in managing wildlife diseases which affect domestic animals and humans. Further details can be obtained by visiting the CCWHC website.

Avian Influenza Survey - 2007

Canada's 2007 Interagency Wild bird Influenza Survey is nearly complete. A major focus of the 2007 Survey is examination of wild birds found dead in all parts of Canada. These provide the most effective means of detecting important strains of avian influenza viruses, such as the Asian-European-African disease-causing H5N1 strain, should they arrive or evolve in Canada and infect wild birds. Healthy live wild birds also are being sampled and tested in 2007, particularly wild ducks from all major migration corridors, and arctic-nesting geese. The 2007 Survey also includes an assessment of wild bird use of poultry farm habitat in Ontario and British Columbia and some assessment of how survey methods may affect survey results. Survey results are available on the CCWHC website as soon as survey data have been entered into the national Survey database. Follow the links to the 2007 Avian Influenza survey at <http://wildlife.usask.ca>.

Results from the 2006 Avian Influenza Wild Bird Survey also are available on the website and are tabulated below. All Avian Influenza viruses (AIV) detected in 2006 were of low pathogenicity and of North American origin. Overall, 35% of healthy wild ducks sampled in late summer and early fall 2006 were infected with one or more AIV. In contrast, no AIV were detected in urban nesting Canada Geese and very few were detected in arctic-nesting geese.

Canada's Inter-agency Wild Bird Influenza Survey - 2007				
Sample Location	Species	No. Tested	No. with virus	% with virus
Live Bird Sampling:				
Across Canada	Ducks (August - October)	3216	1140	35.4%
SW British Columbia	Ducks (December)	627	33	5.3%
Iceland	Brant Geese	179	0	0
	Red Knot	184	1	0.5%
Arctic Nesting	Geese (4 species)	2834	207	7.3%
	Eider	203	0	0
Northeast Coast	Semipalmated Sandpiper	618	20	3.2%
	Eider	210	0	0
	Gulls (3 species)	607	68	11.2%
	Terns	110	14	12.7%
	Leach's Storm Petrel	287	17	5.9%
	Atlantic Puffin	12	1	8.3%
Dead Bird Sampling:				
Across Canada	~160 species	2862	105	3.7%

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