



CANADIAN
**WILDLIFE HEALTH
COOPERATIVE**



CWHC ANNUAL REPORT
2019/2020

NOTE FROM THE CHIEF EXECUTIVE OFFICER

This year saw the global emergence of the COVID-19 virus. The social disruption, economic impacts, and increase burden of illness due to this virus served as an important reminder of the place for wildlife disease surveillance in recognizing and mitigating the adverse impacts of zoonotic diseases on human health. Wildlife associated zoonoses are expected to increase in frequency and importance along with globalisation, climate change and ecosystem alterations which bring people and wildlife into closer contact. The growth and sustainability of the pan-Canadian stewardship and surveillance offered by the CWHC will continue to be a strategic priority of the organization to fulfill our social contract of helping Canadians feel assured when conditions are safe and prepared when threats emerge.

This year also saw increasing feedback on the value of thinking about wildlife health as more than the absence of disease. The health-centric approach of the Pan-Canadian Approach to Wildlife Health developed and championed by the CWHC is serving as a conceptual framework allowing more frequent and diverse conversations between different government agencies. Reports back to us suggest that talking about health as a fulltime job rather than disease emergencies as transient events has encouraged longer-term and more strategic thinking about how we help wildlife cope with the rapidly changing world. It is my sincere hope that the COVID-19 outbreak does not take us backwards wherein wildlife health programs are seen only for their sentinel value for public health and agriculture, but instead Canada continues to move forward, finding innovative ways to be proactive to protect and sustain healthy wildlife.

This year was also my last in the position of Chief Executive Officer. It has been an honour and a privilege to help the CWHC grow. I was provided an excellent foundation laid out by our national office, all the regional centre directors, and my predecessor, Dr. Ted Leighton. My hope is that the CWHC remains a critical part of implementing the Pan-Canadian Approach to Wildlife Health and expands its international reputation as a premier wildlife health organization. As always, I thank all our funders, staff, and directors for their vision, commitment and support of the CWHC, in helping us ensure our value for conservation, society and ecosystems.

Craig Stephen

Chief Executive Officer, CWHC



NOTE FROM THE CHIEF OPERATING OFFICER

The CWHC continues to be a dynamic network of individuals and organizations devoted to the health of wildlife in Canada. New programs and initiatives, such as facilitating the development of national priorities in addressing invasive species such as feral pigs/wild boar, and monitoring for plastics pollution and its effect on wildlife, compliment our ongoing work and activities in such diverse subjects as, marine mammal research and mortality investigations, bat health messaging, training and surveillance and many more. This year we continued to make great strides in our health intelligence efforts, with our Wildlife Health Intelligence Platform now being used by multiple groups and governments in North America, Europe and Asia.

This past year also saw the CWHC continue to apply its activities and expertise to aid Canadians in decisionmaking, including focused efforts on emerging concerns relating to COVID-19, such as quickly developing bat handling guidelines to better protect our vulnerable bat populations and those working with them, as well as facilitated risk assessments pertaining to wildlife and COVID-19. We also initiated a review of our organizational model and conducted strategic reviews with external experts and partners to better position ourselves to meet future needs and expectations, especially in the context of the Pan-Canadian Approach to Wildlife Health.

The continued support of our host institutions, partners and sponsors as well as our staff, directors, and associates allow the CWHC to continue to meet the needs of Canadians to promote and protect wildlife health. The dedication of our partners within government and without, as well as the commitment of our staff, directors, and network members allow the CWHC to deliver a national program that far exceeds investment, and positions Canada in having a world-class wildlife health program. Indeed the CWHC has been recognized by the World Health Organization (WHO) and World Organization for Animal Health (OIE) as a best practice in detecting emerging infectious diseases and that retaining its core functions is critical for many funders and partners. It is with sincere thanks that I am happy to present this year's annual report of our activities and operations.

Patrick Zimmer

Chief Operations Officer, CWHC



OUR PARTNERS



Canada

Parks Canada
Environment and Climate Change Canada
Canadian Food Inspection Agency
Public Health Agency of Canada

HOST INSTITUTIONS



UNIVERSITY OF
CALGARY



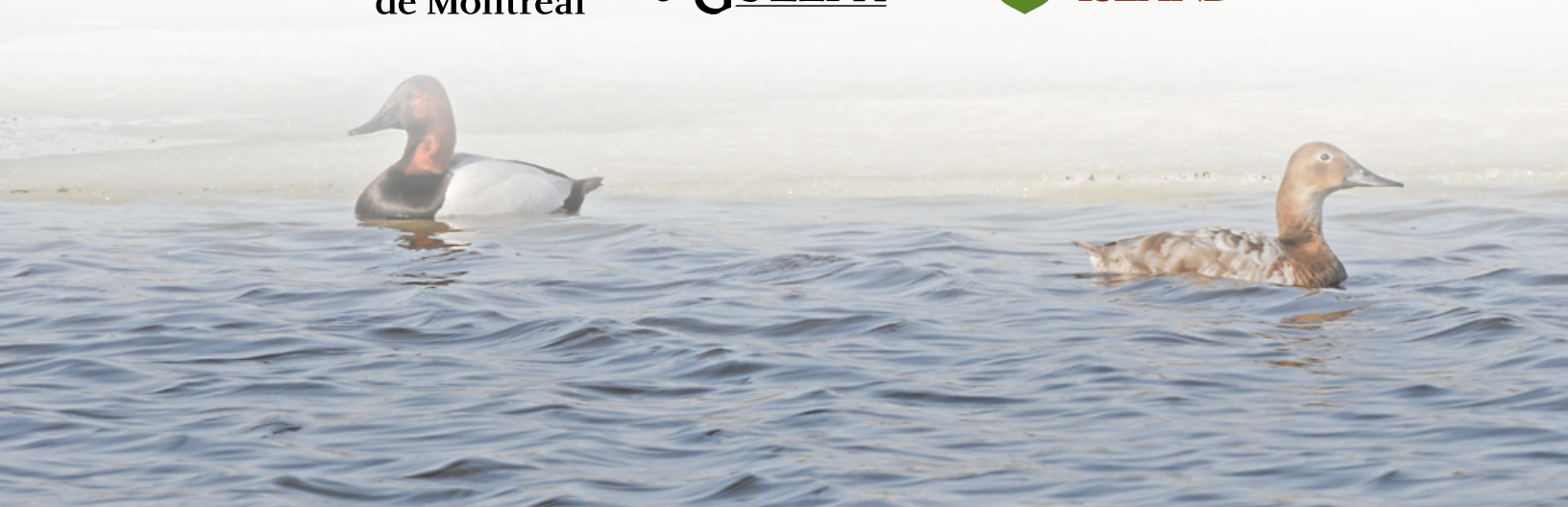
UNIVERSITY OF
SASKATCHEWAN

Université
de Montréal

UNIVERSITY
of GUELPH



UNIVERSITY
of Prince Edward
ISLAND



HEALTH INTELLIGENCE

Health intelligence is the process of generating, collecting, and analyzing a variety of information to foster collaboration and consultation through surveillance, information exchange, research, and response to protect, promote, and support decisions affecting wildlife health and its associated social values. Our health intelligence links various sources of information to document the wildlife health situation in Canada including signals of emerging risks and changes in vulnerability.

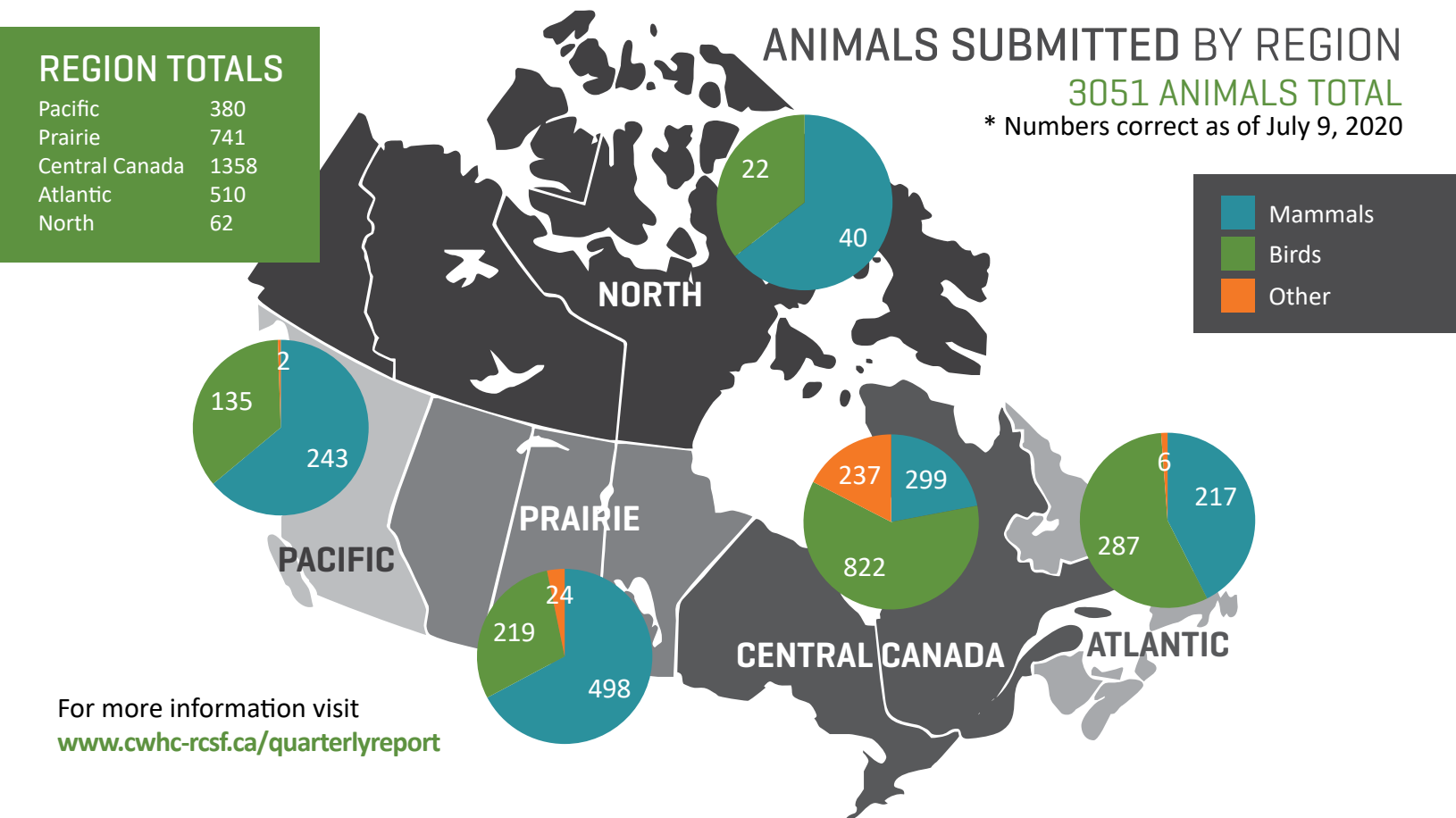
ORGANIZATION OF THE REPORT

Our annual report once again strives to provide Canadians with an update on the state of wildlife health. The report is organized to fit the 4 pillars of the Pan-Canadian Approach to Wildlife Health: Intelligence, Innovation, Stewardship, and Governance. Our critical functions of providing assurance, preparedness, response, and protection are embedded in our Intelligence role. By organizing our report this way, the reader not only sees how the CWHC already contributes to a broad suite of needs of the Pan-Canadian Approach, but also is provided with a summary of wildlife health events of note in 2019-2020.



ASSURANCE

The CWHC assures Canadians about the safety of nature and provides confidence in risk management by informing and educating people and governments about the state of wildlife health in Canada as well as leading in the development of a competent wildlife health workforce. The CWHC has provided a snapshot of what is happening in wildlife diseases through opportunistic and active surveillance in our 6 regional centres. The consistency in the effort helps give confidence when new issues emerge or trends change. The following figure summarizes what we examined and where they came from across our network.



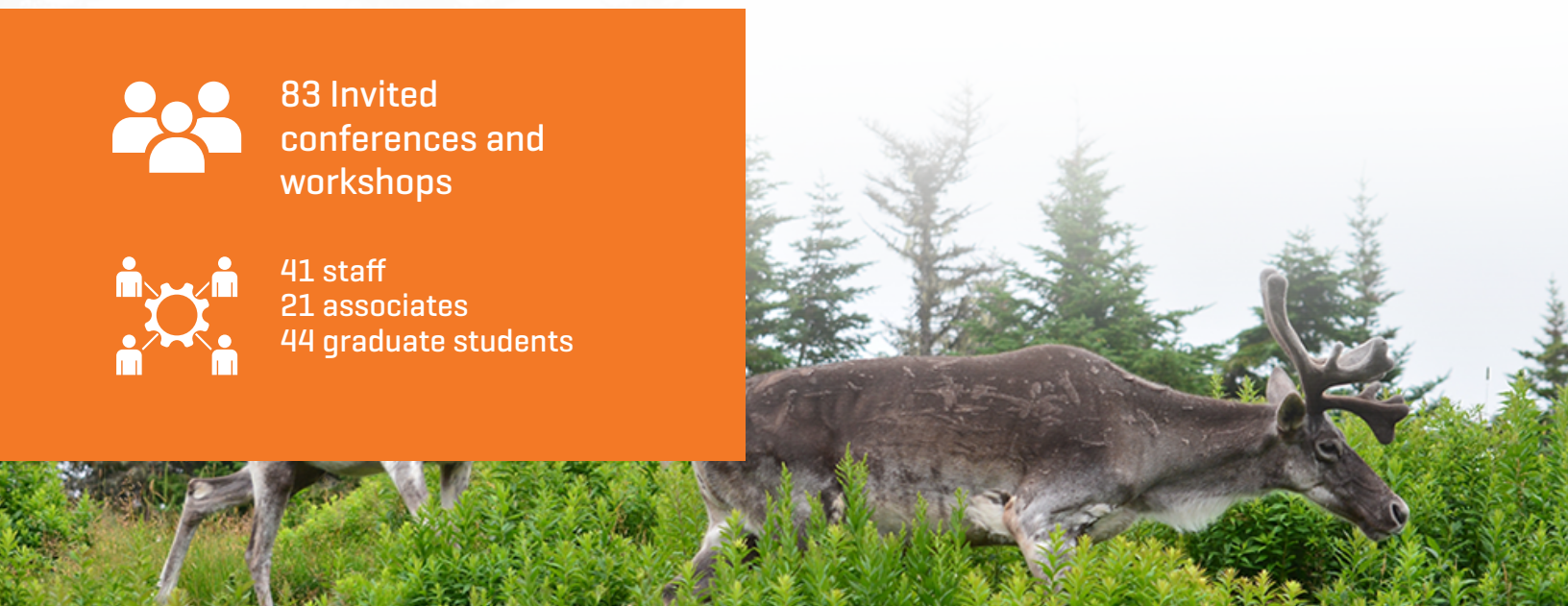
Having our origins in research, as well as 5 of our 6 regional centres being embedded in universities provides the CWHC a tremendous advantage in training the next generation. Our surveillance case load not only provides experience in disease diagnostics, but is often the source of new issues that become the foundation of research programs for Masters of Science and PhD students. As the need for a wider breadth of expertise is needed to inform evidence-based wildlife health management, so too has the variety of topics covered by our trainees grown.



83 Invited conferences and workshops



41 staff
 21 associates
 44 graduate students



PREPAREDNESS

An important part of being prepared for what is coming is the ability to see what is coming. The CWHC provides important, understandable health information on endemic and emerging diseases of importance to conservation, public health, food production, and incomes. It brings assessed surveillance data and research into decision-making through its knowledge mobilization products. Wildlife-sourced diseases are expected to increase in frequency and importance along with globalisation, climate change, and ecosystem alterations which bring people and wildlife into closer contact. Paying careful attention to change and early warnings are a critical role for the CWHC. We present below some examples of interesting and important changes or trends generated through the CWHC in 2019-2020.

SELECTED DISEASE COUNTS

AVIAN BOTULISM

Examined	183
Positive	1

BOVINE TUBERCULOSIS

Examined	350
Positive	0

NEWCASTLE DISEASE

Examined	516
Positive	12

WEST NILE VIRUS

Examined	485
Positive	50

AVIAN INFLUENZA

Examined	516
Positive	2

CANINE DISTEMPER VIRUS

Examined	898
Positive	40

RABIES

Examined	1491
Positive	29

WHITE-NOSE SYNDROME

Examined	266
Positive	7

AVIAN CHOLERA

Examined	183
Positive	3

CHRONIC WASTING DISEASE

Examined	343
Positive	69

SNAKE FUNGAL DISEASE

Examined	20
Positive	2

Climate change is providing opportunities for pathogen traffic. On both the east and west coasts of Canada, marine species that normally inhabit more southernly climes are being found more routinely in colder Canadian waters. For example, a *Mola mola* (or “Ocean Sunfish”) that typically prefers temperate and tropical waters farther south was found on the Prince Edward Island coast in November. Although likely succumbing to cold shock, autopsy of this 422 kg fish found several unique parasites in its gills, liver, and gastrointestinal tract. A case of notoedric mange diagnosed in an Eastern gray squirrel in Montréal reminds us that diseases that are common in the United States but rare in Canada may be influenced by climate change and urbanization that change the exposure and sensitivity of Canadian wildlife to previously rare pathogens and parasites.

In other cases, pathogens typical of one species are found in another, as was the case of bat strain rabies in a striped skunk in Québec. Although this was not a surprising event, the ability to differentiate rabies strains is a critical part of the Québec effort to manage raccoon strain rabies in the province.



RAT-ASSOCIATED ZONOOSES

Graduate student, Sarah Robinson (CWHC ON/NU at the University of Guelph), is investigating the ecology of rat-associated zoonotic pathogens from 3 urban areas in Ontario (Windsor, Hamilton, and Toronto). The CWHC is working with pest control companies to obtain rat carcasses and will be testing them for a variety of zoonotic pathogens, including, *Leptospira interrogans*, *Clostridium difficile*, methicillin-resistant *Staphylococcus aureus*, Hepatitis E virus and Seoul hantavirus. This is a highly collaborative project with partners from CWHC BC, the University of Guelph, the City of Hamilton, and the National Microbiology Laboratory.

Beginning in 2011, the aim of the Vancouver Rat Project has been to understand the risks that rats pose to the health of Canadians. Through our work, we have found that rats in Vancouver’s Downtown Eastside carry a number of pathogens transmissible to people, and that pest control interventions that focus on the culling of rats can increase the prevalence of some of these pathogens, potentially increasing rat-associated health risks. Beyond disease-associated risks, we have also shown that living with rats can negatively impact the **mental health of residents living with them**. This is primarily due to the presence of rats in the home, which can lead to a loss of sleep and increased anxiety. These findings underscore the need to reconceptualize how we consider the risks that rats pose to human health. More information on CWHC rat related projects can be found on our website: <http://www.vancouverratproject.com/>

As Canada steps up efforts to coordinate a national response to invasive pigs like feral pigs and wild boar, with funding and support from the Saskatchewan Ministries of Agriculture and Environment, our Western/Northern regional centre has been testing free-ranging wild boar for diseases that could have potential impacts for domestic animal and human health. To date, close to 200 invasive pigs have been tested for a wide variety of pathogens, including Influenza A, Trichinella, Chronic Wasting Disease, with a dozen different pathogens tested in total per animal. Overall the animals tested have been found to be healthy, the most prominent pathogen found being *Actinobacillus pleuropneumonia*. Initial results of disease testing were published in the Canadian Veterinary Journal (McGregor et al, 2015) and the findings and conclusions have not significantly changed since that publication. Surveillance for occurrence of significant diseases in this invasive species is ongoing.

Our surveillance is not limited to parasites and pathogens. Reviews of our records and submissions of new cases continue to speak to the toll on birds of prey in western Canada from contaminants like lead ammunition or pest control products and the irresponsible use of barbiturates to euthanize animals.

CHRONIC WASTING DISEASE

The CWHC tested 131 cervids from Saskatchewan, Quebec, and Ontario for Chronic Wasting Disease (CWD) in 2019. As of March 2020, 36 were positive (27%) and were all from Saskatchewan where the disease is endemic in wild deer populations. Surveillance indicates that the disease is spreading to new geographic regions and the prevalence appears to be increasing. A current map of the CWD distribution in captive and free ranging cervids in North America is accessible from the USGS National Wildlife Health Centre: https://www.usgs.gov/centers/nwhc/science/expanding-distribution-chronic-wasting-disease?qt-science_center_objects=0#qt-science_center_objects



In addition to our scanning surveillance efforts among cervids, our partners within the BC Provincial Government Ministry of Forests, Lands, Natural Resource Operations and Rural Development has increased targeted surveillance and testing in British Columbia. The B.C. CWD program, initiated in 2000, is focused on prevention by reducing risk through regulatory changes and increasing awareness. The program performs targeted surveillance in what are considered the highest-risk areas adjacent to neighbouring jurisdictions with positive cases (Alberta and Montana). The Province was considered low-risk for the presence of CWD until the summer of 2019 when positive cases were confirmed in northwest Montana, within Libby city limits, only 50 km from the B.C. border. The response by the B.C. Wildlife Health Program and our partners was to significantly enhance surveillance in southeast B.C. to confirm CWD status and ensure detection as soon as possible if introduced. The B.C. government issued an order for the mandatory submission of deer heads, under the Animal Health Act, from harvested animals from management units adjacent to the BC-Montana border during the 2019 hunting season. Support from the hunting and local communities was excellent and resulted in a record number of heads submitted; over 1000 samples were collected from those management units considered at highest risk. Overall, the B.C. CWD Program submitted over 1200 samples in 2019-20 to the CWHC laboratory in Saskatoon for testing, with no positive CWD results to date.

RESPONSE

The CWHC helps our partners plan and organize response to wildlife disease concerns by alerting them to the issue, coordinating and facilitating cooperative planning and providing information on the impacts of management actions.

INVASIVE WILD PIGS

Invasive wild pigs are classified as any pig living outside a fence and can include Eurasian wild boar, escaped domestic breeds and/or a combination of the two. One thing we know for sure is that they are destructive to the environment. They destroy critical habitat, crops, and can transmit pathogens to other animals and humans.

In collaboration with Environment and Climate Change Canada, the CWHC National office has assembled two working groups to develop an action-oriented strategy to mitigate the problem. The groups aided by experts from across North America will address the knowledge gaps and determine priorities for invasive pig management across Canada.



PLASTIC POLLUTION

Plastic use has increased globally since its first introduction in the 1950s. Since that time it has provided a cost-effective alternative to other packaging but is not without negative side effects. Most plastic products are incredibly durable and therefore break down very slowly, causing mounting issues with waste management and pollution. Plastic pollution can be found everywhere in the environment, from shorelines to ditches. Each year, wildlife is impacted by plastic pollution either from entanglements in discarded single-use items or ingestion of particles. The long-term impacts of exposure to plastic pollution are not well-documented in wildlife or people.

In partnership with Environment and Climate Change Canada, the CWHC is helping with response by building capacity to detect and describe the problem and the effects of interventions through better surveillance. In addition, targeted outreach and educational materials as well as new technologies to store, share and utilize monitoring and observational data are being developed.

NORTH ATLANTIC RIGHT WHALES

The North Atlantic right whale (*Eubalaena glacialis*) is a critically endangered species of large whale that is estimated to have a population of just over 400 individuals. Historically hunted to near extinction, this species is currently struggling to survive due to poor reproductive success and a high mortality rate. In recent years, these issues have been complicated by a sudden and dramatic shift in the annual distribution of right whale habitat in Canadian waters from their historical, protected “critical habitat” of Bay of Fundy and south shore of Nova Scotia, into the Gulf of St. Lawrence.

The consequences of this shift in home range were made starkly apparent in 2017 when an unprecedented number of right whales (>100) appeared in the Gulf of St. Lawrence and the population experienced a correspondingly high number of mortalities. During this event, 12 whales were found dead and five were identified as live-entangled. The Canadian Wildlife Health Cooperative (Atlantic and Québec nodes) determined the leading causes of death to be vessel strike and entanglement in at least seven of the whales that were available for necropsy. This information, as summarized in our incidence report (http://www.cwhc-rcsf.ca/technical_reports.php) was critical to establishing new evidence-based mitigation measures for conservation of right whales in the Gulf of St. Lawrence. In the summer of 2019, right whales again appeared in large numbers in the Gulf of St. Lawrence, and again suffered a crippling mortality event: nine whales were found dead and four were live-entangled. The CWHC and its partners (including the Marine Animal Response Society, Réseau Québécois d’Urgences pour les Mammifères Marins, Fisheries and Oceans Canada, and the Canadian Coast Guard) were able to conduct necropsies on five of the whales. Necropsy results confirmed that the most likely cause of death in four whales was, once again, vessel strike.

The recurrence of right whale mortalities in Canadian waters is unsustainable given that the estimated number of deaths which can occur annually and still allow for population growth is fewer than one. It is not yet clear why right whale mortalities occurred in 2019, as only minimal changes were made to the same measures that were in place in 2018 when no deaths were observed. It seems likely that both the 2017 and 2019 mortality events were at least in part a consequence of changes in right whale distribution within the Gulf. In 2019, the population was more widely spread out compared to previous years, resulting in whales occurring outside regions subject to protective fishing and vessel speed regulations. It is clear that as our understanding of how right whales use the Gulf of St. Lawrence during the summer continues to evolve, so must our conservation measures to ensure that those measures are effective at preventing further mortalities. It remains critically important to rapidly investigate any mortality in this species, in order to identify ongoing and emerging threats to population sustainability and to ensure the effectiveness of mitigation measures already in place. Continued, active monitoring of right whale health will inform evidence-based responses specifically aimed at protecting right whales in Canadian waters now and into the future.



PROTECTION

Health protection is designed to prevent or minimize preventable illness or injury. This may include identifying the need for action in advance of a harm or undertaking actions that help a population or individual avoid or better cope with a threat. The CWHC has expanded its work in this area by developing new programs to protect the determinants of wildlife health as well as better forecasting impending harms through risk analysis.

ASSESSING CHRONIC WASTING DISEASE THREAT FOR WOODLAND CARIBOU

Chronic wasting disease (CWD) is considered the most important disease threatening North American cervids. The disease is widespread in the Canadian prairies and is moving west and north from there. Woodland caribou, also known as Boreal caribou (*Rangifer tarandus caribou*), are found across nine provinces and territories in boreal forests and the open taiga forests. They are listed as threatened under the federal Species at Risk Act as well as some provincial and territorial Acts. If CWD were to spread into caribou, population declines or impacts on consumer confidence may threaten indigenous rights to hunt and the traditional way of life that have tremendous economic and sociocultural value as well as exacerbate pre-existing caribou population declines. Our threat assessment (http://www.cwhc-rclf.ca/technical_reports.php) concluded that CWD is a threat of high concern for woodland caribou. The assessment highlighted the need for effective prevention of the spread or the rapid elimination of this disease to avoid direct effects and to prevent further northward expansion of the diseases into barren-ground caribou populations.

COMBATING WHITE-NOSE SYNDROME THROUGH PROMOTION OF BAT HEALTH

As part of our bat health program, the CWHC continues to be at the forefront of bat white-nose syndrome (WNS) surveillance in Canada. Not only are we instrumental in documenting WNS emergence along its western and eastern leading edges, we continue to identify its presence as a mortality factor in WNS endemic areas of Canada. With three bat species federally listed as Endangered, primarily due to the impact of WNS, these data provide those responsible for bat populations impacted by WNS with evidence-based information for their management strategies. While this



is an important aspect of the CWHC's effort to ensure the health of Canadian bat populations, we have recognized there is a role for us in the development of additional health initiatives required to protect our vulnerable bats. One such program is our "Bats in Buildings" educational workshop series, supported by Environment and Climate Change Canada (ECCC) Habitat Stewardship Program-Species at Risk (HSP-SAR) funding and in collaboration with all four Atlantic Provinces. These provide training in beneficial management practices that are designed to protect both the health of bats roosting in human-occupied structures as well as the humans residing in those buildings and pest control operators involved with managing such situations. The workshops highlight how to live with bats safely and how to evict and exclude bats from buildings in a manner that minimizes the bat mortality that can be associated with such activities, providing a high degree of protection and conservation for the endangered bat species that roost in this manner.

We recently received additional ECCC HSP-SAR funding to further expand our bat health program by developing a guide and accompanying workshops on how to acoustically monitor bat populations following the North American Bat Monitoring Program (NABat) protocol. NABat's purpose is to create a continent-wide program to monitor bats at local to range-wide scales, providing reliable data for effective conservation decision-making and the long-term viability of bat populations across the continent. However, current NABat monitoring efforts are limited in Atlantic Canada. Therefore, our education and outreach program will instruct and equip nongovernmental organizations, Indigenous groups, federal/provincial/territorial agencies and citizen scientists to independently engage in and increase this activity in our region. This is significant because NABat is the standard recommended by the federal Recovery Strategy for monitoring endangered Canadian bat populations and is necessary to provide the critical data for assessing regional and national mitigation, recovery and conservation actions.



Lastly, we are constantly evaluating the necessity for additional initiatives to protect the health of bats, and the recent emergence of COVID-19 in humans, caused by the coronavirus SARS-CoV-2, provided such a need. Coronaviruses are found in wildlife, including bats, which created a concern that potential exposure of North American bats to humans infected with SARS-CoV-2 could lead to transmission of this virus to these bats with negative consequences for bat health, especially for those species already impacted by WNS. To address this, the CWHC convened an expert panel of bat health specialists to produce an interim guidance document for wildlife management agencies outlining a precautionary approach for handling bats in situations including research, rehabilitation, and removal of bats from buildings. This document was well received by wildlife managers and researchers alike and demonstrated the CWHC's ability to provide a prompt response to all manner of threats posed to the health of Canadian bat populations.

FINDING EARLY SIGNS OF AN ENVIRONMENTAL HAZARD TO PROMOTE EARLY ACTION

Governments and the poultry industry continue to look for ways to motivate and sustain biosecurity efforts at the farm level to prevent the spill-over of wild bird avian influenza into poultry barns and subsequently to people. The economic impacts of this disease on the poultry sector make this a priority issue. Having the right information in an accessible place and presented in an understandable fashion is key to ensuring farmers have timely knowledge to make their biosecurity decisions. The CWHC's Wildlife Health Information Platform (WHIP) is being adapted to facilitate the integration of atypical data sources such as environmental variables that the CWHC has not historically collected. The intent is to allow users to easily extract data from both animal and environmental sampling to provide a broader overview of the nature of Avian Influenza in British Columbia.

GOVERNANCE

Governance is simply the term for the way a group of people do things. Good governance in wildlife health promotes openness, transparency, and integrity; facilitates effective collaboration; and promotes performance orientation in program delivery. The CWHC continues to support our partners and collaborators to develop new means and capacities for effective governance as well as continuing to evolve and adapt our own governance to most effectively meet the needs of our network and our partners.

The CWHC is built upon a network of expertise that comprises over 40 partner agencies and institutions and dozens of associates and collaborators spread across Canada and globally. Through harmonization and coordination, the CWHC provides a National approach to wildlife health in Canada, presenting a shared vision for wildlife health, identifying challenges and opportunities, and providing action to achieve a shared mission.

OUR MISSION

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

OUR VISION

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

LEADERSHIP TRAINING

Good governance starts with good leaders. Formal leadership training continues to be an important service provided by the CWHC. We co-presented a session on leadership in wildlife health at the 2019 Wildlife Diseases Association Annual Meeting along with the US National Wildlife Health Center. Leadership training expanded in the Caribbean with the launch of a new collaborative One Health leadership program for the French Agricultural Research Centre for International Development in Guadeloupe. Dr. Craig Stephen was also part of a successful collaboration with long-time partners at the University of West Indies and the Miller School of Medicine at the University of Miami to develop a 5-year climate change leaders fellowship program in the Caribbean. The CWHC also provided a workshop for the western region of the Canadian Food Inspection Agency that included One Health leadership and climate change. Informal leadership capacity development wove through many CWHC activities as our staff and directors mentored new wildlife health professionals and graduate students.

THAI NATIONAL WILDLIFE HEALTH CENTRE

The CWHC co-directs the OIE Collaborating Centre on Wildlife health and Biodiversity with the US National Wildlife Health Centre. Our US partners spearheaded the creation of a twinning program between our collaborating centre and the new Thai National Wildlife Health Centre. The purpose of the twinning program is to share experiences and expertise to help new centres develop their programs, policies and people. After a scoping visit, a series of 3 workshop will be presented in 2020. The CWHC will be leading the workshop on health information management, working from the experience developing our wildlife health intelligence platform (WHIP) as well as the growing use of the WHIP internationally, including SE Asia.

SUPPORTING A REVIEW OF FISHERIES AND OCEANS APPROACH TO FISH HEALTH

The CWHC CEO was approached by the Department of Fisheries and Oceans (DFO) to be an external observer in their multi-stakeholder Fish Health Technical Working Group. This group was convened in response to a request from the Minister to review and update how DFO manages salmon health in British Columbia, particularly as it relates to aquaculture. The CWHC developed a population health framework to assess the outputs of the group and provide advice to the Department on new ways to overcome longstanding conflict and uncertainty on risk management in this sector.



INNOVATION

Innovation in wildlife health supports research, development, and knowledge transfer leading to innovative programs and policies to anticipate and prevent adverse wildlife health outcomes and sustain confidence and access to the services wildlife provide to Canadians. Whether through technical innovations, like new diagnostic tests, innovations in how we interact or innovative public policy, Canada needs to keep evolving its wildlife health efforts to meet the demands of a rapidly changing world.

INNOVATIVE HEALTH INFORMATION MANAGEMENT

Knowledge mobilization is about moving knowledge into use by connecting information and expertise with decision-makers in order to improve wildlife health outcomes. The past year has seen continued development of features within the WHIP which enable better tracking of denominator information for disease as well as the formulation of comprehensive quality assurance and quality control (QA/QC) measures to ensure the highest possible quality and availability of accurate data. Having access to testing information in a more structured, reliable way, reduces the time needed to respond to partner requests for information, which improves the quality and speed of decision-making that can be effected at the Federal, Provincial, and Territorial levels. We have also partnered with our colleagues at the National Wildlife Health Centre in Madison, WI, in order to develop shared case definitions which enable us to provide better cross-border views of the wildlife health situation in North America. The introduction of a Knowledge mobilization officer position within the National Office gives us the capacity to respond to partner requests for information much more quickly and has been a boon to the organization in general. Our capacity to handle and integrate observational data as well as necropsy data has led to upgrades to efforts like Trichomonosis mapping, which is now done in real-time, based on both testing information, and citizen-science reports which are received and evaluated by regional pathologists.

CITIZEN SCIENCE – A GROWING PART OF HEALTH INTELLIGENCE

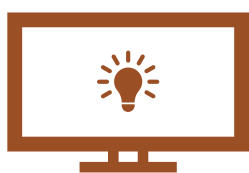
Canada is a massive country, with the vast majority of its populace clustered in urban centres. Expanding our capacity to attest to the status of wildlife health requires more eyes on the land and on the water. Citizen-science provides us opportunities to seek hints of unusual occurrences of wildlife disease. Our Ontario/Nunavut regional centre is expanding its surveillance program by increasing its ability to receive specimens from the general public and the CWHC appealed to the Ontario Veterinary Medical Association for veterinary clinics or veterinarians who would volunteer to store and ship wildlife specimens reported from the public. Their generous participation will help maximize our ability to receive wildlife specimens in the region and provide enhanced disease surveillance across a wider range of animal species and locations.

Building on the proof-of-concept that the Ontario Wildlife Health Tracker gave to the organization, we have begun development of a comprehensive, national online reporting system which will allow both wildlife specialists and members of the public to report morbidity and mortality events in lieu of an actual carcass or samples. Phase Two of this work will be to roll out a mobile app which can be used offline and allow for more accurate location information to be captured. This reporting platform is also being modified for a variety of ongoing and upcoming projects such as Northern Community engagement, Invasive Pigs, and investigation of plastics prevalence in free ranging wildlife, especially shore birds and marine mammals.

POLICY INNOVATION

CWHC graduate students continued to develop the evidence needed to advocate for a modernization of fish and wildlife health policy. Dr. Julie Wittrock successfully defended her PhD exploring new models for fish and wildlife health. The conceptual model for health as a cumulative effect of social, biological and ecological determinants of health are already influencing the design of national wildlife health programs inside and outside of Canada. Her work developed a strong argument for policy innovation for salmon health in Canada, advocating for a one-health policy approach. Dr. Diana Sinclair similarly concluded that a healthy public policy approach was needed as part of her examination of how the concept of wildlife health is used in policy and practice in Ontario. These two students are trail blazing new policy directions for wildlife health that could support the vision of the Pan-Canadian Approach to Wildlife health and provide a solid evidentiary basis for policy innovations.

PUBLICATIONS



83 conferences, presentations, and workshops
34 media presentations



56 peer-reviewed publications
3 book chapters
8 technical reports

STEWARDSHIP

Wildlife health stewardship is achieved by managing shared assets and information to support timely planning and action to protect and sustain healthy wild animal populations. The CWHC plays this role for itself as well as for the nation by coordinating a pan-Canadian network of expertise and capacity.

STATE OF THE CWHC PROGRAM

THEME	ATTRIBUTE	MONITORING TARGETS
Situational Awareness	Samples examined reflect Canada's geographic, ecological and species diversity	Tracking changing patterns of sample submission
	Surveillance results are available in a timely fashion	Assessing the timeliness of report generation, information input and results sharing
	Information is shared with those who need to know quickly and accurately	Frequency and reach of technical reporting, alerts and social media reports
Decision Support	Access to and incorporation of contextual information to turn surveillance information into knowledge	Capacity to access and use contextual information to supplement surveillance outputs
	CWHC expertise is available to partners and supports decision making	Stability and growth of the CWHC core capacity and community of practice
	Contributions to identifying priorities, options for action and strategies to manage wildlife health	Requests for assistance and feedback on impacts of information products
Program Stability	Finances meet changing and growing needs	Financial status
	Human resources and infrastructure meet changing and growing needs	Number and diversity of the CWHC staff and community of practice and stability of relationships with host institutions

COMMITTEES

The CWHC contributes to many initiatives, including regional, national and international committees and working groups. In some instances we contribute technical expertise, while in others we are asked to develop, facilitate and coordinate responses to important issues, such as invasive pigs in Canada and bat health/WNS working groups.

STAFF AND ASSOCIATES

CWHC NATIONAL OFFICE

Craig Stephen - Chief Executive Officer
Patrick Zimmer - Chief Operating Officer
Kevin Brown - Information Services Manager
Bevan Federko - Programmer/Analyst
Marnie Zimmer - Knowledge Mobilization Officer
Robyn Frank - Programmer/Analyst
Nataliya Morgun - WCVN Finance Manager
Jordi Segers - National White-Nose Syndrome Coordinator

ASSOCIATES

Colin Robertson (Wilfred Laurier University)
Todd Shury (Parks Canada)
Brett Elkin (Government of Northwest Territories)
Gordon Stenhouse (Foothills Research Institute)

CWHC BRITISH COLUMBIA

Chelsea Himsworth - Regional Director
Helen Schwantje - Regional Director
Cait Nelson - Assistant Regional Director
Kaylee Byers - Assistant Regional Director
Stephen Raverty - Veterinary Pathologist
Victoria Bowes - Veterinary Pathologist
Ann Britton - Veterinary Pathologist
Glenna McGregor - Veterinary Pathologist

ASSOCIATES

Owen Slater (University of Calgary Faculty of Veterinary Medicine)
Susan Cork (University of Calgary Faculty of Veterinary Medicine)
Judit Smits (University of Calgary Faculty of Veterinary Medicine)
Nigel Caulkett (University of Calgary Faculty of Veterinary Medicine)

CWHC WESTERN/NORTHERN

Trent Bollinger - Regional Director
Lorraine Bryan - Veterinary Pathologist
Erin Moffatt - Wildlife Biologist
Colin Letain - Wildlife Technician

ASSOCIATES/AFFILIATES

Emily Jenkins (Western College of Veterinary Medicine)

CWHC ONTARIO/NUNAVUT

Claire Jardine - Regional Director
Brian Stevens - Veterinary Pathologist
Lenny Shirose - Biologist
Dan Hughes - Communications and Project Coordinator
Laura Dougherty - Wildlife Technician

ASSOCIATES

Jane Parmley (Department of Population Medicine, OVC)
Dale Smith (Associate Director - retired)
Ian Barker (Regional Director - retired)

CWHC QUÉBEC

Stéphane Lair - Regional Director
Kathleen Brown - Lab supervisor
Viviane Casaubon - Wildlife Technician
Judith Viau - Wildlife Technician
Marion Jalenques - Veterinary Resident
Karine Béland - Veterinary Resident
Benjamin Lamglait - Veterinary Resident
Rozenn Le Net - Veterinary Resident

ASSOCIATES/AFFILIATES

Émilie L. Couture (Zoo de Granby)

CWHC ATLANTIC

Megan Jones - Regional Director
Laura Bourque - Veterinary Pathologist
Scott McBurney - Veterinary Pathologist
Darlene Weeks - Wildlife Technician
Fiep de Bie - Wildlife Technician
Tessa McBurney - Wildlife Technician

ASSOCIATES

Pierre-Yves Daoust (Atlantic Veterinary College)
Spencer Greenwood (Atlantic Veterinary College)
David Overy (Nautilus Bioscience Canada – Atlantic Veterinary College)
Gary Conboy (Atlantic Veterinary College)
Dave McRuer (Parks Canada)
Ted Leighton (Western College of Veterinary Medicine)

FINANCES

REVENUES

	General	Targeted	Total
Canadian Agricultural Partnership	360,535		360,535
Canadian Food Inspection Agency	150,000	296,029	446,029
Environment and Climate Change Canada	440,000	326,357	766,357
First Nations and Inuit Health Branch	4,972		4,972
Fisheries and Oceans		45,586	45,586
Parks Canada	150,000	23,745	173,745
Public Health Agency of Canada	240,000	27,271	267,271
ArcticNet		4,000	4,000
Alberta Sustainable Resource Development	5,000		5,000
BC Environment	10,000		10,000
BC Forests, Lands & Natural Resource Operations	10,000		10,000
City of Vancouver		25,000	25,000
New Brunswick	10,259		10,259
Newfoundland and Labrador		5,000	5,000
Northwest Territories	16,000		16,000
Nova Scotia	9,500		9,500
Nunavut	15,000		15,000
Ontario - Agriculture, Food and Rural Affairs		50,000	50,000
Ontario - Health and Long Term Care	100,000		100,000
Ontario - Natural Resources	80,000	92,500	172,500
Ontario Animal Health Network		25,763	25,763
PEI - Environment	4,735	13,136	17,871
PEI - Health			
Québec - Ministère des Forêts, de la Faune et des Parcs	135,000	80,051	215,051
Québec - Ministère de l'Agriculture, des Pêcheries et de l'Alimentation	40,000		40,000
Québec - Ministère de la Santé et des Services sociaux	20,000	10,000	30,000
Saskatchewan Agriculture and Food		68,942	68,942
Saskatchewan Environment	41,309		41,309
Yukon	14,000		14,000
Canadian Wildlife Federation	2,500		2,500
Western College of Veterinary Medicine	11,000		11,000
Miscellaneous Income/Fee-for-service		116,000	116,000
TOTAL REVENUE	\$ 1,869,810	\$ 1,209,380	\$ 3,079,190

EXPENSES

	General	Targeted	Total
Salaries and Benefits	1,090,026	953,989	2,044,015
Equipment	8,645	8,758	17,404
Diagnostic Costs	156,100	121,482	277,581
Operations	63,153	36,314	99,467
Travel	48,766	30,517	79,283
Other	86,248	26,232	112,480
Overhead	203,459	110,184	313,644
TOTAL EXPENSES	1,656,397	1,287,476	2,943,874

REVENUE LESS EXPENSES	\$ 213,413	\$ (78,097)	\$ 135,316
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CONTACT us

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