

CANADIAN WILDLIFE
HEALTH COOPERATIVE



HEALTHY WILDLIFE HEALTHY CANADA



2013/14

Annual Report

CANADA'S NATIONAL WILDLIFE HEALTH SYSTEM



A MESSAGE FROM THE CHAIR EXECUTIVE COMMITTEE

It is with pleasure that I present this year's annual report to you. The report provides an excellent overview of how this internationally unique organization is rising to the needs of Canadians to make decisions about wildlife health.

For the past 22 years, the Canadian Wildlife Health Cooperative has been a central figure safeguarding wildlife health in Canada. This past year has been full of discoveries and achievements that reflect the value the CWHC brings to Canada. Working with our partners across the country, the CWHC has provided leadership and partnerships that created avenues to improve wildlife health.

With the guidance and assistance of our Executive Committee the CWHC has been developing new approaches to securing its future by engaging with the private sector and the public as partners in funding and science. Working with our partners we changed our name to the Canadian Wildlife Health Cooperative/Réseau canadien de la santé de la faune (CWHC/RCSF). We also held a Wildlife Health Ambassadors Dinner in Toronto to celebrate and cultivate new partnerships. As more issues challenge wildlife, we need to work with a larger suite of organizations to develop a base from which we can launch the programs and projects needed to meet our increasingly important mandate.

This past year was also one of transition, marking the last for Dr. Ted Leighton as our Executive Director. Under his leadership, the CWHC's influence and impact has spread nationally and internationally. I want to personally thank Ted for his many contributions to the CWHC and to welcome our incoming Executive Director, Dr. Craig Stephen. Dr Stephen has had a long association with the CWHC and brings a new and rich background of experience and expertise to our top leadership post.

While renewal was everywhere this year, the core programs of the CWHC continued in full force, maintaining national wildlife health surveillance programs and investigating issues new and old. As you read this report, you will appreciate the unique model that is the CWHC, the breadth of the CWHC program and its commitment to serve Canada as its central agency for wildlife health protection.



DOUGLAS FREEMAN
Dean, Western College of Veterinary Medicine
University of Saskatchewan

WHAT is Wildlife Health?

Wildlife health is a two sided coin. On one side is the capacity of fish and wildlife to thrive in a changing world. On the other are safe and sustainable relations between wildlife and society.

Wildlife are healthy when they can sustain their ecological roles and be part of the social and cultural fabric of Canada. When they flourish in the face of changing environments and human pressures and can cope with diseases or other stresses, they are healthy. Healthy wildlife do not present disease risks to us or our domestic animals and when harvested, provide safe and sustainable food.

WHY is it important?

Wildlife are part of all of our lives and they lie at the very heart of the Canadian identity. Urbanization has brought wildlife to where most of us live. The wildlife economy is huge and growing. Interactions between wildlife and agriculture affect international trade and food production. Diseases are shared between wildlife, domestic animals and people.

Now, more than ever, it is important to safeguard wildlife health. Decisions need to be made about how to protect wildlife in the face of human population growth, resource development, urbanization, pollution and more. Those decisions need to be made before new diseases emerge, pollution causes population declines, wildlife infections spread to people, or the safety of a country's food is compromised. Options to respond to such threats are few and often slow. Finding and communicating early clues to prevent new threats and aid in recovery from others is key to ensuring we maintain wildlife health.

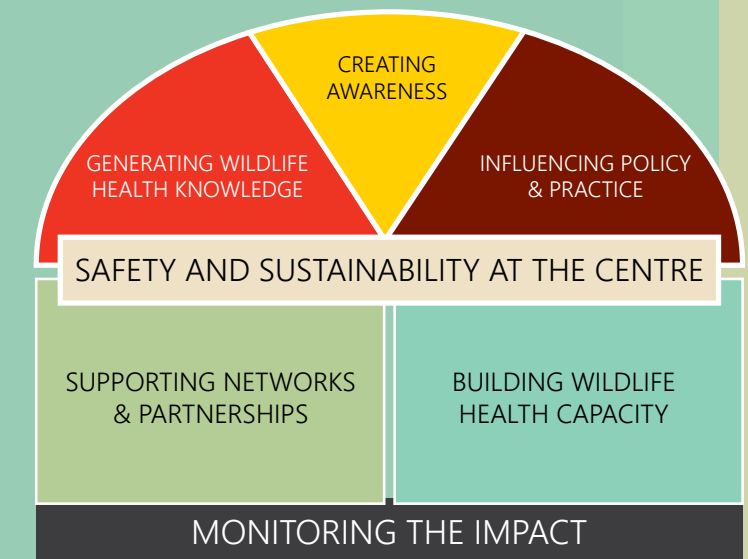
WHO we are

The Canadian Wildlife Health Cooperative is a collection of highly qualified people within a cross-Canada network of partners and collaborators dedicated to wildlife health. Our Cooperative includes internationally renowned wildlife disease diagnosticians and researchers, experts in population health, skilled educators and experienced policy advisors. The CWHC is dedicated to generating knowledge needed to assess and manage wildlife health and working with others to ensure that knowledge gets put to use in a timely fashion.

At the core of the CWHC is a partnership linking Canada's five veterinary colleges and the British Columbia Animal Health Centre. Branching from that core is a network that stretches into the public and private sectors that allows us to access critical expertise needed to detect and assess wildlife health issues and make sure our results find their way to people who need to make decisions on wildlife management, wildlife use, public health and agriculture.

WHAT we are doing

We provide a Canada-wide perspective on wildlife health at the same time as helping to identify and assess emerging problems at a local level. The CWHC facilitates and supports teams, programs and partnerships needed to meet this goal. We build capacity through training the next generation of experts and advocating for strategic investment in wildlife health. Our research creates new wildlife health information and identifies ways to translate that knowledge into action. All of these activities work toward the goal of creating awareness of the importance of wildlife health and providing credible and trustworthy information to affect positive change at a local, national and international level.



ARCTIC CHANGE

MEASURES AND DETERMINANTS OF WILDLIFE HEALTH IN A CHANGING ARCTIC

Healthy wildlife are cornerstones of arctic ecosystem health. They provide nutritious food and sustainable incomes, and are a focus for cultural activities of northern peoples. Climate change, globalization, tourism, and manmade changes to the northern landscape are accelerating risks to wildlife. Emerging diseases in marine mammals and muskoxen, together with widespread caribou and sea bird population declines signal a need to understand the cumulative effects of social and environmental changes in the North. Working with communities, governments and institutions across northern Canada, the CWHC is enhancing surveillance, responding to wildlife health events, contributing to research, and engaging in meaningful and practical knowledge sharing with diverse groups of stakeholders.

CWHC Activities in Canada's North include the following:

COMMUNITY-BASED WILDLIFE HEALTH SURVEILLANCE IN THE SAHTU SETTLEMENT REGION

CWHC has been a partner in this longterm program since 2003. Local hunters contribute data and samples from caribou, moose and muskoxen that they harvest for food for CWHC surveillance and research at the University of Calgary. This program is helping to build a baseline from which to examine wildlife responses to changes such as oil and gas exploration in the Mackenzie Valley.

EMERGING PATHOGENS AND OUTBREAK INVESTIGATIONS

An unusual number of muskoxen on Banks and Victoria Islands were found dead in 2010-2013. CWHC investigated these die-offs and found adults in good body condition that had died very rapidly. The bacteria *Erysipelothrix rhusiopathiae* was cultured from all carcasses tested. This opportunistic bacteria can infect a wide range of mammals, birds and fish and is often associated with other stressors. Subsequent research is exploring how differing stresses might affect this and other muskox diseases.

STRATEGIC SURVEILLANCE DEVELOPMENT

CWHC is helping to develop a muskox health surveillance system in Nunavut. Graduate student Matilde Tomaselli, University of Calgary, Faculty of Veterinary Medicine, is mining the CWHC database to characterize past patterns of muskox diseases across Canada. Together with other literature, expert opinion, and traditional and local knowledge, her findings will inform the design of a new surveillance program. Moving forward, the CWHC will support community-based muskox health programs by receiving, organizing, assessing and storing data and samples for later analysis. Complementary work by CWHC Quebec on muskoxen in northern Quebec provides additional insights and context.

CARIBOU HEALTH

CWHC is engaged in caribou health surveillance, research and management across Canada. Caribou are an iconic species, and a critical food source for many aboriginal people. They are listed as endangered and threatened in many regions. CWHC is working closely with partners to provide knowledge and clinical, diagnostic, and research expertise to guide health assessments, disease investigations, and management plans. Outcomes range from discovering new species of lungworms, linking gastrointestinal parasite diversity with histories of animal movements by man, understanding climate change impacts on parasitic diseases in caribou, and helping design surveillance programs to monitor contaminants and infectious disease in caribou from a consumer assurance perspective.

NARWHALS AS SENTINELS

Much is being written about the potential deleterious effects of ecosystem-level climate-associated change on the health of arctic ecosystems. As a highly ice-associated apex predator species, we feel the narwhal can be used as a high profile sentinel for the health and resilience of the arctic marine ecosystem as a whole. Dr. Sandie Black (University of Calgary) and Dr. Pdraig Duignan (CWHC, University of Calgary) in collaboration with Fisheries and Oceans Canada, travelled to north Baffin Island in August of 2013 and worked with Inuit hunters from the hamlet of Pond Inlet to necropsy and collect samples from 8 narwhals harvested in the annual subsistence hunt. As well as cultures, parasite identification and histological evaluation of tissues, samples collected will be combined with a set of archived tissue samples from 1982-2009 and used for various genomic, proteomic and hormonal assays in the hopes of refining tools for assessment of the population level health of this species.

WHY DOES THE CWHC MATTER?

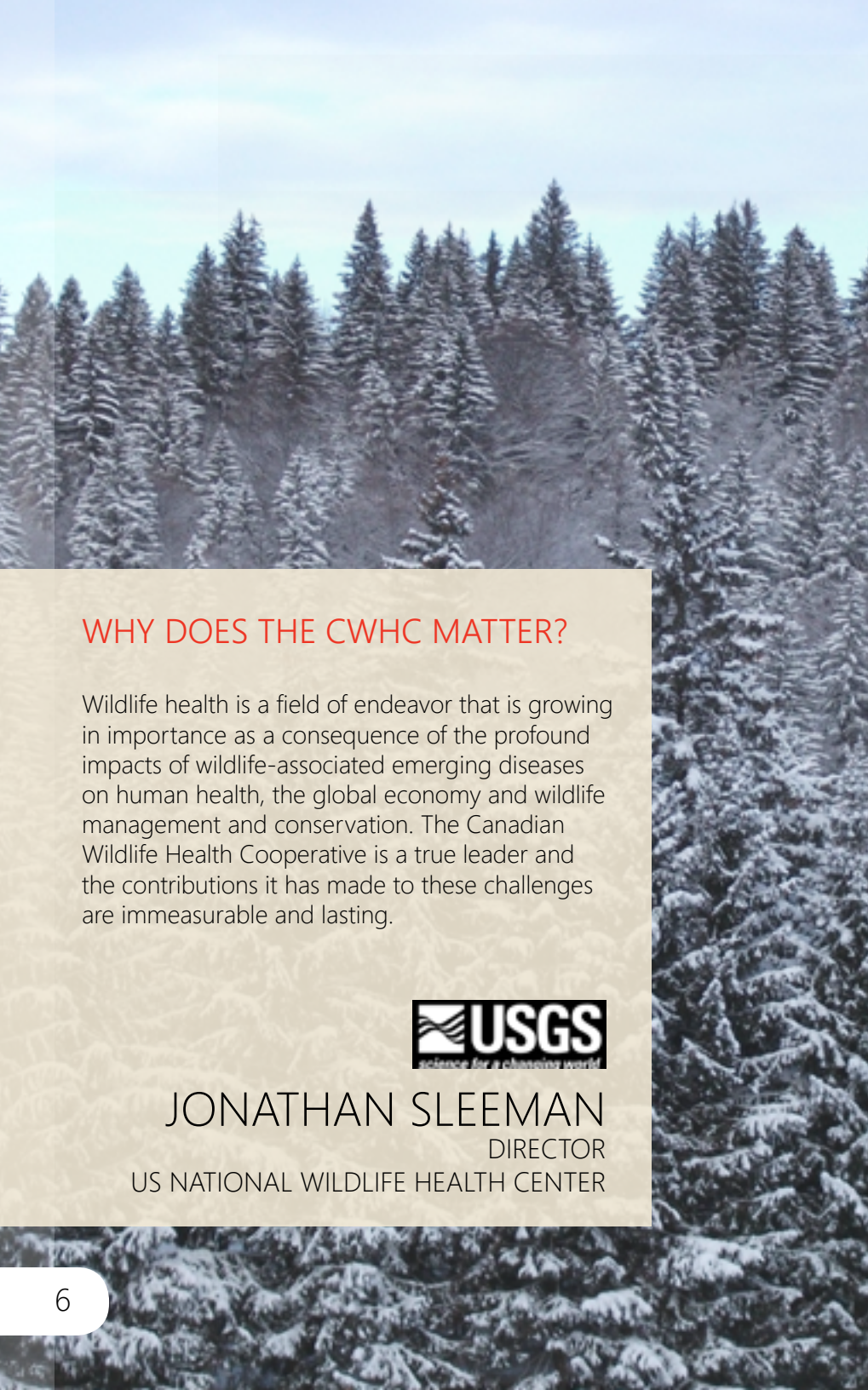
The CWF's mission is to ensure healthy wildlife and marine populations. This would be impossible to achieve without the work of the CWHC. Their expertise and dedication is our first line of defense against wildlife diseases and deserves the support of Canadians.



WADE LUZNY

CEO

CANADIAN WILDLIFE FEDERATION



WHY DOES THE CWHC MATTER?

Wildlife health is a field of endeavor that is growing in importance as a consequence of the profound impacts of wildlife-associated emerging diseases on human health, the global economy and wildlife management and conservation. The Canadian Wildlife Health Cooperative is a true leader and the contributions it has made to these challenges are immeasurable and lasting.



JONATHAN SLEEMAN
DIRECTOR
US NATIONAL WILDLIFE HEALTH CENTER

BELUGA HEALTH

HEALTH OF THE ST. LAWRENCE BELUGA: EVIDENCE OF IMPROVEMENTS BUT SOME NEW CONCERNS

The CWHC Quebec was part of a comprehensive review of the status of St. Lawrence beluga whales that was requested by the Ministry of Fisheries and Oceans following increasing reports of dead calves and apparently low population numbers.

An encouraging finding was a decrease in levels of contamination of belugas and their habitat over the last 30 years by pollutants such as PCBs, PAHs and DDTs. Over the same time, there was a decrease in cases of digestive cancers in this population from 0.6 case / year (13% of the mature adults examined) to 0.1 case / year (2% of the mature adults examined). This supports a causal link between these cancers and exposure to PAHs. Environmental pollution has been thought to contribute to this population's failure to recover. Declines in pollution and cancer are good news for the future of these belugas. The longstanding CWHC beluga surveillance program has raised public awareness about the risks of pollution to wildlife health and helped motivate regulatory changes to restore the St. Lawrence Estuary ecosystem.

Unfortunately, new concerns have been discovered. More cases of problematic births, more reports of dead calves and a lower proportion of calves in the population have been found. At the same time, new contaminants (such as PBDEs) are exponentially increasing in the ecosystem while shifts in environmental conditions are occurring such as increased water temperature, decreased ice cover and changes in prey species availability. The link between these reproductive issues, environmental changes and PBDEs remains uncertain. PBDEs are known to effect hormones that influence reproduction but ongoing surveillance will be needed to understand how these changes are threatening this population. Population health monitoring will allow us to identify new threats that may occur with increasing recreational, commercial and industrial activities as well as deliver the evidence to support new strategies to reduce risks to St. Lawrence belugas.



WILDLIFE HEALTH ASSESSMENT

PARTNERING TO DEVELOP A WILDLIFE HEALTH PROGRAM FOR THE FUTURE

Like many other jurisdictions, the Northwest Territories is facing a number of challenges that will affect wildlife and wildlife-dependent communities. These challenges include climate change, resource development, food insecurity, global transportation of pollutants and emerging disease risks. In response, the Government of the Northwest Territories is embarking on a strategic review of its long standing Wildlife Health Program. Implementing recommendations from this review will help ensure they have a proactive wildlife health program aimed at supporting healthy sustainable wildlife populations, responding to new and emerging diseases, anticipating impacts of environmental change, and providing public assurance about wild food safety and security.

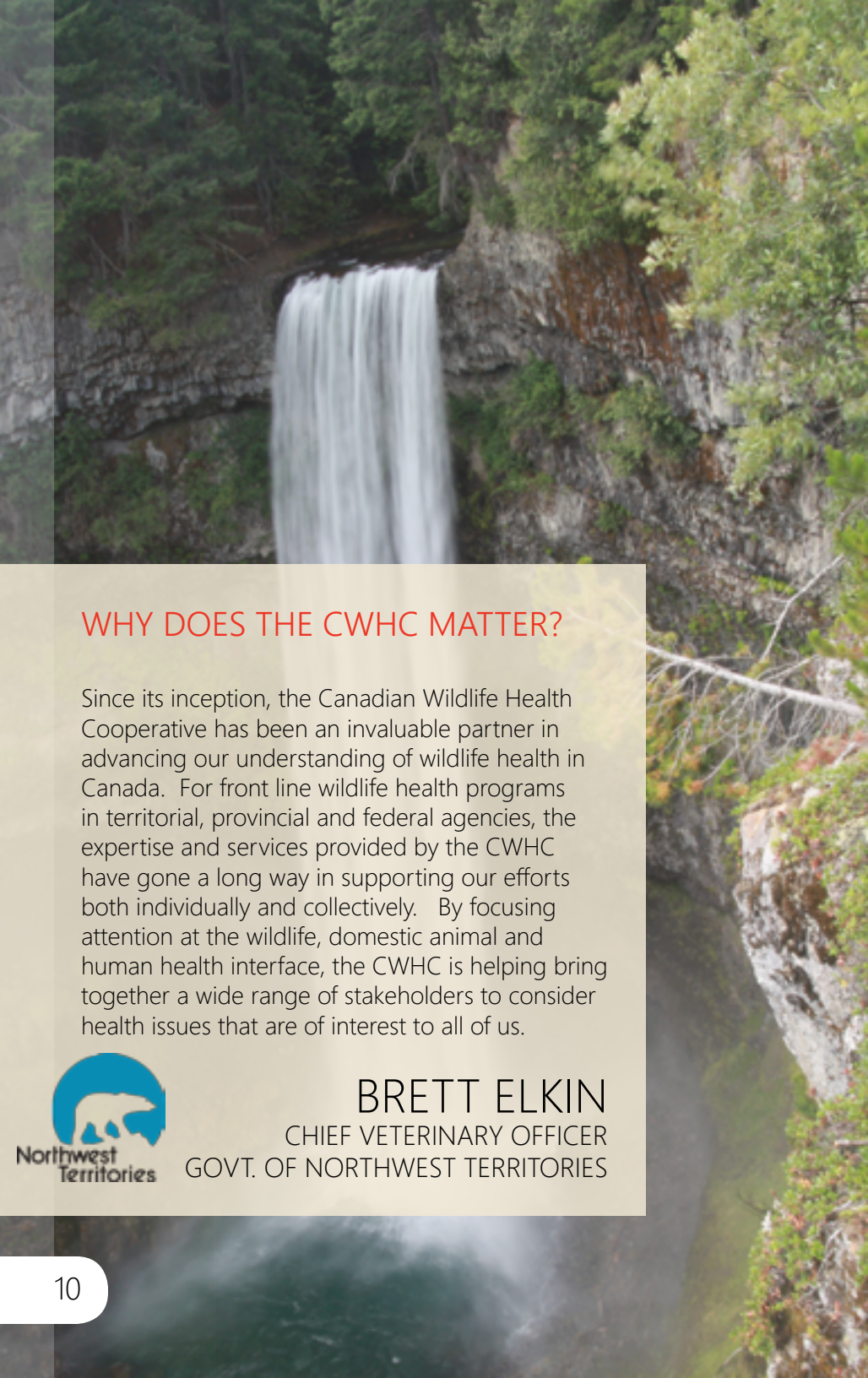
The CWHC with its affiliate, the Centre for Coastal Health, contributed to three main aspects of the GNWT program review. First, we worked with the GNWT Chief Veterinary Officer and wildlife veterinarian to help identify the key links between public health and conservation goals and policy goals and priorities. This will help to position any proposed new program within GNWT's priorities. Second, with funding from the Public Health Agency of Canada, we reviewed the GNWT anthrax management program through a One Health lens. This not only identified some key strengths to preserve in this effective disease management program, but also highlighted some opportunities to integrate it into a broader bison population health approach. This also helped the CWHC to develop a template for program review based on One Health principles. Third, we provided detailed population sampling advice for key programs to detect emerging risks, provide food safety assurance with respect to zoonoses and contaminants, and ensure freedom of specific diseases. This partnership highlights the role the CWHC can play in helping agencies deliver evidence-based program and policy reviews and strategies.

WHY DOES THE CWHC MATTER?

The CWHC provides a necessary and vital service to Canadians which is quite unique in the world. Having a robust, credible, accessible wildlife health diagnostic service staffed by expert veterinarians, biologists, technicians and researchers provides assurance that Canada will be well positioned to detect and deal with emerging zoonotic disease threats now and into the future.



TODD SHURY
WILDLIFE HEALTH SPECIALIST
PARKS CANADA



WHY DOES THE CWHC MATTER?

Since its inception, the Canadian Wildlife Health Cooperative has been an invaluable partner in advancing our understanding of wildlife health in Canada. For front line wildlife health programs in territorial, provincial and federal agencies, the expertise and services provided by the CWHC have gone a long way in supporting our efforts both individually and collectively. By focusing attention at the wildlife, domestic animal and human health interface, the CWHC is helping bring together a wide range of stakeholders to consider health issues that are of interest to all of us.



BRETT ELKIN
CHIEF VETERINARY OFFICER
GOVT. OF NORTHWEST TERRITORIES

ANIMAL WELFARE

SUPPORTING HUMANE USE OF WILDLIFE AND WILD SPACES

The way we interact with wildlife has implications for the well-being of individual animals. The CWHC has made important contributions to policies and practices that try to make those interactions humane and sustainable.

For example, CWHC seal health experts from the Atlantic Veterinary College have been instrumental in assessing and making recommendations pertaining to harvest methods for the seal hunt. Dr. Pierre-Yves Daoust's systematic assessments of impact of different methods for killing seals has influenced policies of the Canadian Veterinary Medical Association as well as affected the practices of the sealing industry. He has since been asked by Inuit communities in Nunavut to apply those skills and lessons to identify the most humane methods of hunting bowhead whales.

In Quebec, investigations of eagle mortality and injuries have helped to identify a problem of unintentional trapping of eagles in leg hold traps intended to capture fur-bearing animals. By combining knowledge of the mechanisms of injury with an understanding of trapping methods, the CWHC team has proposed modifications to trapping methods that would prevent eagles being attracted to baits and getting caught in traps.

Dr. Marc Cattet, in our Headquarters office, has worked closely with the Foothills Research Institute in Alberta to apply new techniques to detect stress hormones in grizzly bear fur collected from the environment as a non-lethal way to see how landscape changes are affecting bear health. The methods are being used as an efficient and humane method to characterize how manmade changes to the environment affect wildlife health. These techniques are being adopted for other species to contribute new insights into how management decisions can influence health outcomes.



INFORMATION MANAGEMENT

LEADERSHIP IN WILDLIFE HEALTH INFORMATION MANAGEMENT

Data that are properly assembled, assessed and shared as information, are the currency of surveillance. The CWHC health information services support scientific research, policy development, risk assessment, university education, awareness of wildlife disease status and natural resource use. While our diagnostic and investigative services are the foundation of this information system, at the heart lies an internationally unique database able to collect and standardize wildlife health events reports from across Canada. The popularity and power of this database has been proven by the purchase of CWHC data support services from a variety of international wildlife health organizations including the Dutch Wildlife Health Centre, the Nevada and Oregon State Wildlife health programs, and the Northeast Wildlife Disease Cooperative, located in New England and including Cornell and Tufts Universities.

In association with our database the CWHC has developed a full range of expertise pertaining to information management, from the custom and ongoing development of the database itself to the extraction, interpretation and communication of wildlife health information and the facilitation of information exchanges among partners and third parties.

The CWHC is actively engaged in developing new means of communications, including our wildlife health blog, "healthywildlife.ca" and social media accounts. Taken together our database and expertise places the CWHC on the cutting edge of wildlife health information management.



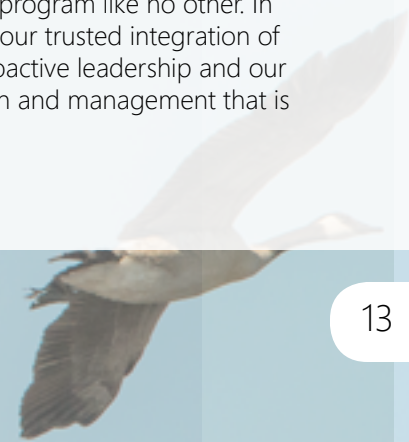
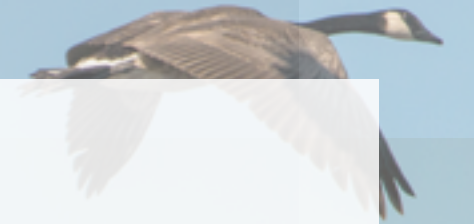
22 YEARS OF SUCCESS

Since its inception, the CWHC has undertaken thousands of disease investigations, trained hundreds of wildlife health professionals, contributed untold hours to teaching and has reported on scores of discoveries and scientific insights. From a modest beginning in the summer of 1992, the CWHC has worked with its partners to become the central node in Canada's wildlife health networks, a key support for government programs in human and animal health and environmental management, and Canada's national wildlife health agency.

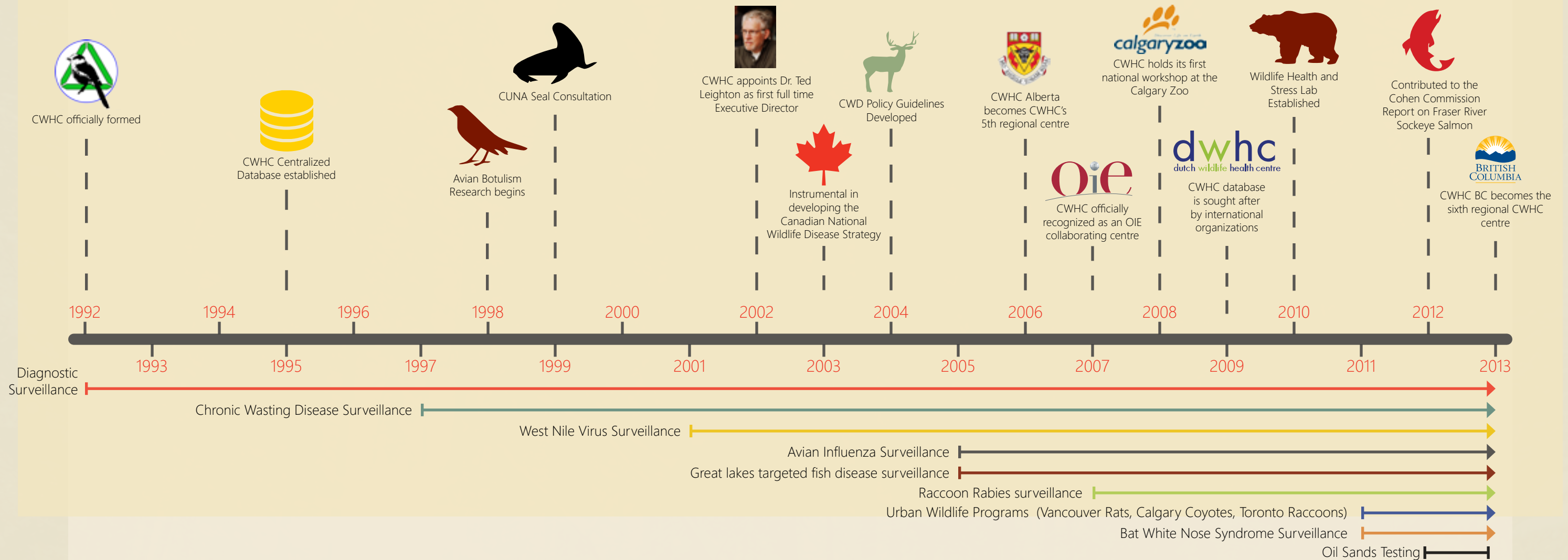
Canada now has a wildlife health surveillance program that exceeds all international standards. The outputs of our efforts have identified priority threats to wildlife conservation, developed strategies to protect wildlife health, helped to secure markets and maintain Canada's international trade in animals and animal products, and produced the evidence needed to mitigate public health concerns.

The CWHC has become a trusted partner in wildlife health, being sought after to facilitate national programs, produce evidence needed to mount local responses, and provide expert advice and leadership on some of the most pressing and perplexing wildlife disease issues confronting Canada.

Our Cooperative has grown over the last 22 years to include more regional centres, more affiliated nodes and more partners in research and practice to become a wildlife health protection program like no other. In our breadth of effective collaboration, our wide range of programs and capacities, our trusted integration of university-based science with responsible authorities, our scientific integrity, our proactive leadership and our cost efficiency, the CWHC represents a national capacity in wildlife health protection and management that is unique in the world.



22 YEAR HIGHLIGHTS



HUNDREDS OF THOUSANDS
of wildlife disease investigations

THOUSANDS
of hours of educational effort

HUNDREDS
of graduate students

HUNDREDS
of scientific and technical papers

SCORES
of disease discoveries

BAT WHITE NOSE SYNDROME

TRACKING A PROBLEM AND COORDINATING A NATIONAL RESPONSE

DETECTING EMERGENCE

Bat white-nose syndrome (WNS), the fungal disease devastating North American bat populations, emerged in Canada during the winter of 2009-10 and was diagnosed by the CWHC Ontario/Nunavut and Québec Regions. In 2011, CWHC Atlantic received a little brown bat that had died during hibernation in a cave where CWHC was studying fungal communities. This was the first case of WNS in the Canadian Maritime provinces. The Maritimes remain a hotbed of WNS mortality in Canada. Since that time CWHC has continued to track the emergence of WNS by collaborating with a wide variety of regional bat researchers and provincial partners.

DIAGNOSIS TO CONSERVATION ACTION

The investigation of WNS in Atlantic Canada led to field investigations to characterize population vulnerability to this disease. Little was known about where bats hibernated in the province of Prince Edward Island. Using citizen science and local high school students, CWHC Atlantic team members discovered the only known active hibernation site on the Island in an abandoned hand-dug well. The prevailing provincial policy is to fill in these wells for public safety, but, upon recognizing them as potential bat overwintering habitat use, provincial officials reconsidered this policy and are working on ways to maintain abandoned wells in such a way to protect the public while maintaining access for bats.

FACILITATING A NATIONAL APPROACH

The Canadian Wildlife Directors' Committee, recognizing the significance of WNS, tasked the CWHC with bringing together Canadian expertise on bats as well as key individuals from the United States. Initial efforts yielded a National Plan to Manage WNS in Canada, the development of working groups to address the various aspects WNS disease response in Canada, the formation of a Canadian WNS Steering Committee and the creation of a Canadian National WNS Coordinator position. This position has been embedded within the CWHC (Atlantic Region) to augment the organization's ongoing leadership on the issue. In her role as WNS coordinator, Allysia Park provides ongoing updates of bat WNS surveillance activities in Canada as well as protocols to guide surveillance, research, recreational and nuisance control activities as they relate to bat populations and managing WNS.

Much remains to be done to recover bat populations that have suffered from WNS as well as protect unaffected Canadian bat populations. The CWHC will continue to help wildlife agencies and organizations mitigate one of the most significant health issues ever faced by the wildlife community.

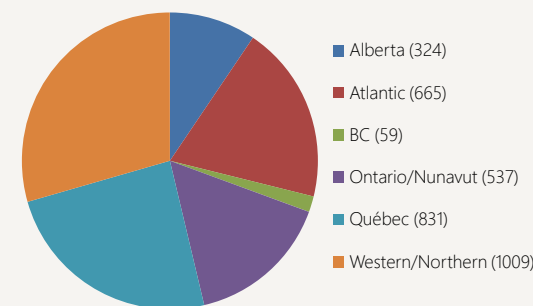
DIAGNOSTIC HIGHLIGHTS

A LOOK BACK AT 2013/14

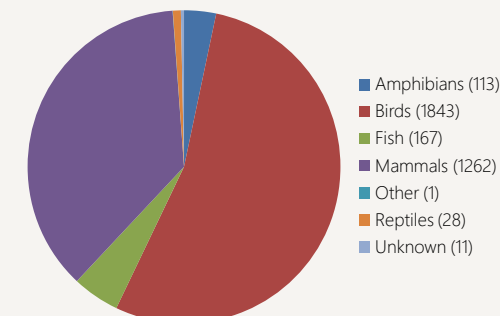
OVERVIEW

In 2012-2013, the number of wildlife specimens examined as part of the CCWHC health monitoring program rose by 6% from the previous year, with approximately 3600 specimens examined. The majority of specimens were birds and mammals and were provided to the program by government agencies and by public institutions, groups or individuals. Among the particularly notable findings were several occurrences of wildlife poisonings, range expansions of several important parasite species, disease outbreaks among fish on the prairies and a resurgence of West Nile Virus in Eastern and Central Canada detected in wild birds.

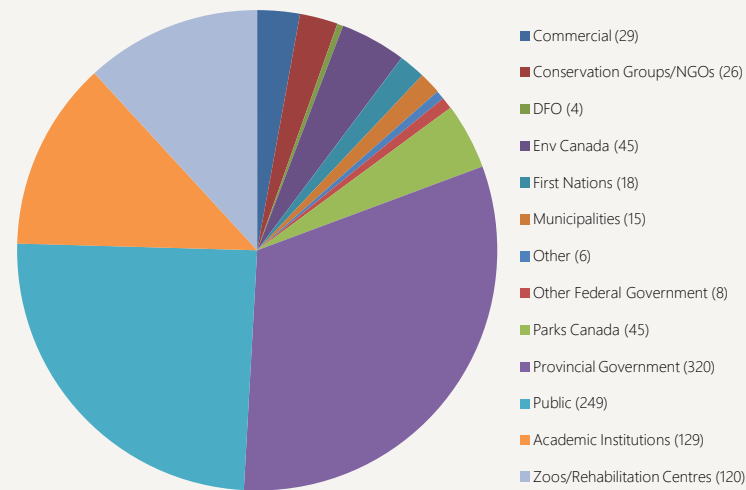
SPECIMENS BY CWHC REGION



SPECIMENS BY TAXONOMIC GROUP



SPECIMENS BY SOURCE



SPECIAL PROJECTS

PROJECT	TESTED	POSITIVE
Avian Influenza Virus	2610	51
West Nile Virus	201	87
Rabies	1077	7
Bat White Nose Syndrome	180	148
Chronic Wasting Disease	86	18

Notes:

- All data taken from the 2013 calendar year
- For detailed data special projects data, please see the CWHC website: www.cwhc-rcsf.ca/reports

DIAGNOSTIC HIGHLIGHTS

A LOOK BACK AT 2013/14

LINKING DISEASE AND CONSERVATION: AMPHIBIAN DECLINE

Frogs, toads and salamanders are indispensable members of the natural environment, and often thought of as the “canary in the mine” given their high sensitivity to pollution and other ecological alterations. Population declines, or even extinctions, of many amphibian species have been documented throughout the world for at least 20 years. One important cause of the declines is disease, particularly infection with the chytrid fungus and with a virus of cold-blooded vertebrates: ranavirus. The CWHC has been documenting outbreaks of disease in Canadian amphibians from the time they were first identified and is also involved in researching various aspects of the infections. In the 90’s, when ranaviruses were first recognized as an emerging cause of severe disease in amphibians, the CWHC focused on describing the course of the disease in tiger salamanders. Results show that ranavirus targets the cells of the immune system of the wood frogs, likely hindering its ability to respond to infection by the virus or any other pathogen. Work on amphibian diseases is vital to inform wildlife management practices regarding the response to an outbreaks, or the movement of animals from one location to another. The more information we have, the better able we will be to prevent the spread of disease into amphibian populations already threatened by habitat loss and other stressors and perhaps, slow down the decline of our amphibians.



FINDING NEW PATTERNS OF DISEASE: LISTERIOSIS IN RABBITS AND HARES

A bacterium infamous for its association with food borne illness has caused the death of two wild hares and a rabbit in Saskatchewan. The bacterium, *Listeria monocytogenes*, was involved in one of the most serious outbreaks of food-borne illness in Canada: the deli meat outbreak in 2008. In fact, *Listeria* is the 3rd most common bacteria associated with food-borne illness in people. But this bacterium also causes significant disease in domestic animals and wildlife. Sheep, goats and cattle can become infected from eating poorly-fermented silage. In wild animals, *Listeria* is known to cause three types of disease, collectively called Listeriosis: 1) septicemia (blood poisoning); 2) female reproductive illness including death of fetuses, miscarriage, uterine infection; and 3) infection in the brain, known as encephalitis. The rabbit and hares that died of Listeriosis in this instance were all females with severe uterine infections. What is unusual about this cluster of cases is it has not been documented in Western Canada before. Although all three were found within urban areas, this probably reflects that people are more likely to find sick or dead wildlife in the city rather than rural areas. The true impact of Listeriosis on rabbits and hares is unknown and further research will be necessary to understand how widespread it is and how these animals become infected.

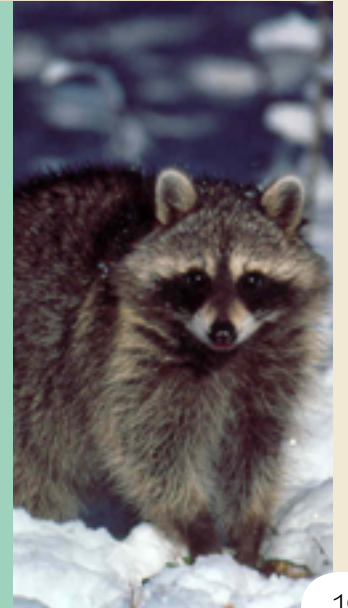


MONITORING CHANGING RISK: WEST NILE VIRUS AND WILD BIRDS

This past summer the CCWHC Western Northern region diagnosed WNV deaths in a Cooper’s hawk, two northern goshawks and two nestling loggerhead shrikes, as well as nine crows. This was a somewhat higher year for West Nile virus infection in birds in Saskatchewan. Some diagnostic testing is still pending so those numbers may increase. The death of the loggerhead shrike nestlings is particularly noteworthy as the number of shrikes has declined dramatically throughout their range and in some parts of Canada they face local extinction. The recent reports of eagles dying of West Nile virus (WNV) in Utah highlights the ongoing mortality in birds and other species associated with this introduced disease. The situation in Utah, where 40 eagles have died since December, is unusual because it is occurring late in the year after the mosquito season. Reports indicate eagles are contracting the disease after feeding on eared-grebes that died of West Nile virus earlier in the year, when mosquitoes were active. This route of transmission is also relatively uncommon. In Canada, eastern loggerhead shrikes are considered endangered and prairie loggerhead shrikes are threatened. The population of shrikes has been declining for the last century and the causes for the declines are multiple and varied. As their numbers dwindle, WNV is just one more threat faced by this vulnerable species.

SENTINELS OF CIRCULATING INFECTIONS: URBAN RACCOON DISEASE

A post-mortem investigation was done on a young raccoon that was among a small group found dead in a wealthy neighbourhood in Toronto. The raccoon had died of parvovirus enteritis, a disease that also causes severe disease in pet dogs. It is more commonly seen in raccoons in rehabilitation centres because infected raccoons become profoundly ill and die quickly, preventing the detection of cases in the wild. A large number of roundworms were also found in the raccoons. The worms (315 worms between 3-6 cm, in clumps and in tangled masses) filled the damaged intestine of the young raccoon. The parasite, known as *Baylisascaris procyonis* also causes rare but serious infections of the brain, eyes and various other organs in people. The case is a good insight into the intimate relationships between wildlife and society. Among healthy and wealthy people and their well-cared-for pets, can be found a large numbers of wild raccoons (common estimates of urban raccoon densities range from 25-50/km²) that may share disease-causing organisms with people and pets. Undertaking ongoing surveillance to ensure a well-informed disease management response that balances the needs of wildlife with the expectations of society is a key role for the CWHC.



INFORMATION SERVICES SUMMARY

PUBLICATIONS, CONFERENCES, AND COMMITTEES

SELECTED PUBLICATIONS

Daoust P-Y, M Hammill, G Stenson, C Caraguel. 2013. A review of animal welfare implications of the Canadian commercial seal hunt: A critique. *Marine Policy* <http://dx.doi.org/10.1016/j.marpol.2013.07.012>

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Stephen C, Karesh W. 2014 (in press). Is 'One Health' delivering results? *OIE Scientific and Technical Review*, Vol. 33 (2), August Burns, T, Ribble, C, McLaws, M., Kelton, D, Stephen, C. 2013. Can we increase compliance in reportable animal disease control by better understanding the views of stakeholders? A qualitative investigation of British Columbia backyard flock owners perspectives on bird health and avian influenza. *Journal of Risk Research*. 16(2): 245-260

Sarah H. Olson, **Jane Parmley**, Catherine Soos, Martin Gilbert, Neus Latorre-Margalef, Jeffrey S. Hall, **Frederick Leighton**, Vincent Munster, Damien Joly. 2014. Sampling strategies and biodiversity of influenza A subtypes in wild birds. *PLoS One* (Accepted)

Schurer, J., T. Shury, **F. Leighton**, E. Jenkins. 2013. Surveillance for *Echinococcus Canadensis* genotypes in Canadian ungulates. *International Journal for Parasitology: Parasites and Wildlife*. 2: 97-101.

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Boulanger J, **Cattet M**, Nielsen S, Stenhouse G, Cranston J. 2013. Use of multi-state models to explore relationships between changes in body condition, habitat and survival of grizzly bears *Ursus arctos horribilis*. *Wildlife Biology* 19:274-288.

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For a full list of publications, please visit www.cwhc-rcsf.ca/publications

SELECTED CONFERENCES

Challenges in Animal Health Surveillance. International Conference on Animal Health Surveillance. La Havana – Key note lecture

Wildlife Disease Association International Conference at Knoxville, Tennessee

Presentation title: "Long-Term Effects of Capture and Handling: An Issue That Should Not Be Ignored"

Expert advisor in the second hearing for WTO EC-Seals litigation, Geneva, Switzerland

Diseases shared between humans and wildlife. Centre for Public Health and Zoonoses Research Symposium, Guelph, ON.

Ecology of *Leptospira interrogans* in Norway Rats (*Rattus norvegicus*) in an Inner-City Neighborhood of Vancouver, Canada. The International Conference on Diseases in Nature Communicable to Man, Calgary, AB.

Canadian Science Center for Human and Animal Health. Winnipeg, Manitoba, "The Emerging Interface of Arboviruses and Wildlife."

6th Annual Workshop on Regional Surveillance and Research for Wildlife-borne Diseases. Fort Collins, CO. "Update on Activities by the Canadian Cooperative Wildlife Health Centre."

SELECTED COMMITTEES

OIE Working Group on Wildlife Diseases

Canada's Inter-agency White Nose Syndrome Committee - Coordinator

Canada's Inter-agency Rabies Surveillance Committee – data management project - Coordinator

Member of the Advisory Board of the Wildlife Disease Association Wildlife Veterinary Section

Technical representative for the Association of Fish and Wildlife Agencies Wildlife Controlled Substances Task Force

Nova Scotia Mainland Moose Recovery Team Member

Parks Canada Animal Care Committee

Provincial Rabies Advisory Committees

Scientific Program Committee member. Rabies in the Americas Conference. Toronto. October, 2013

Canada's Inter-agency Wildbird Avian Influenza Steering Committee - Coordinator

Provincial committees for the surveillance of Avian Influenza Virus

Veterinary expertise Aquarium du Quebec (conservation on native wildlife)

CWHC FINANCIALS

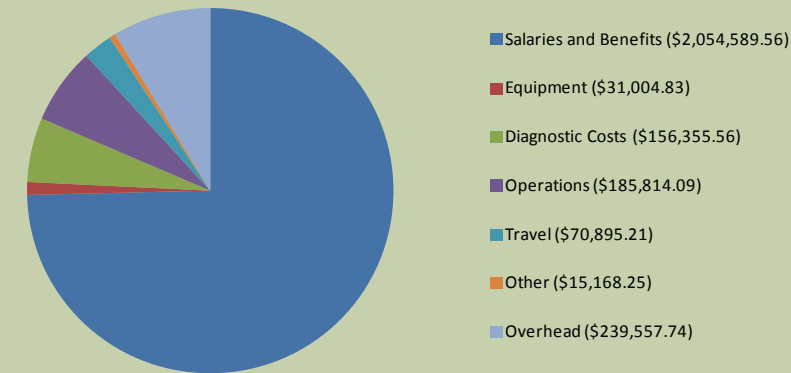
REVENUES

	Core (General)	Special Projects	Total Revenues
Canadian Food Inspection Agency	200,000	309,753	509,753
Environment Canada	400,000	136,418	536,418
First Nations and Inuit Health Branch	4,972		4,972
Fisheries and Oceans		41,620	41,620
Foothills Research Institute		161,347	161,347
Parks Canada	125,000		125,000
Public Health Agency of Canada	212,000	9,998	221,998
Alberta			
Alberta - Community Development	4,000		4,000
Alberta - Fish and Wildlife	5,000	7,000	12,000
British Columbia	20,000	4,240	24,240
Manitoba	10,000		10,000
New Brunswick			
New Brunswick - Fish and Wildlife	10,259	3,500	13,759
New Brunswick - Health	5,000		5,000
Newfoundland & Labrador	21,711		21,711
Northwest Territories	16,000	9,300	25,300
Nova Scotia	9,500		9,500
Nunavut	15,000	3,420	18,420
Ontario			
Ontario - Agriculture, Food and Rural Affairs		50,000	50,000
Ontario - Health and Long Term Care	100,000		100,000
Ontario - Natural Resources	114,500	95,000	209,500
Prince Edward Island			
PEI - Environment	4,735		4,735
PEI - Health		1,050	1,050
Quebec			
MAPAQ	50,000	61,628	111,628
MRNF	50,000	3,238	53,238
Saskatchewan			
Saskatchewan Agriculture and Food			
Saskatchewan Environment	41,309	50,350	91,659
Saskatchewan Health		2,336	2,336
Yukon	10,000	990	10,990
Canadian Wildlife Federation	10,000		10,000
UCVM	125,000		125,000
TOTAL REVENUE	\$ 1,563,986.00	\$ 1,168,676.00	\$ 2,732,662.00

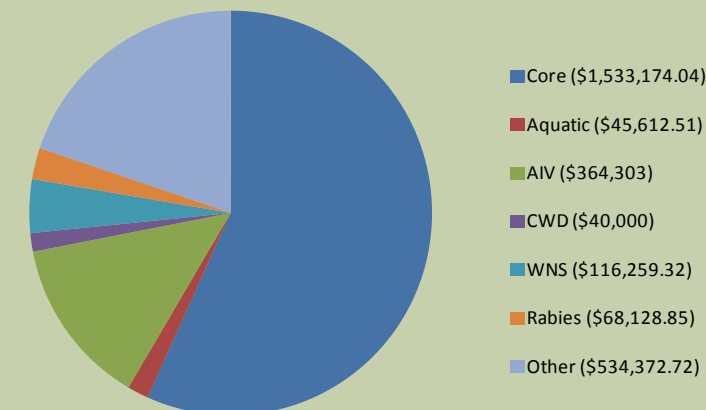
EXPENSES

EXPENSES	Core (General)	Special Projects	Total Expenditures
Salaries and Benefits	1,304,182	750,408	2,054,590
Equipment	28,276	2,729	31,005
Diagnostic Costs	121,900	34,456	156,356
Operations	80,421	105,393	185,814
Travel	34,857	36,039	70,895
Other	13,792	1,376	15,168
Overhead	157,621	81,937	239,558
TOTAL EXPENSES	\$ 1,741,049.00	\$ 1,012,337.00	\$ 2,753,385.00
REVENUE LESS EXPENSES	\$ (177,063.00)	\$ 156,340.00	\$ (20,723.00)

EXPENSES BY CATEGORY



REVENUES BY PROJECT



SECURING OUR FUTURE

PARTNERSHIPS AND CAPACITY

This year's annual report is a reminder of the important role the CWHC plays in ensuring a healthy future for wildlife and Canadians. The past decade has shown us how many surprises arise at the wildlife-human-environment interface. Our goal is to be ahead of the curve and equip the organization to anticipate emerging trends while ensuring a consistent capacity to respond to ongoing problems.

To reach this goal, we are working to diversify our funding opportunities through strategic partnerships and by more effectively communicating our value to the private and NGO sectors. Our Executive Committee has been instrumental in securing resources to help us in this task.

Training the next generation of wildlife health scholars and practitioners who are armed with the skills and knowledge needed to confront emerging challenges to wildlife health is a cornerstone of our plans to be prepared for the future.

We continue to develop new capacity to address the full spectrum of surveillance activities by expanding our diagnostic abilities, extending our partnerships to access new information, improving our information management capacity and creating new tools to quickly communicate information throughout our network.

It is clear that the role for wildlife in ensuring healthy ecosystems, sustainable economies and secure and safe communities will only continue to grow as social and environmental pressures increase. The CWHC is positioning itself to be ready to help make good decisions about how we interact with wildlife to sustain their health and ours.

EDUCATION AND TRAINING

Education is a key activity for the CWHC. Through contributions to University curricula, graduate student training, and workshops and training we are dedicated to ongoing and future development of wildlife health professionals. In addition to training and development CWHC educational activities are focused on the engagement of wildlife health personnel in surveillance activities and the public through informational websites, public presentations and the new media.

2013/14 was an active and productive year for the CWHC: we contributed approximately 600 hours of University course instruction, numerous scientific presentations, over 60 publications, and conducted our 4th Wildlife Health Professionals workshop in Québec City.

Almost 50 graduate students were being supervised and/or trained by CWHC representatives with projects ranging from the development of wildlife health intelligence systems globally to anti-microbial resistance studies in wildlife as well as numerous disease research projects, ranging from Chronic Wasting Disease, Lyme Disease, White Nose Syndrome, ranaviruses and West Nile virus.

OUR MISSION

To promote and protect the health of wildlife and Canadians through leadership, partnership, investigation and action.

LEADERSHIP SUCCESSION



DR. TED LEIGHTON

When Dr. Frederick A. (Ted) Leighton steps down from his role as executive director of the CWHC on July 1, he leaves behind a vital, successful organization that's the envy of other countries.

Leighton is especially pleased with the role that he played in establishing the organization which applies the veterinary medical sciences to wildlife conservation and management in Canada through the collaboration of Canada's five veterinary colleges.

"I don't consider it to be my personal creation," says Leighton. "It's the creation of all the people in the CWHC, and my role has been that of a successful manager who sees the strengths of the people within a collaboration and finds ways of letting those strengths be expressed."

"It's the perfect time for a new person to come in and take over," says Leighton. "The CWHC is on a good footing, and I'm the only one who is stepping down. Everyone else is still in place; the ship is under full sail and they will manage perfectly well without their current captain."



DR. CRAIG STEPHEN

The CWHC's new director, Dr. Craig Stephen, is someone whose lifelong commitment to wildlife mirrors that of his colleagues at the CWHC.

"It is a critical time for wildlife health in Canada and globally," he said. "New diseases, habitat loss, pollution and other pressures are causing tremendous challenges for wildlife. I am excited to be part of a team with the skills and passion to confront these challenges and work with the Canadian wildlife community to find solutions," says Dr. Stephen.

As the CWHC's new leader, Stephen's first goal is sustainability. He plans to continue all the organization's important work in the face of challenging fiscal times in Canada and in the world.

He will also strive to strengthen the group's capability to share the knowledge they've gained through detection, diagnosis and analysis so that they can get the message out to the people who can make a difference, both in industry and government.

SECURING OUR FUTURE

OUR VISION

A world that is safe and sustainable for wildlife and society.

FUNDRAISING & DEVELOPMENT

The CWHC has been pursuing new approaches to securing its future by developing strategies to further engage the private sector and public as partners in funding and science. The steady funding provided by our government partners in times of fiscal restraint and cut-backs have been a firm vote of confidence in the CWHC, but as more issues challenge wildlife, we need to work with a larger suite of organizations to develop a sustainable funding base from which we can launch the programs and projects needed to meet our increasingly important mandate.

WILDLIFE AMBASSADORS' DINNER

This year the CWHC initiated a new program of outreach with Canada's business community; with the guidance and assistance of our Development Subcommittee of our Executive Committee we hosted a Wildlife Health Ambassadors' Dinner in Toronto in February 2014. The event was co-hosted by our partner the Canadian Wildlife Federation and featured an engaging presentation by William Winram, shark conservationist and free diving world record holder. The dinner and the CWHC message it delivered resonated with many who were in attendance and it is hoped that through ongoing dialogue these individuals and the businesses they represent will serve as "ambassadors" for the CWHC, providing advice, expertise and opening doors to new opportunities. In the coming year, look for major changes to CWHC graphic design and further outreach as our Wildlife Health Ambassadors lead us down the road to corporate partnerships.

COMMUNICATIONS & REBRANDING

The CWHC has embarked on the road toward making the CWHC and the issues it addresses better known to Canada and the world. The first step is building our brand, expressing what the CWHC stands for, what we value and what helps guide the organization. To begin with and in conjunction with our corporate advisors we changed our name to the Canadian Wildlife Health Cooperative and we are working on establishing our key messaging. Also, in collaboration with our development committee and the generous support of "Polyester" a graphic design company in Toronto we have begun work on establishing a more impactful visual design for CWHC communications.



WHY DOES THE CWHC MATTER?

In an increasingly complex, interconnected and interdependent world, the value and importance of the Canadian Wildlife Health Cooperative has never been more apparent, never been more critical. The community of competencies, knowledge and collaboration that comprise the CWHC are fundamental to understanding, interpreting, anticipating, preparing and responding to the social and economic consequences that continue to emerge at the interface between ecosystem health, animal health and human health.

BRIAN EVANS

DEPARTMENT HEAD

OIE SCIENTIFIC AND TECHNICAL DEPARTMENT

STAFFING & ACKNOWLEDGEMENTS

CWHC HEADQUARTERS

Ted Leighton - Executive Director
 Patrick Zimmer - HQ Director
 Kevin Brown - Information Services Manager
 Marc Cattet - Professional Associate
 Nadine Kozakevich - Accountant
 Chris Pinel - Systems Analyst
 Bevan Federko - Programmer/Analyst
 Jane Parmley - Epidemiologist
 Christine Wilson - HQ Technician

ASSOCIATES

Catherine Soos Gord Stenhouse
 Dave Janz

EXTERNALLY CONTRACTED

Jerone Cranston - GIS Technician

WILDLIFE HEALTH AND STRESS LAB

Gillian Cattet - Laboratory Technician
 Chloe Rollack - Laboratory Technician

CWHC WESTERN/NORTHERN

Trent Bollinger - Regional Director
 Lorraine Bryan - Veterinary Pathologist
 Marnie Zimmer - Biologist
 Crystal Rainbow - Technician

ASSOCIATES

Emily Jenkins Vikram Misra
 Cheryl Waldner

CWHC ONTARIO/NUNAVUT

Claire Jardine - Regional Director
 Doug Campbell - Veterinary Pathologist
 Lenny Shirose - Biologist
 Dave Cristo - Communications and Project Coordinator
 Erin Scharf - Wildlife Technician

CWHC BC

Chelsea Himsworth - Regional Coordinator
 Jane Pritchard - Director, Plant and Animal Health Branch
 Ann Britton - Veterinary Pathologist
 Victoria Bowes - Avian Pathologist
 Stephen Raverty - Veterinary Pathologist
 Helen Schwantje - Wildlife Veterinarian
 Cait Nelson - Wildlife Health Biologist
 Craig Stephen - Director, CCH

ASSOCIATES

Tyler Stitt

CWHC ALBERTA

Susan Kutz - Regional Director
 Mani Lejeune - Wildlife Parasitologist
 Pdraig Duignan - Wildlife Pathologist
 Jian Wang - Lab Manager

ASSOCIATES

Susan Cork Karin Orsel
 Nigel Caulkett Judit Smit
 Sylvia Checkley Alessandro Massolo

Paul Oesterle - Research Assistant
 Carol-Lee Ernst - Secretary
 Jane Parmley - Epidemiologist

ASSOCIATES

Dale Smith Ian Barker

CWHC QUÉBEC

Stéphane Lair - Regional Director
 André Dallaire - Veterinary Pathologist
 Arianne Santamaria-Bouvier - Veterinary Resident
 Sylvain Larrat - Veterinary Resident
 Audrey Daigneault - Wildlife Technician
 Judith Viau - Wildlife Technician
 Kathleen Brown - Lab Supervisor
 Joëlle Benoit - Wildlife Technician
 Vivianne Casaubon - Wildlife Technician

ASSOCIATES

Julie Arsenault Guy Fitzgerald

CWHC ATLANTIC

Pierre-Yves Daoust - Regional Director
 Scott McBurney - Diagnostic Pathologist
 María Forzá - PhD Graduate Student
 Heather Fenton - MVSc Graduate Student
 Allysia Park - Bat WNS National Coordinator
 Darlene Weeks - Wildlife Technician
 Fiep de Bie - Wildlife Technician

ASSOCIATES

Gary Conboy Raphael Vanderstichel
 Marion Desmarchelier Dave Groman
 Fred Kibenge Shannon Ferrell
 Spencer Greenwood Shannon Martinson

ACKNOWLEDGEMENTS

The CWHC is a unique model that brings together expertise distributed across the nation in our core university and government and non-government partners into the single focus of ensuring healthy wildlife. Without these collaborative partnerships, the CWHC could not provide the advice, insights and evidence needed to develop strategies to protect wildlife health and we would like to thank all of those organizations and agencies with whom we have worked in the past year.

HOST INSTITUTIONS AND REGIONAL NODES

British Columbia Animal Health Centre
 University of Calgary – Faculty of Veterinary Medicine
 University of Saskatchewan – Western College of Veterinary Medicine
 University of Guelph – Ontario Veterinary College
 University of Montreal – Faculty of Veterinary Medicine
 University of Prince Edward Island – Atlantic Veterinary College

PARTNER AGENCIES AND SPONSORS

Alberta - Community Development
 Alberta - Fish and Wildlife
 British Columbia Ministry of Environment
 British Columbia Ministry of Forests, Lands and Natural Resource Operations
 Canadian Food Inspection Agency
 Canadian Wildlife Federation
 Environment Canada
 First Nations and Inuit Health Branch
 Fisheries and Oceans
 Foothills Research Institute

PARTNER AGENCIES AND SPONSORS

Manitoba Ministry of Conservation and Water Stewardship
 New Brunswick - Fish and Wildlife
 New Brunswick - Health
 Newfoundland & Labrador Wildlife Division
 Northwest Territories– Environment and Natural Resources
 Nova Scotia Department of Natural Resources
 Nunavut Department of Environment
 Ontario - Agriculture, Food and Rural Affairs
 Ontario - Health and Long Term Care
 Ontario - Natural Resources
 Parks Canada
 PEI - Environment
 PEI - Health
 Public Health Agency of Canada
 Quebec
 MAPAQ
 MRNF
 Saskatchewan Environment
 Saskatchewan Health
 Yukon - Environment

CANADIAN WILDLIFE
HEALTH COOPERATIVE



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