

OIE Collaborating Centres Reports Activities

Activities in 2021

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Title of collaborating centre:	Research, Diagnosis and Surveillance of Wildlife Pathogens
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Name (including Title and Position) of Head of the Collaborating Centre (formally OIE Contact Point):	Dr. Jonathan Sleeman, Center Director, USGS National Wildlife Health Center
Name of writer:	Dr. Jonathan Sleeman and Patrick Zimmer

ToR: To provide services to the OIE, in particular within the region, in the designated specialty, in support of the implementation of OIE policies and, where required, seek for collaboration with OIE Reference Laboratories

ToR: To identify and maintain existing expertise, in particular within its region

1. Activities as a centre of research, expertise, standardisation and dissemination of techniques within the remit of the mandate given by the OIE

Epidemiology, surveillance, risk assessment, modelling	
Title of activity	Scope
Canadian Wildlife Health Surveillance Program by the CWHC	Wildlife health monitoring activities by the CWHC include a nationwide surveillance program providing a set of observations and signals that have relevance for conservation, public health and economic development. In 2021 the CWHC examined 3645 animals in our targeted and scanning surveillance programs, from all 13 provinces and territories. Diagnostic highlights include the detection of SARS-CoV-2 detection in White-tailed Deer in Quebec and Saskatchewan http://blog.healthywildlife.ca/first-evidence-of-the-covid-19-virus-in-canadian-wildlife-in-the-wild-white-tailed-deer-infected-with-sars-cov-2/ , the detection of epizootic hemorrhagic disease in White-tailed Deer in Ontario http://blog.healthywildlife.ca/epizootic-hemorrhagic-disease-in-white-tailed-deer-in-the-kingston-ontario-area/ , and the continued spread of White Nose Syndrome in endangered Canadian bat species http://blog.healthywildlife.ca/confirmed-case-of-white-nose-syndrome-in-northern-manitoba/
Avian Influenza surveillance among wild birds by the CWHC	In 2021 the CWHC tested 2,921 wild birds for avian influenza virus via RT-PCR. This includes 940 birds found dead from across Canada of which 10 were matrix PCR positive, including 3 H5 positives (HP H5N1 from the province of Newfoundland). The remaining 1981 samples were collected from live trapped waterfowl from across Canada. 312 of these samples were matrix positive, including 93 H5 positives and 2 H7.
White Nose Syndrome/P. destructans Surveillance by the CWHC	In 2021 the CWHC examined 266 bats for the causative agent of White Nose Syndrome (P. destructans). Bats were subjected to necropsy and tested via PCR and culture. 4 of the 266 bats were diagnosed with WNS, including continued westward expansion with P. destructans being detected in environmental samples in the province of Saskatchewan, the first time the agent was found in that jurisdiction.
Zoonotic disease surveillance by the CWHC	In 2021 the CWHC conducted targeted surveillance programs for Rabies and West Nile Virus. 1884 animals were examined for Rabies, 27 were positive via IHC and/or DRIT from multiple jurisdictions in Canada, in particular the provinces of Saskatchewan, Quebec, and Ontario. 1232 wild birds were examined for WNV in Canada (RT-PCR), 33 birds were found positive from multiple jurisdictions, this is in keeping with the level of detection of the disease from the previous year.
Chronic Wasting Disease surveillance by the CWHC	In 2019, the CWHC discontinued its targeted surveillance program in Saskatchewan. However, all cervid species submitted to select CWHC regional centres via our scanning surveillance program are tested for CWD. In 2021 317 animals (including Mule Deer, White-tailed deer, Moose and Elk) were tested and 80 cases of CWD have been confirmed in Saskatchewan under this program. All samples are tested via IHC. In addition Chronic Wasting Disease was detected for the first time in the province of Manitoba.
White Nose Syndrome (WNS)/Pseudogymnoascus destructans surveillance by the NWHC	(2021) Passive surveillance combined with a designed surveillance approach, based on a dynamic diffusion model that identifies high risk areas where Pseudogymnoascus destructans (Pd) is predicted to spread annually in western and southern states, continued in the 2020/2021 season. NWHC evaluated samples from 2141 bats and 1529 environmental samples during the 2020/2021 season. These samples represented 26 species of bats from more than 200 locations and were received from 28 states. Overall, Pd range expansion was identified in 15 new counties in nine states. This included the first reported detection of the Pd fungus on bats in New Mexico and the first confirmation of WNS in Montana and Wyoming. The total number of states where the Pd fungus has been definitively detected is now 39.
Batrachochytrium salamandrivorans (Bsal)/B. dendrobatidis (Bd) Surveillance by the NWHC	The NWHC released a risk assessment that evaluated the impact that import regulations and surveillance efforts have had on the risk of Batrachochytrium salamandrivorans (Bsal) to the United States. This updated a previous Bsal risk assessment to provide information for adaptive decision-making. The study found that the regulatory actions put in place in 2016 by the U.S. Fish and Wildlife Service under the Lacey Act had the intended effect of reducing salamander imports and subsequent risk of introduction. However, further research has confirmed additional species capable of carrying Bsal infection that are common in the captive amphibian global trade network. The overall risk-reduction of the initial regulatory actions was limited by this lack of knowledge. A widespread surveillance effort conducted by the USGS National Wildlife Health Center and the USGS Amphibian Research and Monitoring Initiative contributed to reducing consequence risk by increasing confidence of Bsal absence in high-risk areas. However, the risk-reduction benefit of surveillance is restricted to the time-period when surveillance was conducted. On-going surveillance is important as long as there is continued import and introduction risk. The USGS National Wildlife Health Center is active in the surveillance and diagnostic working groups of the North American Bsal Task Force to allow exchange of new information and adaptive preventive actions in the face of the Bsal risk. In 2021, the USGS NWHC screen
Avian influenza surveillance in wild birds by the NWHC	In calendar year 2021, NWHC tested samples collected from 462 wild-bird carcasses for presence of avian influenza virus (AIV) as part of its avian mortality surveillance program in the United States. Tested carcasses were received from 28 U.S. states, and samples from 57 of the carcasses tested positive for the AIV matrix gene. None of the samples tested positive for H5- or H7-subtypes of AIV and no samples tested positive for subtypes of highly pathogenic AIV.
Avian paramyxovirus surveillance in wild birds by the NWHC	In calendar year 2021, NWHC tested samples collected from 187 wild-bird carcasses for presence of avian paramyxovirus-1, including Newcastle Disease Virus (NDV), as part of its avian mortality surveillance program in the United States. Tested carcasses were received from 9 U.S. states, and samples from 13 of the carcasses tested positive for the NDV matrix gene.
RHDV2 surveillance in lagomorphs by the NWHC	In the calendar year 2021, NWHC tested samples collected from 107 wild lagomorphs for presence of rabbit hemorrhagic disease virus type 2 (RHDV2). Either whole carcasses (36) or tissues (71) collected in 15 states (AZ, CA, IA, ID, MA, MT, NH, NM, NV, OR, RI, SD, TX, WA, WI) were submitted to NWHC for testing. Of the 107 animals tested, 29 lagomorphs from eight states (AZ, CA, ID, MT, NM, NV, OR, TX) were positive for RHDV2.
Coronavirus surveillance in wildlife by the NWHC	NWHC initiated a project with partners to characterize coronavirus (CoV) diversity in free-ranging North American wildlife. During calendar year 2021, NWHC completed initial screening of 313 samples for CoVs. Alpha-CoVs were confirmed in six of the samples, and 28 additional samples identified as suspect for CoVs are undergoing further characterization. SARS-CoV-2 was not detected in any of the samples examined.
Training, capacity building	
Title of activity	Scope

Veterinary education in Canada by CWHC	Academic training in North American universities on One Health at the undergraduate and graduate level by the CWHC. The CWHC is situated in Canada's 5 Veterinary Colleges and contributed to 21 veterinary graduate or undergraduate courses and supported the training of 38 graduate students, residents and internships.
OIE National Wildlife Focal Points Workshops	The NWHC assisted with the development and delivery of the intermediate cycle of training for Wildlife Focal Points for all Regions during September 20-22, 2021.

ToR : To propose or develop methods and procedures that facilitate harmonisation of international standards and guidelines applicable to the designated specialty

2. Proposal or development of any procedure that will facilitate harmonisation of international regulations applicable to the surveillance and control of animal diseases, food safety or animal welfare

Proposal title	Scope/Content	Applicable area
Wildlife Disease Case Definitions	The CWHC and NWHC joint case definition working group held a 3-day workshop and developed 15 diagnostic case definitions for select wildlife diseases with the assistance of the pathology staff of both organizations. Publication	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
International Wildlife Health Surveillance "Working Group"	In partnership with several organizations and centres, notably the USGS National Wildlife Health Centre, Wildlife Health Australia, Dutch Wildlife Health Centre and government agencies from various jurisdictions the NWHC and CWHC promotes and participates in an informal International Wildlife Health Surveillance Working Group.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
Wildlife Health Information Platform by the CWHC	The CWHC National Wildlife Disease database has redeveloped and is capable of tracking incident and event-based data. This new platform supports Canadian wildlife health needs for disease assurance and enhance its competitiveness by augmenting current surveillance systems with new technology and information streams. In collaboration with Agriculture and Agri-Food Canada an Avian Influenza module of the platform was designed in cooperation with poultry industry and government representatives. The platform (Wildlife Health Information Platform - WHIP) became operational in late 2018.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare
CAHSN and CEZD	The CWHC are founding members of the Canadian Animal Health Surveillance Network (http://www.inspection.gc.ca/animals/terrestrial-animals/diseases/surveillance/eng/1313720601375/1313720675875) and the Community for Emerging and Zoonotic Diseases (https://www.cahss.ca/media/uploads/CEZD/documents/17-01-04_17-29/CEZD_Summary_English_.pdf), sitting on the board of directors and provide strategic advice and surveillance information. These programs link multiple jurisdictions and partners and draws on the disease detection abilities of multiple entities to provide surveillance information on select diseases.	<input checked="" type="checkbox"/> Surveillance and control of animal diseases <input type="checkbox"/> Food safety <input type="checkbox"/> Animal welfare

ToR: To establish and maintain a network with other OIE Collaborating Centres designated for the same specialty, and should the need arise, with Collaborating

Centres in other disciplines

ToR: To carry out and/or coordinate scientific and technical studies in collaboration with other centres, laboratories or organisations

3. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres (CC), Reference Laboratories (RL), or organisations designated for the same specialty, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
Aquatic Animal Diseases Collaborating Centre	Charlottetown, Canada	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Founding member of the Centre. Assist in the centre establishment and frequent interaction between the centre and the CWHC Atlantic regional centre at the University of PEI
Chronic Wasting Disease Reference Laboratory (CFIA)	Winnipeg Canada	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	The CWHC serves as a tissue and data bank for Chronic Wasting Disease.
H5N1 reference laboratory (CFIA)	Winnipeg, Canada	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	The CWHC collaborates with the Winnipeg lab to provide confirmatory testing for Canada's wild bird AIV surveillance program.
Centre of Expertise for Rabies (CFIA)	Ottawa, Canada	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	The CWHC provides samples and data to the Rabies Centre in collaboration for Rabies surveillance in Canada.
National Wildlife Health Centre	Madison, Wisconsin	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Our Collaborating Centres are a Consortium and there is regular contact between the two centres.

Thailand National Wildlife Health Center, Mahidol University	Bangkok, Thailand	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	We have entered into a formal twinning project arrangement with Mahidol University/ Thailand NWHC to assist in the establishment of an OIE Collaborating Centre in Wildlife Health and Biodiversity at that institution. We conducted a virtual workshop on wildlife health information management, and an online questionnaire survey of stakeholders to understand value and importance of wildlife disease surveillance as part of a One Health system, impediments to conducting surveillance, and proposed solutions.
Commonwealth Scientific and Industrial Research Organisation (CSIRO) represented by its Health and Biosecurity Business Unit	Black Mountain, Australia	<input type="checkbox"/> Africa <input type="checkbox"/> Americas <input checked="" type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	This project is examining the presence of lagoviruses in lagomorphs, including Sylvilagus species, in their native home range of North America to shed further light on the emergence of these viruses. We will use deep RNA sequencing (metatranscriptomics) to characterise lagoviruses present in the liver and duodenum of healthy North American lagomorphs.
USDA APHIS Veterinary Services National Veterinary Services Laboratories	Ames, Iowa	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	Provide samples and viral isolates of wild bird origin for follow up characterization and to validate diagnostic assays for analysis of samples from wildlife. The NWHC is also an affiliate member of the USDA's National Animal Health Laboratory Network.

4. Did your Collaborating Centre maintain a network with other OIE Collaborating Centres, Reference laboratories, or organisations in other disciplines, to coordinate scientific and technical studies?

Yes

Name of OIE CC/RL/other organisation(s)	Location	Region of networking Centre	Purpose
National Center for Emerging and Infectious Diseases, CDC	Atlanta, Georgia	<input type="checkbox"/> Africa <input checked="" type="checkbox"/> Americas <input type="checkbox"/> Asia and Pacific <input type="checkbox"/> Europe <input type="checkbox"/> Middle East	One Health coordination and performance of a collaborative project to conduct surveillance for coronaviruses in wildlife.

ToR: To place expert consultants at the disposal of the OIE.

5. Did your Collaborating Centre place expert consultants at the disposal of the OIE?

Yes

Name of expert	Kind of consultancy	Subject
Patrick Zimmer	Serves as the OIE National Focal Point for Wildlife in Canada.	Wildlife Health Surveillance
Jonathan Sleeman	Serves as the OIE National Focal Point for Wildlife for the USA	Wildlife Health Surveillance
Jonathan Sleeman	Serves as a Member of the OIE's Working Group on Wildlife.	Wildlife Health
Jonathan Sleeman	Serves as the OIE's Working Group on Wildlife representative to the PPR GREN.	PPR Eradication
Hon Ip	Serves on the OIE-FAO OFFLU Wildlife Influenza Group.	Avian Influenza
Jonathan Sleeman	Serves on the OIE Ad Hoc Group On Reducing The Risk Of Disease Spillover Events At Markets Selling Wildlife And Along The Wildlife Supply Chain.	Wildlife Trade

ToR: To provide, within the designated specialty, scientific and technical training to personnel from OIE Member Countries

6. Did your Collaborating Centre provide scientific and technical training, within the remit of the mandate given by the OIE, to personnel from OIE Member Countries?

Yes

- a) Technical visits: 0
 b) Seminars: 4
 c) Hands-on training courses: 0
 d) Internships (>1 month): 0

Type of technical training provided (a, b, c or d)	Content	Country of origin of the expert(s) provided with training	No. participants from the corresponding country
b	Wildlife Health Information Management for the Thailand National Wildlife Health Centre.	USA, Canada, and Thailand	50
b	OIE Virtual Workshop for Focal Points for Wildlife in Asia and the Pacific, 5th Training Cycle	Asia and Pacific Region	200
b	Workshop on Peste des Petits Ruminants Outbreak Investigation in Wildlife Virtual meeting 16 Mar 2021 - 17 Mar 2021	Asia and Pacific Region	200

b	OIE Webinar “The evolving role of veterinarians in wildlife health for One Health” Virtual Meeting, 3 Mar 2021	Asia and Pacific Region	200
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ToR: To organise and participate in scientific meetings and other activities on behalf of the OIE

7. Did your Collaborating Centre organise or participate in the organisation of scientific meetings on behalf of the OIE?

No

ToR: To collect, process, analyse, publish and disseminate data and information relevant to the designated specialty

8. Publication and dissemination of any information within the remit of the mandate given by the OIE that may be useful to Member Countries of the OIE

a) Articles published in peer-reviewed journals: 92
CWHC

Fenton, H, S McBurney, EJ Elsmo, CA Cleveland and MJ Yabsley. 2021. Lesions associated with Bartonella taylorii-like bacterium infection in a free-ranging, young-of-the-year raccoon from Prince Edward Island, Canada. JVDI 33(2):362-365 <https://doi.org/10.1177/1040638720988515>

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Miller D, Camus A, Raverty S. 2021. Editorial: Pathologic findings in stranded marine mammals: A global

perspective. *Frontiers in Marine Science* 8: 79690810. DOI: 10.3389/fmars.2021.796908

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Moore M, Rowles T, Fauquier D, Baker J, Biedron I, Durban J, Hamilton P, Henry A, Knowlton, A, McLellan, W, Miller, C, Pace, Pettis, R, Raverty, S, Rolland, R, Shick, R, Sharp, S, Smith, C, Thomas, L, van der Hopp, J, and Ziccardi, M. 2021. Assessment of North Atlantic Right Whales. *Diseases of Aquatic Organisms* 143: 205-226. DOI.org/10.3354/dao03578

Morell M, Ljsseldijk L, Barends A, Grone A, Siebert U, Raverty S, Shadwick R, Kik M. 2021. Evidence of hearing loss and fatal toxoplasmosis in a free-ranging harbor porpoise. *Animals* 11: 3058. DOI: <https://doi.org/10.3390/ani11113058>

Morell M, Ljsseldijk L, Piscitelli-Doshjkov M, Ostertag S, Estrade V, Haulena M, Doshkov P, Bourien J, Raverty S, Siebert U, Puel J-L, Shadwick R. 2021. Cochlear apical morphology in toothed whales: using the pairing hair cell-Deiters' cell as a marker to detect lesions. *The Anatomical Record* DOI: 10.1002/ar.24680

Murray MH, Byers KA, Buckley J, Magle SB, Maffei D, Waite P, German D. 2021. "I don't feel safe sitting in my own yard": Chicago resident experiences with urban rats during a COVID-19 stay-at-home order. *BMC Public Health* 21(1): 1008. DOI: 10.1186/s12889-021-11095-y

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Polinski M, Zhang Y, Morrison PR, Marty GD, Brauner CJ, Farrell AP, Garver KA. 2021. Innate antiviral defense demonstrates high energetic efficiency in a bony fish. *BMC Biology* 19: 138. DOI: <https://doi.org/10.1186/s12915-021-01069-2>

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Anjum MF, Schmitt H, Börjesson S, Berendonk TU, Donner E, Stehling EG, Boerlin P, Topp E, Jardine C, Li X, Li B. et al. 2021. The potential of using *E. coli* as an indicator for the surveillance of antimicrobial resistance (AMR) in the environment. *Current opinion in microbiology*. Dec 1;64:152-8.

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Giacinti J, McKenzie C, McRuer D, Sinclair D, Stevens B, Bowman J, Gomer T, Heydon C, Nituch L, Jardine C. 2021. Disease risks associated with translocation of wildlife – information for veterinarians and wildlife rehabilitators in Ontario. Report completed for Ontario Ministry of Natural Resources and Forestry. 41pp.

NWHC

Aeby, G.S., Shore, A., Jensen, T., Ziegler, M., Work, T.M., Voolstra, C., 2021. A comparative baseline of coral disease in three regions along the Saudi Arabian coast of the central Red Sea. *PLoS ONE* 16.

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Work, T.M., Duhr, M., Flint, B., 2021. Pathology of mouse (*Mus musculus*) predation on Laysan albatross (*Phoebastria immutabilis*) on Midway Atoll National Wildlife Refuge. *Journal of Wildlife Diseases* 57, 125-131.

Work, T.M., Weatherby, T.M., DeRito, C.M., Besemer, R.M., Hewson, I., 2021. Sea star wasting disease pathology in *Pisaster ochraceus* shows a basal-to-surface process affecting color phenotypes differently. *Diseases of Aquatic Organisms* 145, 21-33.

Work, T.M., Weatherby, T.M., Landsberg, J.H., Kiryu, Y., Cook, S.M., Peters, E.C., 2021. Viral-like particles are associated with endosymbiont pathology in Florida corals affected by stony coral tissue loss disease. *Frontiers in Marine Science* 8.

b) International conferences: 12
CWHC

Giacinti J, French SK, Robinson S, Pearl L, Jardine C. 2021. What is an urban area and why does it matter?: Classifying urban spaces for the purpose of wildlife health research and practice. International Urban Wildlife Conference, Virtual meeting May 27, 2021.

Robinson S, Giacinti J, French S, Jardine C. 2021. Barriers and opportunities for equitable and representative wildlife health surveillance in urban spaces. International Urban Wildlife Conference, Virtual meeting May 27, 2021.

Byers KA, Lee MJ, Himsworth CG. 2021. The Vancouver Rat Project: After a decade, what do we know? Pest Coast Workshop: Seattle City Rats. Virtual. November 16-17th.

Byers KA. 2021. The Mission, the Message, the Medium: An Introduction to Risk Communication. The Wildlife Society Annual Conference. Virtual. November 1 - 5th.

Byers KA, Lee MJ, Himsworth CG. 2021. RATS: Understanding our urban neighbours. Washington Rodent Academy. Virtual. October 27 - 30th.

Byers KA, Booker TR, Combs M, Himsworth CG, Munshi-South J, Lee MJ, Patrick DM, Whitlock MC. 2021. Blending ecology and genomics to understand patterns of rat-associated pathogen prevalence. International Urban Wildlife Conference. Virtual. May 25 - 27th.

Himsworth CG, Lee MJ, Byers KA. 2021. Living with rats: Could an ecosystem lens provide new insights into urban rat control? International Urban Wildlife Conference. Virtual. May 25 - 27th.

Fauquier D, Durham K, Doughty L, Moore M, McLellan W, Costidis A, Sharp S, Rotstein D, Burek Huntington K, Huggins J, Halaska B, Flannery M, Danil K, Rice J, Garner M, Duignan P, Raverty S, Colegrove K, Goldstein T, Harms C, Calambokidis J, Moore S, Baker J, Gulland F, Garron M, Smith A, Fougères E, Mase-Guthrie B, Wilkinson K, Vezbickie J, Greenman J, Savage K, Hardy M, Moors-Murphy H, Cottrell P, Urban Ramirez J, Greig D, Rowles T, Wilkin S. 2021. United States Large Whale Unusual Mortality Events. International Association of Aquatic Animal Medicine, Tampa, FL, May 28-30.

Miller J, LaTorre R, Albores O, Raverty S, Cottrell P, Engstrom M. 2021. A rare opportunity to plastinate and examine the heart of an endangered southern resident killer whale heart. The International Society for Plastination. Online Interim Meeting, April 26-29.

Pace C, Haulena M, Drumm H, Akhurst L, Raverty S. 2021. Mortality trends in live-stranded harbor seals (*Phoca vitulina*) along the British Columbia coast, 2011-2020. International Association of Aquatic Animal Medicine, Tampa, FL, May 28-30.

Pace C, Haulena M, McGregor G, Strobel M, Jackson C, Raverty S. 2021. A review of neoplastic disorders in a captive population of Jamaican fruit bats (*Artibeus jamaicensis*). Joint American Association of Zoo Veterinarians Annual Conference and European Association of Zoo and Wildlife Veterinarians, Virtual, October 4.

Temam S, Gaydos J, Norman S, Huggins J, Lambourn D, Calambokidis J, Ford J, Hanson B, Haulena M, Zabek E, Cottrell P, Hoang L, Raverty S. 2021. Epidemiology of a *Cryptococcus gattii* outbreak in porpoises and dolphins from the Salish Sea. International Association of Aquatic Animal Medicine, Tampa, FL, May 28-30.

c) National conferences: 13

Byers KA, Lee MJ, Himsworth CG. 2021. Using urban rat ecology to inform municipal rat management. Municipal Rodent IPM Working Group. Virtual. November 19th.

Jardine C. Wildlife and One Health. Invited talk for One Health Institute, University of Guelph, Virtual meeting November 16, 2021.

Stevens B, and Jardine C. Wildlife Health in Ontario. Invited talk for District Biologists, Ontario Ministry of Mines, Northern Development, Natural Resources, and Forestry. Virtual meeting, September 8, 2021.

Beattie I, Schofer D, McGregor G, Lee M, Lee L, Himsworth C, Byers K. 2021. Causes of bat mortality in British Columbia, Canada. Undergraduate Summer Research Poster Day, University of Saskatchewan. October 5th.

Byers KA. 2021. Consider conversation: How SciComm can compliment your career. University of Saskatchewan. Undergraduate workshop: Challenges in communicating in science. Virtual. June 1.

Byers KA, Himsworth C. 2021. Vancouver Rat Project update. Pest Management Canada. Virtual. February 22 - 23.

Byers KA, Booker TR, Combs M, Himsworth CG, Munshi-South J, Patrick DM, Whitlock MC. 2021. What rat movement reveals about rat-associated health risks. ADED Seminar Series, Centre for Coastal Health. January 19.

Clark A, Bourque L, Jones M, Raverty S. 2021. Erosive bronchopneumonia and tracheitis in a striped skunk (*Mephitis mephitis*). the American Association of Zoo Veterinarians (AAZV) 28th Annual Zoo and Wildlife Pathology Workshop, The Davis-Thompson Foundation. Virtual, October 10.

Cottrell P, Cottrell B, Lehnhart T, Raverty S. 2021. British Columbia grey whale strandings, Grey Whale Unusual Mortality Working Group, Zoom Meeting. Abbotsford, BC, October 20.

Lee K, Alava J, Cottrell P, Raverty S. 2021. Emerging contaminants of concern and maternal transfer in the endangered Southern Resident Killer Whales (*Orcinus orca*), Southern Resident Killer Whale Contaminants Technical Working Group (TWG) Meeting, November 24, Webinar.

Raverty S, Cottrell P, Cottrell B, Lehnhart T. 2021. Necropsy findings of Canadian grey whale cases. Grey Whale Unusual Mortality Working Group, Zoom Meeting, Abbotsford, BC, October 20.

Warren J, Poissant J, McAdie M, Raverty S, Whiteside D. 2021. Evaluating for heritable degenerative heart disease in Vancouver Island Marmots. Canadian Society for Ecology and Evolution (CSEE), Virtual Presentation, November 6.

Warren J, Poissant J, McAdie M, Raverty S, Whiteside D. 2021. Evaluating for heritable degenerative heart disease in Vancouver Island Marmots. University of Calgary, Summer Undergraduate Research Experience (SURE), Calgary, AB, August 25-26.

d) Other

(Provide website address or link to appropriate information): 2
CWHC

The CWHC website provides up-to-date reporting on a number of wildlife diseases <http://www.cwhc-rscf.ca>

The CWHC produces quarterly reports highlighting surveillance numbers on a 3 month basis, diagnostic highlights, project features and wildlife health news stories. The reports are available at http://www.cwhc-rccsf.ca/quarterly_report.php. The CWHC Annual Report is available at http://www.cwhc-rccsf.ca/annual_reports.php

9. Additional comments regarding your report: