Workshop Summary

One Health Zoonotic Disease Prioritization for Multisectoral Engagement in Alaska

Fairbanks, Alaska

CS 323380-A

Photo 1. Aurora borealis (Northern Lights) displays over Endicott Mountains in Alaska.

DISCLAIMER

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Photo 2. Group of Dall sheep (Ovis dali) rams on Marmot Rock at Denali National Park.

PARTICIPATING ORGANIZATIONS

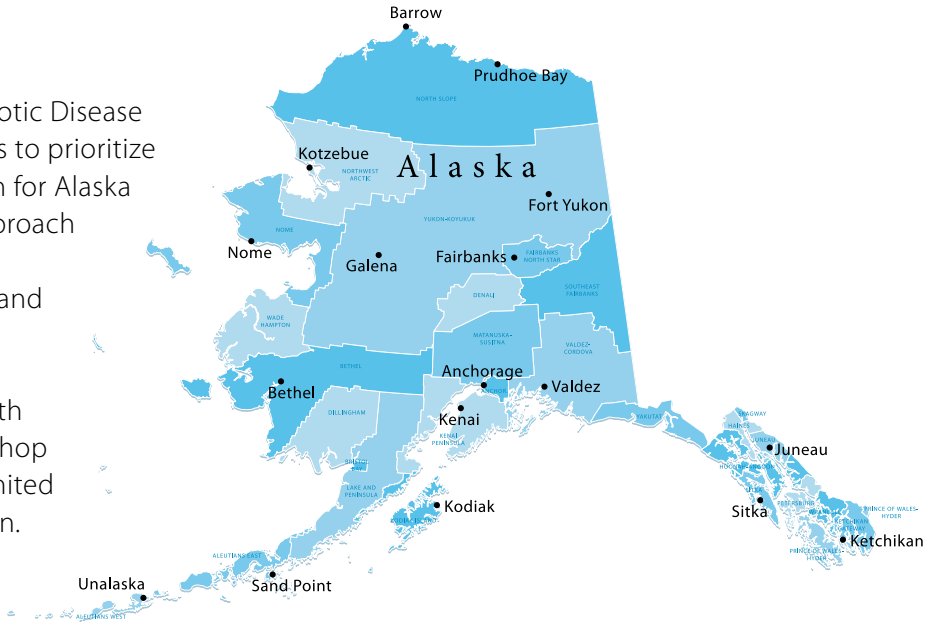
- Alaska Department of Environmental Conservation
- Alaska Department of Fish and Game
- Alaska Department of Health and Social Services, Alaska Section of Epidemiology
- Alaska Native Tribal Health Consortium, Department of Community, Environment and Health
- Alaska State Virology Laboratory
- Aleutian Pribilof Islands Association
- National Oceanic and Atmospheric Administration (NOAA)
- North Slope Borough Department of Wildlife Management
- United States Arctic Research Commission
- United States Centers for Disease Control and Prevention (CDC)
  - Arctic Investigations Program
  - One Health Office
- United States Department of Agriculture (USDA)
- United States Department of the Interior (DOI)
  - U.S. Fish and Wildlife Service
  - U.S. Geological Survey
  - U.S. National Park Service
- University of Alaska, Anchorage

Photo 3. Woman holds wild-caught silver salmon (*Oncorhynchus kisutch*) from Alaska's Kanektok River.

Photo 4. Group of brown bear fish for salmon at McNeil River Game Sanctuary.

SUMMARY

The purpose of the One Health Zoonotic Disease Prioritization workshop for Alaska was to prioritize zoonotic diseases of greatest concern for Alaska using a multisectoral, One Health approach with input from representatives from Indigenous, public, animal (livestock and wildlife), and environmental health sectors and other relevant partners. This workshop was the first One Health Zoonotic Disease Prioritization Workshop conducted for a single state in the United States and the first in the Arctic region.



The specific workshop goal was to use a multisectoral, One Health approach to prioritize endemic and emerging zoonotic diseases of greatest concern in Alaska to be jointly addressed by sectors responsible for human, animal, and environmental health.

During the workshop, participants worked collaboratively to develop a list of zoonotic diseases for prioritization for Alaska, define criteria for prioritization, and determine questions and weights relevant to each criterion. A total of 7 zoonotic diseases were identified as a priority by participants using the One Health Zoonotic Disease Prioritization Process, a mixed methods prioritization process, which was developed by the U.S. Centers for Disease Control and Prevention (CDC) (Appendix A).

After the identification of the priority zoonotic diseases, participants developed next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners.

The priority zoonotic diseases for multisectoral, One Health collaboration for Alaska are (Table 1):

- Amnesic shellfish poisoning/paralytic shellfish poisoning*
- Zoonotic influenza
- Rabies
- Cryptosporidiosis/giardiasis
- Toxoplasmosis
- Brucellosis
- Q fever

**Amnesic shellfish poisoning (ASP) and paralytic shellfish poisoning (PSP) are not zoonotic diseases but given the concerns and rising prevalence of algal toxins in the environment of Alaska, they were added to the list. Because the ASP and PSP toxins originate in microbes and are transmitted through the food chain, they represent a One Health concern with similar properties to zoonotic infections.*

This report summarizes the One Health Zoonotic Disease Prioritization Process used to prioritize zoonotic diseases of greatest concern for Alaska, as well as next steps and action plans identified to jointly address these zoonotic diseases using a multisectoral, One Health approach including human, animal, and environmental health agencies and other relevant sectors.

Photo 5. Salmon travel upstream at Brook's Falls at Katmai National Park, Alaska.

Table 1. Priority zoonotic diseases selected in Alaska by participants in the One Health Zoonotic Disease Prioritization workshop conducted March 20-21, 2019.

Zoonotic Disease	Human Disease Burden	Animal Disease Burden	Diagnostics, Treatment, and Prevention
Amnesic shellfish poisoning (ASP)/ paralytic shellfish poisoning (PSP)	From 1973-1996, over 200 cases of PSP were reported in Alaska and were attributed to more than 70 outbreaks across the state.[1] Warming ocean temperatures have been associated with an increase in harmful algal blooms (HABs) responsible for producing ASP and PSP in marine waters of Alaska. Because of subsistence and rural community reliance upon natural resources for food and culture, these toxins have important implications for One Health in Alaska.[2] Toxins in blue mussels at sites around Juneau, Alaska, were measured at 4,500 micrograms per 100 grams of shellfish. This level is fatal to a person after only consuming a few mussels.[3] The Alaska Department of Environmental Conservation regularly tests commercially harvested shellfish, but recreationally and subsistence harvested resources are not routinely monitored.[4]	Nearly all molluscan shellfish and many other invertebrates and forage fish have the potential to have ASP and PSP toxins in their tissues and can serve as a vector for the toxins.[5] Marine consumers, including seabirds, marine mammals, and fish can be deleteriously impacted by exposure to toxins. Recent studies of marine wildlife in Alaska have documented ASP and PSP toxins across a broad geographic area and multiple trophic levels.[6,7] Although toxicity levels are not yet established for birds, localized wild-bird deaths have been linked to PSP in coastal Alaska.[8,9] Other recent die-offs of seabirds and marine mammals may also be related to HABs and are currently under investigation.[10,11]	Clinical diagnosis is based on recent shellfish ingestion and presence of clinical manifestations of toxicity such as nausea, vomiting, paresthesia, dysarthria, dysphagia, and weakness. The toxin can also be confirmed in a clinical specimen such as blood or urine.[1] There is no antidote for PSP, however supportive care can be lifesaving.[12] Supportive treatment for severe cases is the use of a mechanical respirator and oxygen.[13] The Alaska Division of Public Health strongly recommends against eating noncommercial shellfish from Alaska waters[12]. The toxin is not destroyed by cooking or freezing. Only shellfish that are sold commercially and routinely tested can be deemed safe to eat.[12,13]

Zoonotic Disease	Human Disease Burden	Animal Disease Burden	Diagnostics, Treatment, and Prevention
Zoonotic Influenza	There have been no reported human infections in the U.S. with highly pathogenic avian influenza (HPAI) virus nor with poultry-origin strains first identified in China that have high case fatality rates.[14] However, sporadic human infections with avian influenza A may occur in the United States.[15,16] Given that Alaska has been identified as a point of entry for Asian-origin influenza viruses into North America via dispersal by wild birds[17,18], the reliance upon subsistence harvest of wild waterfowl in this region[19], the continued circulation of avian influenza A viruses in East Asia with relatively high case fatality rates, and the existence of backyard poultry operations in Alaska with limited biosecurity, zoonotic exposure to avian-origin influenza viruses is an important human health concern in Alaska. Variant swine influenza viruses (ie H1N1v) consist of those able to infect humans. While the global 2009 H1N1 influenza pandemic ended, variant swine flu virus continues to circulate as a seasonal flu virus. Since 2010, approximately 7,987 laboratory-confirmed Influenza A cases have been reported in Alaska.[20,21]	As part of statewide avian influenza surveillance studies, researchers reported a mean apparent prevalence of 1.7% within wild birds in Alaska.[22] Prevalence has been reported to be much higher, however, in dabbling ducks (7.0% overall in statewide surveillance efforts)[22] with species-specific rates exceeding 20% in multi-year sampling efforts in western Alaska.[23,24] In 2016, a wild mallard was found to have HPAI.[25] H1N1 and H3N2 swine flu viruses are endemic among pig populations in the U.S. with outbreaks normally occurring in colder weather months.[26] As part of the USDA ongoing national surveillance for swine, over 120,000 samples have been tested between 2010 and 2016 resulting in over 10,000 positive cases for influenza.[27]	As a general precaution, people should avoid contact with birds (wild or domestic) that appear ill or have died of unknown causes and with bird feces. Those coming into contact with birds, bird carcasses, or bird feces may reduce exposure by wearing gloves, handling in well-ventilated areas, avoiding eating, drinking, or smoking when handling and thoroughly washing hands following contact.[28] While seasonal influenza vaccination in humans will not prevent infection with avian influenza A viruses, it can reduce the risk of co-infection with human and avian influenza A viruses in humans.[28] Vaccination of domestic animals against influenza A viruses is an economic and effective mode of prevention, however biosecurity measures must be carried out concurrently. Such measures may include disinfection, control of animal movement and quarantine, and facility modifications.[29] Treatment includes antiviral drugs and continued monitoring.[28] Diagnosis for influenza and novel types of zoonotic influenza includes collection of respiratory specimens for laboratory testing using PCR.[30]
Rabies	Three human cases of rabies have been reported in Alaska since 1914 but none have been reported since 1942.[31]	Between 15 and 50 wildlife cases of rabies are reported each year in Alaska. Rabies is enzootic among the fox populations in northern and western regions in Alaska, and there have been periodic epizootics documented every 3 to 5 years.[31]	Rabies is diagnosed in animals using direct fluorescent antibody tests or a direct rapid immunohistochemical test (dRIT). Several laboratory tests are required for diagnosis in humans.[32] There is a vaccine available to both animals and humans. Following any contact or bite from a rabid animal, medical attention is immediately necessary.[32] Prophylaxis is the immediate treatment following exposure however, following onset of clinical symptoms there is no treatment and the disease is almost uniformly fatal.[32]

Zoonotic Disease	Human Disease Burden	Animal Disease Burden	Diagnostics, Treatment, and Prevention
Cryptosporidiosis/ Giardiasis	A recent study reported a 28.8% seroprevalence of *Cryptosporidium* in people with or without wild bird contact in Alaska. The same study reported a 18.9% seroprevalence of *Giardia intestinalis* in the same population.[33] From 2001-2010, there were 1,042 human cases of giardiasis reported in Alaska. Annual rates of giardiasis in Alaska have repeatedly been higher than in the rest of the United States.[31] Another study looking at prevalence among specific groups of Alaska residents found seroprevalence of *Giardia* to be highest among subsistence hunters and their families at 30%.[34]	Zoonotic genotypes of *Giardia* have been reported in muskoxen, dogs, and seals in the North American Arctic.[35] A 2005 study looking at prevalence of *Cryptosporidium* and *Giardia* subspecies in northern Alaska found that prevalence was highest among ring seals (22.6% *Cryptosporidium*, 64.5% *Giardia*) and right whales (24,5% *Cryptosporidium*, 71.4% *Giardia*).[34] Another study in 2008, identified that fecal samples from harbor seals in Glacier Bay national park did not detect serum antibodies against *Cryptosporidium*, but identified *Giardia* in 6% of the fecal samples.[36]	Both cryptosporidiosis and giardiasis are diagnosed through microscopic analysis of stool samples. In both cases PCR can be used to determine species. Those with competent immune systems will recover from cryptosporidiosis without treatment, but fluid replacement and nitazoxanide may be recommended. For giardiasis, metronidazole, tinidazole, and nitazoxanide are recommended. Prevention for both are primarily good hygiene practices and avoiding contaminated food and water.[37,38]
Toxoplasmosis	A 2019 study reported a 2.9% seroprevalence for *Toxoplasma gondii* in people with or without wild bird contact in Alaska.[33]	A recent study looking at seroprevalence among sea otters reported 32% of sea otters tested positive for *T. gondii*.[39] Another study looking at serum antibody prevalence for *T. gondii* within Alaska wildlife reported 23% positive among moose, 43% for black bears, 9% for wolves, 7% for Dall sheep[40], 24% in polar bears[41], and 44% in brown bears[42].	Past exposure to toxoplasma is diagnosed through serologic testing. Healthy individuals typically do not require treatment to recover. However, pyrimethamine and sulfadiazine, plus folinic acid can be administered. Prevention includes cooking foods to proper temperatures and avoiding contact with cat feces.[43]
Brucellosis	A 2019 study reported a 0.1% seroprevalence for *Brucella spp*. in people with or without wild bird contact in Alaska.[33]	There are 10 species of *Brucella* recognized in animals.[31] One recent study looking at seroprevalence of *Brucella* in Alaskan harbor seals found that overall, 52% of adult seals tested positive for antibody seroprevalence.[44] A study looking at serum antibody prevalence for *Brucella* among caribou, wolves, and bears reported highest prevalence in the northwest region of Alaska.[45]	Diagnosing brucellosis is done through bacterial isolation in blood cultures and serologic testing. [46] There is no standardized diagnostic tests for different species of animals.[31] Antibiotics, generally doxycycline and rifampin, are given to treat the infection. Brucellosis can be prevented through avoiding the consumption of undercooked meat and unpasteurized dairy products. Additionally, those handling animal tissues should wear protective clothing.[46] Prevention also includes vaccination of domestic livestock.[31]

Zoonotic Disease	Human Disease Burden	Animal Disease Burden	Diagnostics, Treatment, and Prevention
Q Fever	A recent study reported a 8.3% seroprevalence of *Coxiella burnetii* (Q fever) in people with or without wild bird contact in Alaska.[33]	A 2015 study reported a 17% seroprevalence of *Coxeilla burnetii* in live seemingly healthy northern sea otters of Alaska.[47] Another study in 2013 found an 80% seroprevalence in northern fur seals of Alaska.[48]	Q Fever is diagnosed through a blood test. The majority of those infected recover without treatment. However, for people who develop Q fever disease, treatment with 2 weeks of doxycycline antibiotic is recommended.[49] Prevention methods for Q fever include avoiding contact with animals, especially those giving birth, and refraining from consuming raw milk or raw milk products. Q fever is most commonly spread to people by infected farm animals, including goats, cattle, and sheep.[49]

Photo 6. Male caribou grazing on fall tundra in the Toklat River Basin.

INTRODUCTION

Zoonotic diseases are diseases that are spread between animals and people. Most known human infectious diseases and about three-quarters of newly emerging infections originate from animals.[50] Zoonotic diseases that occur in large numbers can impact society in three main ways. Specifically, they:

- Threaten the health of animals resulting in illness, loss of productivity, and death.
- Threaten the livelihood, food security, and cultural traditions of the population dependent on wildlife and livestock as a major source of food and income.
- Threaten the health of people, with ability to cause a significant number of illnesses and death, and significant social and economic losses.

In order to best address zoonotic disease threats, a multisectoral, One Health approach is needed. One Health means a collaborative, multisectoral, and transdisciplinary approach—working at the local, regional, national, and global levels—with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment.

To begin addressing zoonotic disease challenges in Alaska, a One Health Zoonotic Disease Prioritization workshop was held on March 20–21, 2019, in Fairbanks, Alaska. The purpose of the One Health Zoonotic Disease Prioritization workshop for Alaska was to prioritize zoonotic diseases of greatest concern for Alaska using a multisectoral, One Health approach with input from representatives of Indigenous, public, animal (livestock and wildlife), and environmental health sectors and other relevant partners.

The specific workshop goal was to use a multisectoral, One Health approach to prioritize endemic and emerging zoonotic diseases of greatest concern in Alaska to be jointly addressed by sectors responsible for human, animal, and environmental health.

Photo 7. Moose cow with young calf.

WORKSHOP METHODS

The One Health Zoonotic Disease Prioritization (OHZDP) process uses a mixed methods prioritization process developed by the U.S. Centers for Disease Control and Prevention's (CDC) One Health Office. The methods have been previously described in detail (Appendix A). Workshop organizers began to prepare and plan for this workshop months in advance. During the planning process, a core planning team of points of contacts from each sector and CDC's One Health Office was established. One of the items during the planning phase was developing an initial zoonotic disease list for the prioritization workshop. The initial list of zoonotic disease was initially developed by reviewing and incorporating zoonotic diseases from the human and animal reportable disease lists in Alaska. A zoonotic disease was selected if it was known to be spread, or had the potential to be spread, between humans and animals and was of concern for Alaska. Additional zoonotic diseases were then added to this initial list through a literature review process to identify zoonotic diseases present in Alaska. Members of the core planning team also had opportunities to review and comment on the list and share within their respective sectors.

During the workshop, participants represented Indigenous, public, animal (livestock and wildlife), and environmental health sectors and other relevant partners (Appendix B). Workshop participants had an opportunity to review and finalize the initial zoonotic disease list to focus on for prioritization. Zoonotic diseases on human or animal reportable disease lists were included on the initial list. A list of 40 zoonotic diseases were considered during the workshop (Appendix C).

Workshop participants then developed five criteria for ranking the 40 zoonotic diseases. Once the five criteria were developed, one categorical question was developed for each criterion through group discussion. Questions were then developed to best assess each criterion (Appendix D). All questions had ordinal, binomial, or multinomial answers. The ordinal nature is necessary for the scoring process and each answer choice was given a score, which was determined by the participants. Voting members then individually ranked their preferences for the relative importance of each criterion. Each individual voting member's ranking were entered in the OHZDP Tool by a facilitator and a group weight for each criterion was calculated. Facilitators and workshop participants answered each question for each zoonotic disease using data that were identified through an extensive literature search, as well as information from WHO, OIE, ProMED, and other relevant websites. Data on disease transmission, severity, pandemic and epidemic potential, economic impact, prevention and control, and environmental impact were collected for each zoonotic disease. If information for a particular zoonotic disease was not available for Alaska, national or global data were used.

After scoring all zoonotic diseases, decision tree analysis was used to determine the ranked zoonotic disease list. Each weighted criterion was applied across each question's answers for each zoonotic disease. The scores for all five questions for each zoonotic disease were then summed. The highest raw score was then normalized giving that zoonotic disease a normalized score of 1.

The raw and normalized scores for each zoonotic disease were presented to the participants for discussion. Workshop participants then utilized the ranked OHZDP list to discuss and decide on a final priority list of seven zoonotic diseases (Appendix E). After the participants decided on the priority zoonotic diseases, participants developed next steps and action plans to address the priority zoonotic diseases.

CRITERIA AND QUESTIONS DEVELOPED

The criteria for ranking zoonotic diseases selected by the voting members in Alaska are listed in order of importance below. A description of how the questions assessed the criteria are listed below. For the full question and answer choices, see Appendix D.

Rank	Criteria	Weight	Question Description
1	Clinical Outcomes	0.36	The clinical outcomes of the disease, as measured by case fatality rate (CFR), in humans or animals in Alaska.
2	Exposure/ Transmission/ Prevalence	0.25	Exposure as defined by the presence of the zoonotic disease in Alaska, and transmission as defined by the number of modes of transmission.
3	Safety/Security, Social/Cultural, Economic	0.21	Food security, food safety, cultural and social impacts, and economic impacts on the use of animal resources.
4	Response Capacity	0.11	The unavailability in Alaska of surveillance, control, interventions, and statewide response capacity in humans and animals.
5	Climate Change	0.08	The impact of climate change and other related climate- driven threats on the zoonotic disease.

PRIORITY ZOONOTIC DISEASE LIST FOR ALASKA

The seven priority zoonotic diseases for multisectoral, One Health collaboration for Alaska are (Table 1):

1. Amnesic shellfish poisoning/paralytic shellfish poisoning
2. Zoonotic influenza
3. Rabies
4. Cryptosporidiosis/giardiasis
5. Toxoplasmosis
6. Brucellosis
7. Q fever

NEXT STEPS AND ACTION PLANS

After finalizing the list of priority zoonotic diseases, workshop participants discussed next steps and action plans to address the priority zoonotic diseases using a multisectoral, One Health approach.

Participants were asked to develop next steps and action plans for how to address the priority zoonotic diseases using a multisectoral, One Health approach. A summary of the recommendations organized by theme follows:

MULTISECTORAL, ONE HEALTH COLLABORATION

- Develop a catalog of existing One Health groups/capacities in Alaska
- Publicize existence of the One Health groups/capacities within Alaska
- Coordinate meeting times to include all stakeholders and increase participation
  - Publicize priority zoonotic disease list to agencies, community groups, and use the list itself as a tool for engagement
- Continue to coordinate One Health meetings and workshops with multisectoral participation and working groups that include diverse regional representation
- Hold an annual One Health conference for information exchange and planning
- Develop a zoonotic disease prioritization workgroup to revisit the list, document activities, and identify challenges and ways forward
  - Invite Canadian and Russian partners to involve common One Health and zoonotic disease issues
- Develop a One Health contact list or listserv that could be used for communication and important information to connect people
  - This listserv can be used as a bulletin board to identify who to contact for various needs
  - Need to identify who would maintain this listserv

Photo 8. Man kayaking in Sitka Harbor, Alaska.

SURVEILLANCE

- Build on existing networks for surveillance
  - There are functioning surveillance networks for some of the priority zoonotic diseases, but those are not fully coordinated. While data is commonly shared, there is no formalized mechanism for whom to share with and when to share disease data for the priority zoonotic diseases. In some circumstances, there are also legal limitations on what data can be shared
- Identify and attempt to secure targeted research and surveillance funds
  - Currently, these funds are ad hoc in response to events
- Utilize existing resources like the LEO Network (citizen scientist report network) to capture observational data
- Develop a system for sharing case definitions for the priority zoonotic diseases between human and animal health sectors

LABORATORY

- Increase testing capacity for public health laboratories for all priority zoonotic diseases
- Develop state-wide capacity for all priority zoonotic diseases
- Enhance animal disease diagnostics laboratory capacity
- Develop community-based hunter networks to gather animal samples
- Develop a document that elaborates the network of laboratory capacity within the state

Photo 9. Domestic yak *(Bos grunniens)* on an Alaskan farm.

PREPAREDNESS AND OUTBREAK RESPONSE

- Identify opportunities to integrate human and animal response plans for the priority zoonotic diseases
  - Response plans are currently separate by sector. Plans can be disease-specific or could cover multiple diseases, as appropriate
- Conduct joint zoonotic disease table top exercises not only among government agencies, but all relevant stakeholders including community members
- Enhance messaging during the response phase of a zoonotic disease event that utilizes a One Health approach

Photo 10. Native American Clan House and Totems.

WORKFORCE

- Conduct trainings for students not only within their own disciplines but also within networks to think about multisectoral approaches
- Develop educational material on problem solving that uses a One Health approach
  - For example, the APU partnership in Environmental Health is a new program that provides mentoring; BLaST is another for Alaska Natives and rural students in training.
- Strengthen and develop community-based outreach, with youth engagement that leads to adult involvement.
- Review current outreach programs for youth effectiveness.
  - Utilize assets that exist in regional hubs such as health consortia and Native Corporations
  - Develop capacity of these assets to address various topics
- Create an educational focus on zoonotic disease issues for the public
  - Examples include food safety, security, sanitation, mental and behavioral health, improve human and animal health, rural Alaska culture, and economics
- Develop messaging for priority zoonotic diseases that are specifically tailored to the groups receiving the information

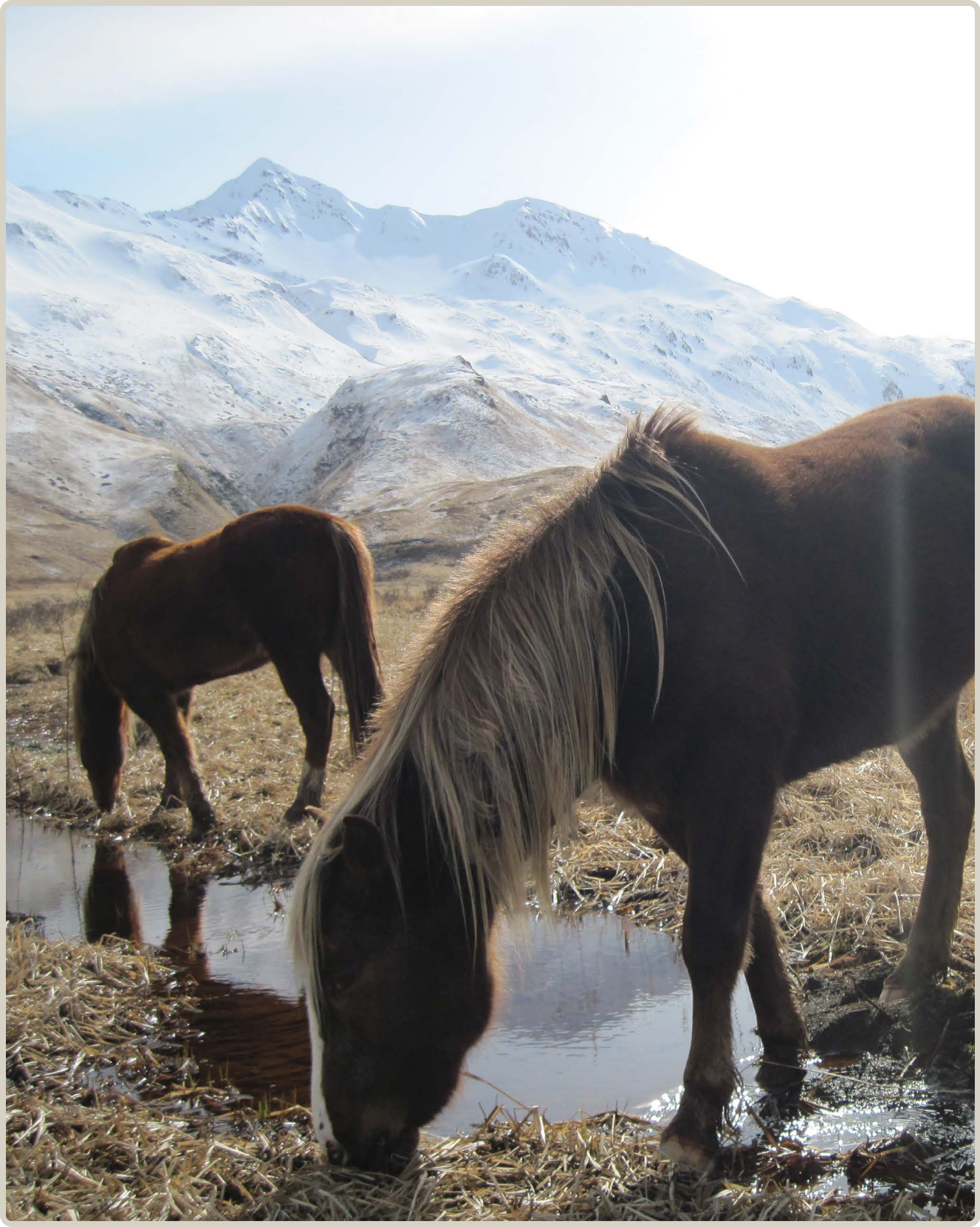
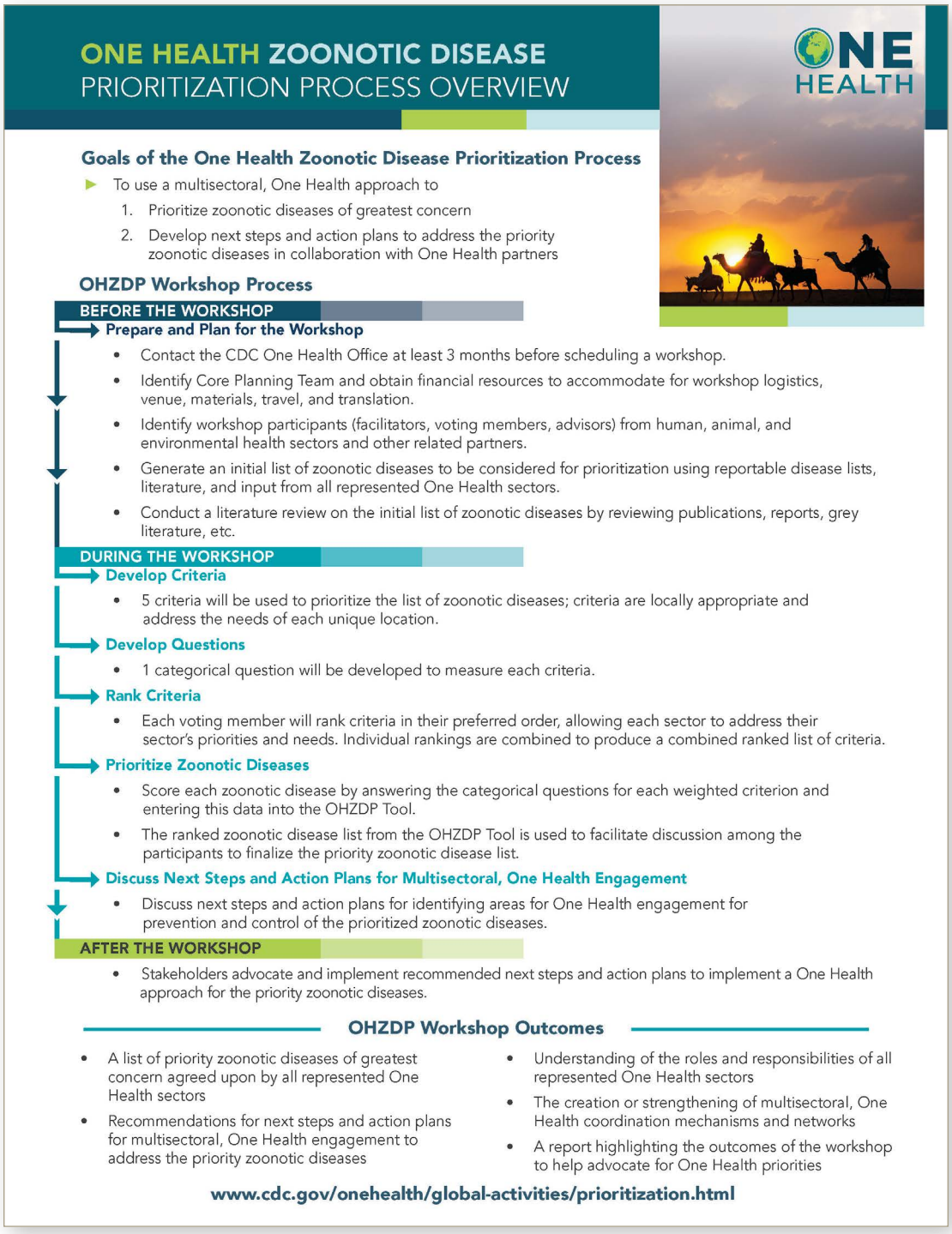


Photo 11: Wild horses grazing in Kodiak, Alaska.

APPENDIX A: Overview of the One Health Zoonotic Disease Prioritization Process

U.S. Centers for Disease Control and Prevention: Overview of the One Health Zoonotic Disease Prioritization Workshop http://www.cdc.gov/onehealth/what-we-do/zoonotic-disease-prioritization



ONE HEALTH ZOONOTIC DISEASE PRIORITIZATION PROCESS OVERVIEW

ONE HEALTH

Goals of the One Health Zoonotic Disease Prioritization Process

- To use a multisectoral, One Health approach to
  1. Prioritize zoonotic diseases of greatest concern
  2. Develop next steps and action plans to address the priority zoonotic diseases in collaboration with One Health partners

OHZDP Workshop Process

BEFORE THE WORKSHOP

Prepare and Plan for the Workshop

- Contact the CDC One Health Office at least 3 months before scheduling a workshop.
- Identify Core Planning Team and obtain financial resources to accommodate for workshop logistics, venue, materials, travel, and translation.
- Identify workshop participants (facilitators, voting members, advisors) from human, animal, and environmental health sectors and other related partners.
- Generate an initial list of zoonotic diseases to be considered for prioritization using reportable disease lists, literature, and input from all represented One Health sectors.
- Conduct a literature review on the initial list of zoonotic diseases by reviewing publications, reports, grey literature, etc.

DURING THE WORKSHOP

Develop Criteria

- 5 criteria will be used to prioritize the list of zoonotic diseases; criteria are locally appropriate and address the needs of each unique location.

Develop Questions

- 1 categorical question will be developed to measure each criteria.

Rank Criteria

- Each voting member will rank criteria in their preferred order, allowing each sector to address their sector's priorities and needs. Individual rankings are combined to produce a combined ranked list of criteria.

Prioritize Zoonotic Diseases

- Score each zoonotic disease by answering the categorical questions for each weighted criterion and entering this data into the OHZDP Tool.
- The ranked zoonotic disease list from the OHZDP Tool is used to facilitate discussion among the participants to finalize the priority zoonotic disease list.

Discuss Next Steps and Action Plans for Multisectoral, One Health Engagement

- Discuss next steps and action plans for identifying areas for One Health engagement for prevention and control of the prioritized zoonotic diseases.

AFTER THE WORKSHOP

- Stakeholders advocate and implement recommended next steps and action plans to implement a One Health approach for the priority zoonotic diseases.

OHZDP Workshop Outcomes

- A list of priority zoonotic diseases of greatest concern agreed upon by all represented One Health sectors
- Recommendations for next steps and action plans for multisectoral, One Health engagement to address the priority zoonotic diseases
- Understanding of the roles and responsibilities of all represented One Health sectors
- The creation or strengthening of multisectoral, One Health coordination mechanisms and networks
- A report highlighting the outcomes of the workshop to help advocate for One Health priorities

www.cdc.gov/onehealth/global-activities/prioritization.html

APPENDIX B: One Health Zoonotic Disease Prioritization Workshop Participants for Alaska

Voting Members

#	Name	Organization	Title/Position
1	Bob Gerlach	Alaska Department of Environmental Conservation	Alaska State Veterinarian
2	Kimberlee Beckmen	Alaska Department of Fish and Game	Wildlife Health Veterinarian
3	Kim Porter	Alaska Department of Health and Social Services, Alaska Section of Epidemiology	Career Epidemiology Field Officer
4	Mike Brubaker	Alaska Native Tribal Health Consortium, Department of Community, Environment and Health	Director of Community, Environment and Health
5	Amy Holman	National Oceanic and Atmospheric Administration	Regional Coordinator
6	Mike Bruce	United States Centers for Disease Control and Prevention, Arctic Investigations Program	Epidemiology Team Lead (current director)
7	Jodie Jones	United States Department of Agriculture	Veterinary Medical Officer
8	David Payer	United States Department of the Interior, U.S. National Park Service	Wildlife and Fisheries Team Lead
9	Arleigh Reynolds	University of Alaska, Fairbanks	Director of One Health Initiative

Advisors/Observers

#	Name	Organization	Title/Position
1	Christina Carpenter	Alaska Department of Environmental Conservation	Environmental Health Division Director
2	Camilla Lieske	Alaska Department of Fish and Game	Wildlife Health Surveillance Program Veterinarian
3	Jim Berner	Alaska Native Tribal Health Consortium, Department of Community, Environment and Health	Senior Director of Science, Community Health Services
4	Jayme Parker	Alaska State Virology Laboratory	Public Health Microbiologist, Lab Manager
5	Karen Pletnikoff	Aleutian Pribilof Islands Association	Community Environment and Safety Manager
6	Cheryl Rosa	Arctic Research Commission	Deputy Director
7	Raphaela Stimmelmayr	North Slope Borough Department of Wildlife Management	Research Biologist, Wildlife Veterinarian
8	Maya Ramaswamy	United States Centers for Disease Control and Prevention, Arctic Investigations Program	Epidemic Intelligence Service Officer
9	John Pearce	United States Department of the Interior, U.S. Geological Survey	Supervisory Wildlife Biologist

#	Name	Organization	Title/Position
10	Douglas Causey	University of Alaska, Anchorage	Professor, Biological Sciences; Principal Investigator
11	John Blake	University of Alaska, Fairbanks	Director Animal Resources Center
12	Gay Sheffield	University of Alaska, Fairbanks, Alaska Sea Grant	Bering Strait Agent
13	Karsten Hueffer	University of Alaska, Fairbanks	Associate Dean of Veterinary Medicine

Workshop Facilitators

#	Name	Organization	Title/Position
1	Thomas Hennessy	United States Centers for Disease Control and Prevention, Arctic Investigations Program	Director
2	Grace Goryoka	United States Centers for Disease Control and Prevention, One Health Office	Health Scientist
3	Ria Ghai	United States Centers for Disease Control and Prevention, One Health Office	Doctoral Epidemiologist

Photo 12. Commercial fishing boats in Prince William Sound, Alaska.

APPENDIX C: Initial Zoonotic Disease List of the One Health Zoonotic Prioritization Process in Alaska

This initial list of 40 zoonotic diseases was used for the One Health Zoonotic Disease Prioritization Workshop in Alaska. This list of zoonotic diseases was developed from the human and animal reportable disease lists for Alaska and by input from human, animal, and environmental health sectors in Alaska.

	Bacteria	**Etiological agent**
1	Anthrax	*Bacillus anthracis*
2	Brucellosis	*Brucella spp.*
3	Campylobacteriosis	*Campylobacter spp.*
4	E. coli	*Escherichia coli*
5	Glanders	*Burkholderia mallei*
6	Leptospirosis	*Leptospira spp.*
7	Listeriosis	*Listeria monocytogenes*
8	Lyme disease	*Borrelia burgdorferi*
9	Melioidosis	*Burkholderia pseudomallei*
10	Plague	*Yersinia pestis*
11	Psittacosis	*Chlamydia psittaci*
12	Q fever	*Coxiella burnetii*
13	Salmonellosis	*Salmonella spp.*
14	Shigellosis	*Shigella spp.*
15	Tularemia	*Francisella tularensis*
16	Vibriosis	*Vibrio spp.*
17	Yersiniosis	*Yersinia enterocolitica*
18	Zoonotic tuberculosis	*Mycobacterium bovis.*

	Viruses	**Etiological agent**
19	Hantavirus pulmonary syndrome	*Hantavirus*
20	Jamestown Canyon encephalitis	*Jamestown Canyon virus*
21	Rabies	*Rabies virus*
22	Severe acute respiratory syndrome	*Severe acute respiratory syndrome coronavirus*
23	Snowshoe hare encephalitis	*Snowshoe Hare virus*
24	West Nile fever	*West Nile virus*
25	Zoonotic influenzas (avian and swine)	*Influenza A*

	Parasites	Etiological agent
26	Anisikiasis	*Anisakis*
27	Cryptosporidiosis	*Cryptosporidium*
28	Cysticercosis	*Taenia solium*
29	Cyclosporosis	*Cyclospora cayetanensis*
30	Diphyllobothriasis	*Diphyllobothrium latum*
31	Echinococcosis	*Echinococcus spp*
32	Giardiasis	*Giardia spp.*
33	Metorchiasis	*Metorchis conjunctus*
34	Toxoplasmosis	*Toxoplasma gondii*
35	Trichinellosis	*Trichinella spp.*

	Prions	Etiological agent
36	Bovine Spongiform Encephalopathy	*Prion disease*
37	Chronic Wasting Disease*	*Prion disease*

	Fungi	Etiological agent
38	Cryptococcosis	*Cryptococcus spp.*

	Algal Toxins
39	Amnesic shellfish poisoning**
40	Paralytic shellfish poisoning**

*Chronic wasting disease (CWD) was included even though no human cases have been detected because it falls within a class of pathogens that includes some that have been show to infect humans (namely, BSE). There is also evolving laboratory animal data showing transmission of CWD to macaques through feeding of meat from an infected animal, heightening concern for potential zoonotic transmission.

Due to the unique features of prion diseases—including a long and unpredictable incubation period— long-term surveillance is needed to know if human infections could be occurring. For this reason, the question of CWD as a zoonotic disease has been approached with a strong One Health focus.

**Amnesic shellfish poisoning (ASP) and paralytic shellfish poisoning (PSP) are a public health threat of increasing concern in Alaska due to changing marine conditions. ASP/PSP can be fatal illnesses in humans and other animals. Because the ASP and PSP toxins originate in microbes and are transmitted through the food chain, they represent a One Health concern with similar properties to zoonotic infections.

APPENDIX D: Criteria and questions developed for ranking the zoonotic diseases

Criterion A: Clinical Outcomes *(criterion weight = 0.355)*

Question: Does the zoonotic disease have a clinical outcome that is mild or severe in humans, animals (in either one animal species or multiple), or both in Alaska?

- **Mild in humans: Case fatality rate (CFR) <6%**
- **Severe in humans: CFR ≥6%**
- **Mild in animals: CFR <6% AND no fitness consequences (reproductive or production losses)**
- **Severe in animals: CFR ≥6% OR fitness consequences (reproductive or production losses)**

Answer:

- ☐ Mild in both animals and humans (0)
- ☐ Severe in one animal species and mild in humans (1)
- ☐ Severe in multiple animal species and mild in humans (2)
- ☐ Severe in humans only and mild in animals (3)
- ☐ Severe in humans and animals (4)

[The assumption was with routine health care in Alaska. If the pathogen was not present in the United States, global CFR data was used from a comparable developed country, if available.]

Criteria B: Climate change sensitivity and other emerging threats *(criterion weight = 0.079)*

Question: How will climate change and related environmental drivers impact this zoonotic disease within the next 10 years?

Answer:

- ☐ Decreased risk (0)
- ☐ No change in risk (1)
- ☐ Unknown risk change (2)
- ☐ Increased risk (3)

[Unknown risk was provided with a higher score than no change in risk due to the gaps in data and the potential risk that there can be.]

Criteria C: Exposure/Transmission/Prevalence *(criterion weight = 0.245)*

Question: Is the zoonotic disease present in Alaska (currently or any time in the past) in humans or animals, and how many modes of transmission are known for the zoonotic disease?

Answer:

- ☐ Not present in Alaska in humans or animals, and only one mode of transmission (0)
- ☐ Not present in Alaska in humans or animals, and >1 mode of transmission (1)
- ☐ Present in Alaska in humans or animals and only one mode of transmission (2)
- ☐ Present in Alaska in humans or animals, and >1 mode of transmission (3)

Criteria D: Food Safety/Security, Social/Cultural, Economic *(criterion weight = 0.210)*

Question: How does this zoonotic disease affect the food security*, food safety, cultural/ social impacts, and economic impact of human use of animal resources (for cultural, nutritional or economic purposes)?

Answer:

- ☐ No impacts (0)
- ☐ One of the 4 (1)
- ☐ Two of the 4 (2)
- ☐ Three of the 4 (3)
- ☐ All (4)

*[*The definition of food security has been partially pulled from the Inuit Circumpolar Council's definition focusing on availability, accessibility, and stability]*

Criteria E: Response Capacity (surveillance, medical, treatment, diagnosis) *(criterion weight = 0.110)*

Question: How many of these response capacities below are not available for the zoonotic disease in humans or animals in Alaska?

- **Surveillance system in place for animals**
- **Control (isolation or education) or intervention (vaccine) or treatment in humans**
- **Control (quarantine or culling or depopulation) or Intervention (vaccine) or treatment in animals**
- **Statewide capacity to respond to an outbreak in humans**
- **Statewide capacity to respond to an outbreak in domestic animals or wildlife**

Answer:

- ☐ None of the above or one of the above (0)
- ☐ Two of the above (1)
- ☐ Three of the above (2)
- ☐ Four of the above (3)
- ☐ All of the above (4)

APPENDIX E: Ranked Zoonotic Disease List of the One Health Zoonotic Prioritization Process in Alaska

Final results of the One Health Zoonotic Disease Prioritization, including raw and normalized scores for 40 zoonotic diseases. The top prioritized zoonotic diseases selected by workshop participants are shown in bold.

#	Disease	Raw Score	Normalized Final Score
1	**Zoonotic influenzas (avian and swine)**	**0.849766583**	**1**
1	Melioidosis	0.824515261	0.970284
3	Anthrax	0.795850897	0.936552
4	Chronic wasting disease*	0.795850897	0.936552
5	Zoonotic tuberculosis	0.769461895	0.905498
6	Listeriosis	0.741935211	0.873105
7	**Amnesic shellfish poisoning**	**0.733412892**	**0.863076**
8	**Cryptosporidiosis**	**0.705886208**	**0.830682**
9	Bovine spongiform encephalopathy	0.674281844	0.793491
10	Campylobacteriosis	0.645723565	0.759883
11	**Toxoplasma**	**0.645723565**	**0.759883**
12	West Nile virus	0.638232841	0.751068
13	**Rabies**	**0.626996016**	**0.737845**
14	**Brucellosis**	**0.618196881**	**0.72749**
15	**Giardiasis**	**0.6170592**	**0.726151**
16	Tularemia	0.6170592	0.726151
17	Echinococcosis	0.574494826	0.676062
18	Glanders	0.559457134	0.658366
19	Hantavirus pulmonary syndrome	0.552072496	0.649675
20	Leptospirosis	0.538169008	0.633314
21	**Q fever**	**0.538169008**	**0.633314**
22	Severe acute respiratory syndrome (SARS)	0.525683493	0.618621
23	*Cryptococcus gattii*	0.495881448	0.58355
24	*E. coli*	0.494458551	0.581876
25	**Paralytic shellfish poisoning**	**0.466931868**	**0.549483**
26	Psittacosis	0.459278815	0.540476
27	Plague	0.443103443	0.521441
28	Cyclosporosis	0.441680547	0.519767
29	Shigellosis	0.441680547	0.519767

#	Disease	Raw Score	Normalized Final Score
30	Yersiniosis	0.441680547	0.519767
31	Salmonellosis	0.38662718	0.45498
32	Anisakiasis	0.371751817	0.437475
33	Diphyllobothriasis	0.371751817	0.437475
34	Vibriosis	0.371751817	0.437475
35	Jamestown canyon virus	0.345362815	0.406421
36	Snowshoe hare virus	0.345362815	0.406421
37	Trichinosis	0.292861625	0.344638
38	Cysticercosis	0.210281575	0.247458
39	Metorchiasis	0.136495736	0.160627
40	Lyme disease	0.10669369	0.125556

Photo 13. Sled dog team races through the snow.

APPENDIX F: Scores for Each Criterion of the One Health Zoonotic Prioritization Process in Alaska

Zoonotic Disease List	A. Clinical Outcomes	B. Climate Change	C. Exposure/ Transmission/ Prevalence	D. Food Safety/ Security, Social/ Cultural, Economic	E. Response Capacity
Anisikiasis	0	3	0	4	3
Anthrax	4	2	1	4	2
Bovine spongiform encephalopathy	4	1	0	4	3
Brucellosis	2	2	1	4	2
Campylobacteriosis	2	2	1	4	3
Chronic wasting disease	4	2	1	4	2
Cryptococcosis	3	3	1	0	1
Cryptosporidiosis	3	3	1	4	1
Cyclosporosis	0	1	1	4	3
Cysticercosis	0	2	0	3	0
Diphyllobothriasis	0	3	0	4	3
Amnesic shellfish poisoning	3	3	1	4	2
E. coli	0	3	1	4	3
Echinococcosis	3	2	1	2	1
Giardiasis	2	3	1	4	1
Glanders	4	1	1	0	2
Hantavirus pulmonary syndrome	3	2	1	0	4
Jamestown Canyon encephalitis	0	2	0	4	3
Leptospirosis	2	2	1	3	1
Listeriosis	4	1	1	4	1
Lyme disease	0	3	0	0	1
Melioidosis	4	1	1	4	4
Metorchiasis	0	1	0	0	4
Paralytic shellfish poisoning	0*	3	1	4	2
Plague	3	1	1	0	1
Psittacosis	2	1	1	2	1
Q fever	2	2	1	3	1
Rabies	3	2	1	3	1
Salmonellosis	0	1	1	4	1
Severe acute respiratory syndrome	3	1	1	0	4

Zoonotic Disease List	A. Clinical Outcomes	B. Climate Change	C. Exposure/ Transmission/ Prevalence	D. Food Safety/ Security, Social/ Cultural, Economic	E. Response Capacity
Shigellosis	0	1	1	4	3
Snowshoe Hare encephalitis	0	2	0	4	3
Toxoplasmosis	2	2	1	4	3
Trichinosis	0	2	0	3	3
Tularemia	2	3	1	4	1
Vibriosis	0	3	0	4	3
West Nile fever	3	3	0	4	3
Yersiniosis	0	1	1	4	3
Zoonotic influenzas	4	3	1	4	3
Zoonotic tuberculosis	4	1	1	4	2

The scores identified in this table were scored by workshop facilitators and participants by using data and subject matter expertise. When data was not available, participants assigned a score through discussion and consensus.

* The score of "0" given for criteria A for Paralytic Shellfish Poisoning (PSP) was incorrectly scored. The overall rankings of the zoonotic diseases by the OHZDP Tool are used as a guide and a resource to develop the final priority zoonotic disease list. Even with this incorrect scoring, PSP was still deemed as incredibly important to prioritize by all participants during the open discussion section of the workshop.

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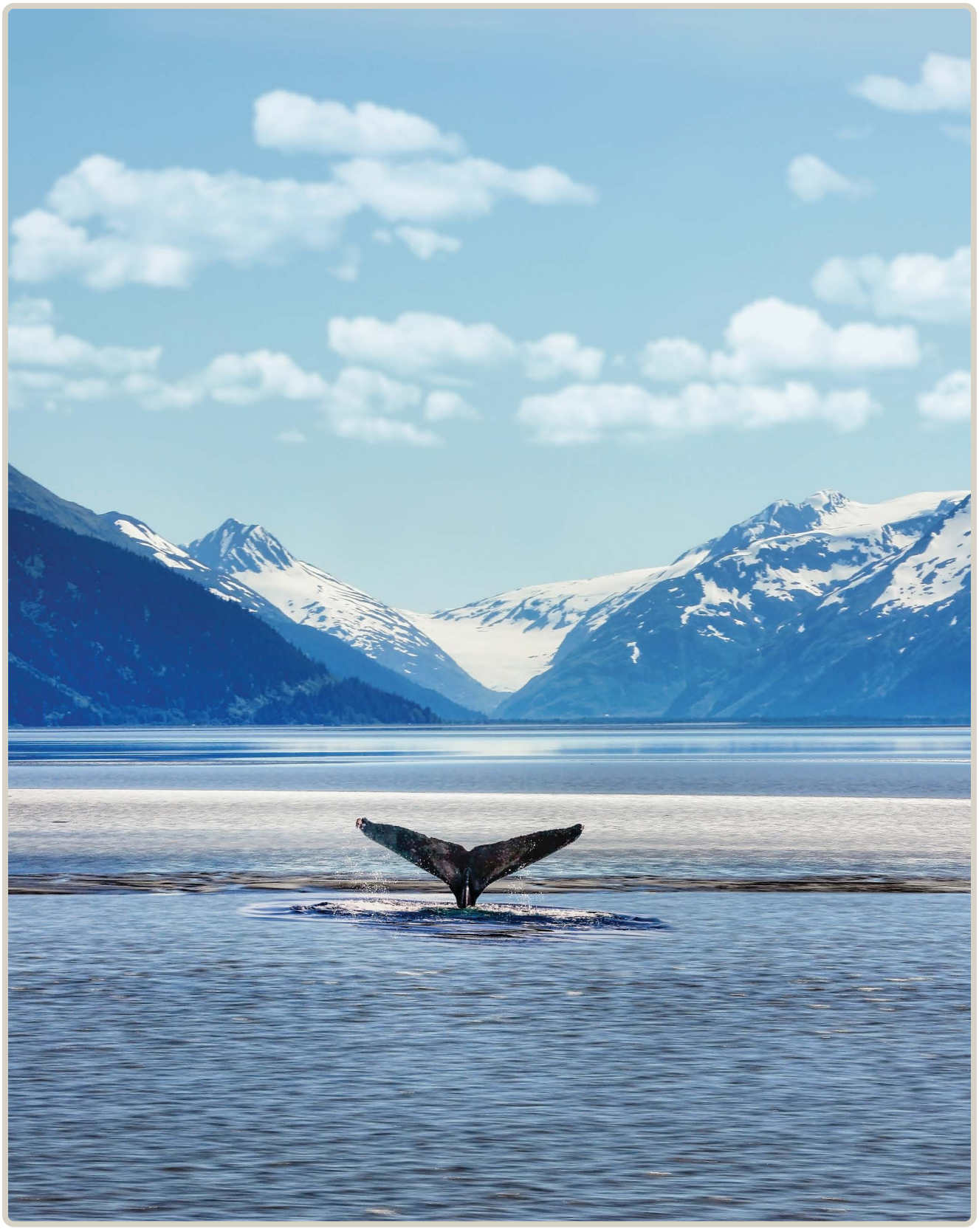

Photo 14. Whale in the ocean with scenic Alaskan landscape and mountains.

http://www.cdc.gov/onehealth