Canada's National Chronic Wasting Disease Control Strategy

October 2005

Prepared for the Federal-Provincial/Territorial Resource Ministers Council by the Technical Working Group assembled under the Inter-Agency Oversight Committee (IOC) for Chronic Wasting Disease. Published on Behalf of the IOC by
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EXECUTIVE SUMMARY

The objective of Canada's National Chronic Wasting Disease Control Strategy is to establish a coordinated national policy and a disease response and management framework to minimize the negative impacts of Chronic Wasting Disease on biodiversity, human and livestock health, the environment and the economy. The ultimate objective of this Strategy is to eradicate Chronic Wasting Disease from Canada or, failing this, to achieve the tightest possible control of the disease so that it does not spread to new geographic areas or to new species, and so that its environmental, economic and health impacts are minimized. As mandated by the federal-provincial/territorial Resource Ministers Council in September 2004, the Chronic Wasting Disease Control Strategy is a direct application of *Canada's National Wildlife Disease Strategy*, applied to this specific disease issue and created under the leadership of the Canadian Wildlife Directors Committee.

The Chronic Wasting Disease Strategy will not replace, but will complement and build upon, existing disease management policies and programs, identifying and filling program gaps and improving integration of new and existing programs. The Strategy recognizes and respects the jurisdictional authorities, historic investments and legitimate interests of federal, provincial, territorial, Aboriginal, regional and municipal governments, of universities and non-government agencies and of the public in Chronic Wasting Disease. Participants in the Strategy agree that the Strategy, and the policies and programs that arise from it, will be based on the principles 1) of full and open collaboration, 2) use of the best available science, 3) close vertical and horizontal integration among jurisdictions, 4) careful, strategic investment of new resources, and 5) adaptive management, such that cycles evaluation and revision of program actions are integral components of all policies and programs. Although applicable to the disease in all species, the focus of the Strategy is Chronic Wasting Disease in wild, farmed and captive cervids (members of the deer family - Cervidae).

The six goals of the Strategy are: 1) Prevention of further emergence of Chronic Wasting Disease in Canada, 2) Early detection of Chronic Wasting Disease in cervid populations, 3) Planned responses to Chronic Wasting Disease, 4) Effective management of Chronic Wasting Disease in cervids through valid scientific approaches, 5) Education and training required to achieve goals 1 to 4, and 6) Communications, both internal and external, to assure coordination, collaboration, integration, and accurate risk communication. Detailed Action Plans will be developed for each of these goals and the actions thus defined will then be integrated to achieve a coordinated response and management program for Chronic Wasting Disease in Canada.

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Cover Photo: Mule Deer from the vicinity of Saskatchewan landing Provincial Park, found in October 2003 with severe clinical Chronic Wasting Disease. Photo: Saskatchewan Environment

Background:

On 18 September 2004, the Ministers Council, representing federal, provincial and territorial government ministries with responsibilities for wildlife, mandated the Canadian Wildlife Directors Committee to develop a national strategy to respond to and control Chronic Wasting Disease (CWD) in Canadian wild animals. This strategy was to be modelled on Canada's National Wildlife Disease Strategy and was to serve as an urgent application to one disease, CWD, of the broader Wildlife Disease Strategy. On 21 October 2004, the wildlife directors established a process and governance structure for development of the CWD Control Strategy. An Interagency Oversight Committee would be struck, representing federal, provincial and territorial government agencies with responsibilities in agriculture, health and environment/wildlife. A Technical Working Group would be responsible for drafting the CWD Control Strategy, with input from a Stakeholders Consultative Committee and a Science Advisory Committee.

The Technical Working Group (Appendix 1) met for the first time in Regina, Saskatchewan on 8-9 November 2004. At this meeting, the National Wildlife Disease Strategy was reviewed and adapted to the specific case of Chronic Wasting Disease. The general background and foundational principles of the National Wildlife Disease Control Strategy were adopted unchanged. The six goals were modified. The outcome is presented in this document. Action Plans for each of the six goals of the CWD Control Strategy have also been prepared and specify the actions to be undertaken to control CWD, their time frame, costs, and the departments and agencies responsible for each.

In preparing this Strategy, the Technical Working Group has used the report, *Chronic Wasting Disease in Canadian Wildlife: An Expert Opinion on the Epidemiology and Risks to Wild Deer*, as an important reference document. This report was prepared by an international panel of scientists and released on 4 August 2004, (available at <http://wildlife1.usask.ca/ccwhc2003/Publications/>).

Introduction

The rapid pace of disease emergence in Canada and around the world at the beginning of the 21st century has created new challenges to wildlife management, public health, livestock health, and national and regional economies. Canada's National Chronic Wasting Disease Control Strategy is a policy framework through which governments at all levels will seek to minimize the harmful effects of this disease on Canadian and international societies. The objectives of this Strategy will be achieved through a series of Action Plans developed for each strategic goal and implemented collaboratively among the responsible jurisdictions. Each Action Plan will have immediate, medium and long-term objectives. There will be regular progress reports and updates for each Action Plan.

International Context

Diseases originating or reservoired in wild animals, such as Chronic Wasting Disease,[I] are having an increasingly serious impact on biodiversity, human health, agricultural production and economies regionally and worldwide. Avian Influenza, SARS, HIV-AIDS, West Nile Virus, BSE, Tuberculosis and Lyme Disease are other examples. Canada's international obligations within the United Nations, World Health Organization, World Trade Organization, World Organization for Animal Health (OIE) and the Food and Agriculture Organization, among others, require vigilance and transparency in detecting, identifying, reporting and containing important wild animal diseases.

National Context

Canada's capacity to manage important disease issues has been challenged in recent years by the number, complexity and magnitude of high-impact disease occurrences and the threat of bioterrorism. Major assessments of national disease response capacity were carried out in 2003 by Health Canada, the Canadian Food Inspection Agency and Fisheries and Oceans Canada for human health, livestock health and aquacultural animal health, respectively. Many of the diseases of greatest concern to human and domestic animal health are infectious diseases acquired from wild animals, either within Canada or elsewhere in the world. Approximately 70% of new or newly important diseases affecting human health and human economies worldwide are believed to have a wild animal source. National capacity to manage wild animal diseases was evaluated in 2001 and 2002 by the Canadian Wildlife Directors Committee, and this evaluation initiated the development of the National Wildlife Disease Strategy. In September 2004, the Ministers Council, representing federal, provincial and territorial governments with responsibilities for wildlife, mandated the Canadian Wildlife Directors Committee to develop a National Chronic Wasting Disease Control Strategy. This strategy was to be modelled after the proposed National Wildlife Disease Strategy.

[I] Definitions of terminology are in Annex 1.

National Process

Collaborative management of wild animal diseases in Canada began in 1992 when federal, provincial and territorial governments formed a partnership with Canada's four colleges of veterinary medicine and established the Canadian Cooperative Wildlife Health Centre, a national program of wildlife disease surveillance, research and response. In 2001, the resources, performance and capacity of this university-based, inter-agency partnership were reviewed. The review highlighted limited national capacity and recommended a range of enhancements. The scale and direction of these recommendations were endorsed by the federal/provincial/territorial Wildlife Ministers Council of Canada in September 2002. Development of a national policy framework for strategic expansion of capacity and for coordination of wildlife disease management among governments was approved at a meeting of the Council of federal, provincial and territorial Ministers responsible for wildlife, forests, and fisheries and aquaculture in September 2003. At the September 2004 Ministers Council meeting, the Canadian Wildlife Directors Committee was directed to develop a National Chronic Wasting Disease Control Strategy, to be ready for review, approval and implementation in the fall of 2005.

Canadian Wildlife Directors Committee (CWDC)
The CWDC consists of the directors of wildlife of each province and territory, the five regional directors and Director General of the Canadian Wildlife Service, and one representative each of Fisheries and Oceans Canada and the Parks Canada Agency. The role of the CWDC is to provide leadership in the development and coordination of policies, strategies, programs and activities which address wildlife issues of national concern and contribute to the conservation of biodiversity.

Canadian Cooperative Wildlife Health Centre
The Canadian Cooperative Wildlife Health Centre undertakes national wildlife disease surveillance, provides scientific information to partner agencies, teaches university and agency personnel, and responds to major wildlife disease issues. The Centre thus both supports government agencies to carry out their mandates and serves as a scientific centre of excellence on wildlife disease based at all four Canadian veterinary colleges.

The Centre is managed by a Board of Directors consisting of the Canadian Wildlife Directors Committee, the veterinary college deans, and representatives from the Public Health Agency of Canada, the Parks Canada Agency, the Canadian Food Inspection Agency, the Canadian Wildlife Federation and Ducks Unlimited Canada. CCWHC offices are in Charlottetown, St-Hyacinthe, Guelph, Saskatoon, and Nanaimo.

National Consultations

The National Chronic Wasting Disease Control Strategy was developed under the leadership of the federal/provincial/territorial Canadian Wildlife Directors Committee, in consultation with the Public Health Agency of Canada, Agriculture and Agri-Food Canada, the Canadian Food Inspection Agency, the Parks Canada Agency, the Canadian veterinary colleges, and provincial and territorial ministries responsible for wildlife, health, agriculture, fish and environment. Action Plans arising from the National Chronic Wasting Disease Control Strategy have been developed through similar iterative consultations among jurisdictions.

Overview

Many of the important health issues of the past 50 years have involved infectious diseases of wild animals that have been transmitted to humans and domestic animals, or diseases with adverse affects on human society because of their direct impacts on wildlife. The objective of Canada's National Chronic Wasting Disease Strategy is to establish a coordinated national policy and a disease response and management framework that aims to minimize the negative impacts of the disease on biodiversity, human and livestock health, the environment and the economy.

The National Chronic Wasting Disease Control Strategy will be concerned with managing the disease in susceptible wild animals in close association with disease eradication programs applied to domestically reared animals. The long-term aim of the Strategy is eradication of Chronic Wasting Disease from Canada. However, short- and medium- term aims are to contain the disease and prevent further occurrences in new geographic areas.

The animal species of primary concern for the Strategy are members of the deer family (cervids), but the goals of the Strategy apply equally to all species discovered to be affected by the disease.

The National Chronic Wasting Disease Control Strategy aims to complement (not replace) disease management mandates and programs of government agencies by building on existing disease management policies and programs, identifying and filling gaps, and improving integration. For instance, the Strategy will strive to establish seamless integration with animal disease management programs in all sectors, specifically with Health Canada and the Canadian Public Health Agency, the Parks Canada Agency, the domestic animal health programs of the Canadian Food Inspection Agency (CFIA) and Agriculture and Agri-Food Canada (e.g. CFIA's Foreign Animal Disease Eradication Support Plans) and with animal disease management programs within provincial and territorial governments. The Strategy also aims to ensure that animal disease management activities, when relevant, are linked to the appropriate programs/activities in other countries from whom Canada may receive, or to whom Canada may transmit, wildlife diseases as a result of natural migration, trade or other movements of wildlife or wildlife products.

Canada's National Chronic Wasting Disease Control Strategy will serve as a policy framework through which participants agree to work together to achieve the Strategy's goals. The Strategy will be implemented through a detailed Action Plan for each of the six thematic goals of the Strategy. The benefits and the costs of the actions taken to achieve these goals will be shared among the participants as negotiated for each Action. The roles and responsibilities of the many participants of the Strategy will be established via formal agreements arrived at collaboratively. This Strategy recognizes and respects the jurisdictional authorities, historic investments and legitimate interests in wild animal diseases of federal, provincial, territorial, Aboriginal, regional and municipal governments, of universities and non-government agencies, and of the public.

The National Chronic Wasting Disease Control Strategy: Six Goals

Goal 1:

Prevention of further emergence of Chronic Wasting Disease in new locations, as new prion variants, or affecting new species.
Prevention of further emergence of CWD in Canadian wildlife through epidemiological analysis, a strengthened science base, and improved interception at control points.

Goal 2:

Early detection of Chronic Wasting Disease in cervid populations.
Early detection to maximize the effectiveness of control measures and minimize costs and economic losses, achieved through vigilant CWD surveillance supported by improved scientific methods and facilities.

Goal 3:

Planned responses to Chronic Wasting Disease.
Achieved through integrated emergency planning among jurisdictions, and pre-determination of response options, responsibilities, resources and personnel.

Goal 4:

Effective management of Chronic Wasting Disease.
Achieved through the development of an adaptive risk assessment and response framework for the ongoing management of CWD.

Goal 5:

Education and training.
Education and training of wildlife disease specialists and other personnel required to deliver the components of the National CWD Control Strategy Action Plans in all sectors.

Goal 6:

Communication
Communication to achieve the coordination and collaboration essential to realize all of the goals of the National CWD Control Strategy and to inform all sectors, including the public, about the environmental, economic, and health issues related to CWD and associated management responses.

Canada's National Chronic Wasting Disease Control Strategy

Principles

The Strategy is based on the following five principles.

1. Collaboration	Implementation of the Strategy will proceed on the basis of full and open collaboration and communication among participants.
2. Based in Science	Veterinary, wildlife and biomedical sciences are central to the goals of the Strategy and must inform policies and regulations.
3. Integration	Participants will cross-reference their relevant policies and programs in order to integrate national Chronic Wasting Disease management horizontally and vertically among jurisdictions.
4. Strategic Investment	Action Plans developed under the Strategy will build on existing programs, infrastructures and policies. New resources will be invested strategically, to enhance programs and fill priority gaps as required to achieve the Strategy's goals.
5. Adaptive Management	Implementation mechanisms will evolve through repeated sequences of planning, implementation, review and revision. Regular review and evaluation of program effectiveness is integral to the Strategy.

Challenges

Important challenges will be faced in achieving the National Chronic Wasting Disease Control Strategy's goals. Among these are:

- Wildlife disease issues, such as Chronic Wasting Disease, with important impacts on Canadian biodiversity and society are emerging at an unprecedented rate (Annex 2).

- The socio-economic impacts of Chronic Wasting Disease can be large, possibly affecting human health concerns, agriculture and food safety, Aboriginal economies and cultures, nature-based industries and wildlife conservation and management programs, (Annex 3).

- Chronic Wasting Disease issues affect multiple departments and agencies within governments, and federal, provincial, territorial, Aboriginal, regional, municipal and non-government jurisdictions, simultaneously.

- The scientific and operational requirements for control and management of Chronic Wasting Disease concurrently with other wildlife disease issues also requiring management responses will severely strain or exceed Canada's current national capacity for wildlife disease management.

Participants in the Strategy are committed to meeting these challenges and achieving the Strategy's goals.

Goals of the National Chronic Wasting Disease Control Strategy

Ultimate Objective:

The ultimate objective of Canada's National CWD Control Strategy is eradication of CWD from Canada or, failing this, the tightest possible control of CWD so that it does not spread to new geographic areas or new species, and so that its environmental, economic and potential public health impacts are minimized.

GOAL 1: Prevention of Further Emergence of Chronic Wasting Disease (CWD) in new locations, as new prion variants, or affecting new species.

Prevention of further emergence of Chronic Wasting Disease in Canadian Wildlife through epidemiological analysis, a strengthened science base, and improved interception at control points.

Key Components:

Controls of Importation, Exportation and Inter-provincial / Intra-provincial / Territorial Movement of Cervids and Cervid Parts.

- Existing regulations, inspection and enforcement procedures on cervids and cervid parts, from wild, farmed and captive animals, will be reviewed and strengthened or augmented as necessary to minimize the risk of the movement and spread of CWD.

International Disease Intelligence and Information Analysis

- Regular monitoring of CWD occurrences which could be potential threats to Canada will inform importation control programs.

Scientific Research: Epidemiology and Disease Emergence

- Effective import controls and prevention of disease emergence require scientific knowledge that must be developed as programs of control and prevention are implemented, evaluated and improved.

GOAL 2: Early Detection of Chronic Wasting Disease in Cervid Populations

Early detection of CWD in cervid populations to maximize the effectiveness of control measures and minimize costs and economic losses, achieved through vigilant CWD surveillance supported by the most current scientific methods and facilities.

Key Components:

A National Network of CWD Detection and Laboratory Diagnosis

- An effective surveillance network coordinated among all sectors is essential to the CWD Control Strategy.

Information Management

- Information technology will be developed to ensure rapid analysis and distribution of CWD surveillance information to all participants.

Scientific Research to Support Surveillance and Laboratory Methods

- CWD surveillance and diagnosis of the disease through laboratory tests requires active scientific support.

GOAL 3: Planned Responses to CWD

Develop an integrated, reasoned, and planned response to current and new occurrences of CWD.

Key Components:

Control Planning to Contain, Reduce and Eventually to Eradicate CWD from Areas Where it Currently Exists.

- Control programs for immediate implementation in areas where CWD occurs in wild cervids.
- Close coordination among control programs for farmed, captive and wild cervids.

Advance Planning for Responses to New Occurrences

- Advance planning will pre-define CWD response objectives and methods, and identify practical limits in CWD management, so that timely responses to occurrences are effective.

Scientific Research to Close Critical Knowledge Gaps

- Identify information that is required for CWD control or eradication, and carry out the research required to obtain this information

- Assess whether new occurrences of CWD fit the current understanding of CWD epizootiology, and respond accordingly.

Field Response Capacity

- Personnel and equipment required for a range of possible CWD response scenarios will be identified, coordinated and educated, as needed, to assure national capacity to respond to CWD occurrences.

Decision and Communication Plan for Urgent Responses

- Decision authority, lines of communication and a plan for informing the public will be pre-defined for responses to significant CWD occurrences and issues over a range of possible scenarios. Given the nature of CWD as it may occur in wild, farmed, or captive cervids, the definitive lead authority may differ in these different scenarios.

Access to Resources

- Resources (financial and in-kind) for timely responses to significant CWD occurrences must be available outside normal budget cycles.

GOAL 4: Effective Management of Chronic Wasting Disease in cervids

Effective disease management, achieved through the development of an adaptive risk assessment and response framework for the ongoing management of CWD.

Key Components:

Appraisal and Selection of CWD Management Methods

- Recent advances in the wildlife and biomedical sciences will be applied to wildlife disease management objectives to derive scientifically-sound procedures to reduce the impact of CWD in wild/captive cervids.

Scientific Research on CWD and Management Options

- The science base for CWD management decisions and actions is evolving. This science base will be maintained through identification of research priorities and support of priority research required for CWD control.

Risk, Cost and Feasibility Analysis

- Personnel and processes to evaluate and recommend management options are needed to support CWD management decisions. Evaluations must consider the potential negative impact of CWD, costs of management options, likelihood of success of management methods, and potential negative impacts of the management response itself.

Post-operational Assessment of CWD Management Responses

- Adaptive management requires evaluation of CWD management procedures and revision of procedures in light of these evaluations. The National CWD Control Strategy will achieve progressive improvement through continuous assessment and revision.

Disease Surveillance

- Monitoring of CWD in Canada is required to ensure that any new occurrences are detected quickly and to gather information on CWD for management decisions. Surveillance methods will be evaluated, refined and improved.

GOAL 5: Education and Training

Education and training of wildlife disease specialists and other personnel required to achieve the goals of the National CWD Control Strategy.

Key Components:

Education of Surveillance, Response, and Management Personnel

- In the short-term, field workers, technical staff and others who will contribute to implementation of the Strategy will require continuing education and up-grading to meet the needs and the standards of the Strategy. Educational requirements and capacity to offer programs will be assessed and sufficiency achieved.

Education of Wildlife Disease Scientists

- In the long-term, implementation of the National CWD Control Strategy requires scientific capacity in the wildlife and biomedical sciences applied to Chronic Wasting Disease. Educational capacity to create the scientists needed in this field will be assessed and, if necessary, expanded to assure sufficiency.

GOAL 6: Communication

Communication to achieve the coordination and collaboration essential to realize all of the goals of the National CWD Control Strategy and to inform all sectors, including the public, about the environmental, economic, and potential health issues related to CWD and associated management responses.

Key Components:

A: INTERNAL COMMUNICATIONS

Communication Plan

- Open sharing of all key information among internal participants involved in any aspect of the National CWD Control Strategy.

Information Management

- The information technology needed to meet the communication requirements of the National CWD Control Strategy will be assessed and appropriate tools and capacities developed.

Formal Agreements

- Establish formal agreements that define lead agencies and spokespersons as well as parameters of shared information as appropriate to various CWD scenarios, and in order to provide a collaborative communications response.

Common and Consistent Messages

- The communications plan for the National CWD Control Strategy will include mechanisms to ensure that information emanating from the activities carried out under the Strategy is correct and internally consistent.

B: EXTERNAL COMMUNICATIONS

Risk Communication

- Risk communication is the process of communicating responsibly and effectively with stakeholders and the general public about the risk factors associated with an issue (e.g., security of wild and farmed cervids, potential economic impacts, possible interspecies transmission). Participants in the National CWD Control Strategy will address public and economic concerns to create a shared understanding among stakeholders and the public on the nature of the relevant risk factors and management options.

Information Feedback

- Establish a framework whereby comments from the public and stakeholders can be received, considered, and, if appropriate, integrated into the National CWD Control Strategy in a timely manner as the strategy itself evolves.

The Path Forward

The rapid pace of disease emergence in Canada and around the world at the opening of the 21st century has created new challenges to public and livestock health, wildlife management, national and regional economies and the environment. The National Chronic Wasting Disease Control Strategy, together with complementary policies and programs in the public health, agriculture, and wildlife sectors, establishes a framework for meeting one of these challenges.

Urgent and important issues demand urgent and definitive actions. Canada's National Chronic Wasting Disease Control Strategy is a framework for immediate and progressive action, based in science, and adaptable to the uncertainties of the future.

Canada's National Chronic Wasting Disease Control Strategy

ANNEX 1

DEFINITIONS OF TERMS

Wildlife and Wild Animal: In this document, these words refer to animals that are free-ranging and do not depend directly on humans for food, shelter or other essential functions. The species of predominant concern in the National Chronic Wasting Disease Control Strategy are members of the deer family (cervids). The Strategy recognizes the potential of zoo animals, livestock and other domestic animals potentially to exchange diseases like Chronic Wasting Disease with wildlife. The Strategy will integrate smoothly with the disease management programs established for agricultural species, pets and zoo collections.

Disease: Disease includes any impairment that interferes with or modifies the performance of an individual's normal functions. The focus of this Strategy is a single disease, Chronic Wasting Disease, which is one of several recognized transmissible spongiform encephalopathies (TSE) caused by abnormal folding of a body protein known as the prion protein. At present, Chronic Wasting Disease is known to affect mule deer, white-tailed deer, elk and moose.

Emerging Disease: This term came into common use in the early 1990s to designate diseases with the potential to cause important negative affects on people, their economies or their environments, and which either are newly-recognized by science (e.g. SARS) or were previously known but have acquired a new importance (e.g. Chronic Wasting Disease in North America). Emerging diseases may affect human health directly, domestic animals and associated economies or wild animals and associated economies. The vast majority of emerging diseases of the past 50 years are infectious diseases of wild animals that have been transmitted to humans (termed zoonotic diseases or zoonoses), to domestic and zoo animals, or to both, but some affect human society adversely through their direct impact on wild animals.

Biomedical: This word refers to the total of biological and medical sciences and encompasses such fields as animal and plant biology, microbiology, toxicology, population biology, epidemiology, risk analysis, physiology, pathology, medicine, molecular biology and genetics.

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ANNEX 2

WILDLIFE DISEASES - SOME BACKGROUND

In the first six months of 2003, wild animal diseases were second only to war in claiming attention and causing exceptional expenditure by governments around the world. Diseases originating in wild species have affected human health and food safety, agricultural production and economic viability, ecosystem integrity and biodiversity, and world economies on an ascending scale throughout the past century and into the current one.

Wildlife diseases have affected Canadian society substantially in the past decade. Eradication of Chronic Wasting Disease, a prion-associated disease of deer, from Canadian farms has cost upwards of $40 million to governments and industries, while its emergence in wild deer in Canada in 2001 now jeopardizes those wild deer populations and associated economic activities. Bovine Tuberculosis in wild elk and deer in Manitoba is affecting international trade, has provoked conflicts and confrontations over acceptable management responses, and has the potential to spread east and west across the Canada and south into the United States. West Nile virus swept across Canada from 2001 to 2003, causing human illness, straining response capacities and demonstrating the power of introduced infectious organisms to spread widely in new environments. Type E botulism suddenly became an annual epidemic in Common Loons and other fish-eating birds on the Great Lakes in 1999. This is a new conservation concern with potential negative implications for human food safety and fishery management and, perhaps, is a manifestation of the sweeping ecosystem disruption of the Great Lakes associated with introduced foreign species of mussels and fish.

Internationally, Severe Acute Respiratory Syndrome (SARS), a new disease caused by a virus attributed to one or more small wild carnivores in Asia, was first detected in November 2002. It had cost the world economy approximately $136 billion as of June 2003. In this same six month period, Ebola Virus killed small groups of people in west Africa and threatened remnant populations of rare gorillas, control of Avian Influenza of wild bird origin caused heavy economic losses to the poultry industry of Europe, and Monkey pox, a disease of wild African rodents, was imported into the pet trade of the United States, infected a native North American species (prairie dog), and caused disease in some 70 people at multiple locations, thereby mimicking a bio-terrorist release of Smallpox.

These wildlife health issues of 2003 are not unprecedented but, in their scale and number, they represent a new height on a rising curve of important health and economic issues linked to wild animal diseases. Some 70% of new or newly important diseases affecting human health and human economies worldwide are considered to have a wild animal source. Such emerging disease issues in Canada can be traced, with progressively increasing number and importance, from the turn of the last century to the present day. Bubonic Plague was imported into California in 1900, became established permanently in native wild animals, and had spread to western

Canada by the 1930s. Bison recovery herds became infected with Bovine Tuberculosis and Brucellosis by the 1920s and these diseases were imported to Wood Buffalo National Park with diseased bison at that time. Lassa Fever arrived briefly in North America from Africa in the 1970s just as the current epidemic of the Raccoon Strain of Rabies, now affecting Ontario and New Brunswick, was beginning in West Virginia. Lyme Disease, from wild mice, suddenly emerged as a major human health issue later in the same decade. HIV-AIDS, a disease caused by viruses from African apes and monkeys, eclipsed Lyme Disease as a public health issue in the mid-1980s. Ebola virus emerged in Africa at about this same time, just as Chronic Wasting Disease was spreading, undetected, among elk farms in the United States and Canada. *Sin Nombre* Hantavirus and the Hantavirus Pulmonary Syndrome it causes were first recognized in people and deer mice in North America in 1993, Hendra virus in horses, people and bats in Australia in 1994, Nipah virus in pigs, people and bats in Malaysia in 1998. West Nile virus came to North America in 1999, SARS emerged late in 2002. In these same years, Europe and Asia experienced costly outbreaks of Foot and Mouth Disease and Classical Swine Fever, half the Harbour Seals in Europe died in a second epidemic of viral distemper, and both Asia and Europe experienced outbreaks of wildlife-associated strains of Influenza A in poultry that were pathogenic to people and posed potential public health threats far in excess of those posed by SARS. Thus animal diseases, most of them derived from wildlife, threaten human health and human economies as never before.

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ANNEX 3

SOCIO-ECONOMIC IMPACTS OF WILDLIFE DISEASES

The socio-economic impacts of wild animal diseases are very large. The principal impact of many of these diseases is on human health. *Human health* concerns directly drive societal responses to SARS, West Nile virus, Bovine Tuberculosis, and Rabies, for example. Collectively, management responses to these five diseases have cost Canadian society hundreds of millions of dollars in just the past two years, in addition to the direct health care costs for affected persons. Diseases in wildlife also pose food safety hazards for the many Canadians who consume wild animals and fish or their products. Diseases such as Brucellosis, Tuberculosis, Salmonellosis, Trichinellosis and Type E Botulism are important food safety concerns in this context.

Agriculture also has been affected severely by wildlife diseases. Bovine Tuberculosis and Chronic Wasting Disease have resulted in costly trade sanctions against the Canadian cervid industry. Newcastle Disease and Influenza A in wild birds constantly threaten the poultry industry and the latter also threatens the swine industry and human health. Infection of wild animals with a major foreign animal disease like Foot and Mouth Disease or Rinderpest will result in prolonged trade embargoes sufficient to cripple segments of the livestock industry. A single case of BSE had cost Canadian beef producers an estimated $6 billion during the first 18 months following its discovery in May 2003.

Economic activity based on wildlife is very large in Canada. A study in 1996 demonstrated that such activity contributed $12.1 Billion to the Canadian GDP in that year, equivalent to the $12.3 Billion that was the total contribution to the GDP by all of agriculture.[b] Tourism has been massively affected by diseases such as SARS in Canada, Foot and Mouth Disease in the United Kingdom and Ireland, and even by BSE, which has closed many borders to meat exports from Canada, including game meat obtained by recreational and commercial hunting. If Canada fails to manage Chronic Wasting Disease and other wild animal diseases effectively and visibly, it will lose its reputation for pristine environments and nature-based tourism, and the multi-billion dollar economy this reputation sustains.

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[b] Environment Canada. The Importance of Nature to Canadians. Environment Canada Internet Site <http://www.ec.gc.ca/nature/>. 1996. Statistics Canada Farm cash receipts. Gross domestic product at factor cost. <http://www.statcan.ca/english/Pgdb/Economy/Primary/prim03.htm>. 2002: Accessed on 5 January 2002.

Environmental Impacts of Wildlife Diseases

Species at Risk. Species at risk by virtue of habitat loss or other factors are particularly vulnerable to the negative impact of new diseases. Disease thus can terminate recovery programs because small populations of rare species cannot sustain sudden high mortality. The Black-footed Ferret was nearly exterminated in this manner by Canine Distemper, and Bubonic Plague in its main prey, the prairie dog, is a major impediment to successful re-introduction of this rare species. West Nile virus may pose a similar threat to the eastern race of the Loggerhead Shrike.

Climate Change. Many diseases are highly influenced by climate. Vector species such as mosquitoes, ticks, slugs and snails respond dramatically to small changes in climate and this can, in turn, radically alter the occurrence of the diseases they carry. Climate also affects disease occurrence through mechanisms such as crowding of animals on remnant habitat as areas become dryer or wetter or otherwise unsuited to previously resident species. Thus, disease emergence is predicted to be an important effect of global climate change.

Wildlife Conservation. Disease in wild animals normally is a positive, stabilizing influence in animal ecology, essential to ecosystem integrity. However, disease emergence is a common feature of disturbed environments in which species richness and diversity has been reduced, habitat has been fragmented and ecosystem processes of energy flow and material recycling have been simplified. New patterns of disease develop in disturbed environments. Some current examples include Type E Botulism among fish-eating birds on the Great Lakes and epidemic Newcastle Disease among Double-crested Cormorants on over-fished northern lakes. Furthermore, conservation management actions may themselves carry considerable risk of negative impacts from disease. In particular, the movement of wild animals from one geographic location to another for conservation or other purposes always carries the risk that diseases also will be transported and released in new areas. The current epidemic of Raccoon Rabies had such an origin, as did the occurrence of Tuberculosis and Brucellosis in Wood Buffalo National Park and the occurrence of the brain worm of White-tailed Deer in Nova Scotia with its consequent limitations on Moose and extermination of Caribou.

Appendix 1

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