Rabies Policy Manual for Newfoundland and Labrador

Newfoundland Labrador

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1. Acronyms

AHD – Animal Health Division (FLR)

AHPA – *Animal Health and Protection Act*

CWHC –Canadian Wildlife Health Cooperative (Atlantic Veterinary College)

CDA – *Communicable Disease Act*

CFIA – Canadian Food Inspection Agency

CMOH – Chief Medical Officer of Health (DHCS)

CO – Conservation Officer (FLR)

CVO – Chief Veterinary Officer (AHD, FLR)

DEC – Department of Environment and Conservation

DHCS – Department of Health and Community Services

dRIT - Direct Rapid Immunohistochemical Test

EHO – Environmental Health Officer (SNL)

EMD – Ecosystem Management Divisions

FLR – Fisheries and Land Resources

FAT – Fluorescent Antibody Test

HDCV – Human Diploid Cell Vaccine

NG - Nunatsiavut Government

OIE – Office international des épizooties (WOAH - World Organization for Animal Health)

OLF-CFIA – Ontario Laboratory – Fallowfield, CFIA

PEP – Post-Exposure Prophylaxis

PPE – Personal Protective Equipment

RCMP – Royal Canadian Mounted Police

RFFIT - Rapid Fluorescent Focus Inhibition Test

RIG – Rabies Immunoglobulin

RMOH – Regional Medical Officer of Health

RNC – Royal Newfoundland Constabulary

RV – Regional Veterinarian (AHD)

SNL – Service Newfoundland and Labrador

TDG – *Transportation of Dangerous Goods Act*

WHO – World Health Organization

ZDC – Zoonotic Diseases Consultant (AHD, FLR)

2. Introduction

A. The Rabies Virus

Rabies is a zoonotic disease of mammals, or one that is transmitted from animals to humans, with a human case fatality rate of virtually 100% in unvaccinated or untreated patients [1]. Humans do not play a significant role in the transmission cycle of rabies and, as such, are considered secondary hosts [2]. Without a living host, the rabies virus is fragile and cannot survive for a prolonged period of time in the environment when exposed to UV radiation, heat, desiccation, solvents, detergents, or a pH outside the 3-11 range [3] [4]. However, the virus can survive for extended periods of time at low temperatures, and has been documented to have endured years of storage in -20^{0}C to -80^{0}C. This may be one of the means by which rabies persists in cold climates (e.g. frozen carcasses in the Arctic) [5].

The rabies virus (RABV) is in the genus *Lyssavirus* and a member of the family *Rhabdoviridae.* At the current time, there are 12 known species in the genus *Lyssavirus,* but RABV is the only species that is recognized in North America. All but one (Lagos Bat Virus) of the remaining 11 *Lyssavirus* species are known to cause similar rabies-like encephalomyelitis. All of the species differ genetically and are classified into separate phylogroups, which are established from phylogenetic analysis. Rabies vaccines may offer some protection against other types of *Lyssavirus*, depending on the genetic distance between the new isolates and the classical rabies virus (RABV). *Lyssavirus* species identification is an active area of research, and it is expected that others will be identified over the coming years. The various species of *Lyssavirus* are listed in Table 1 and mapped out geographically in Figure 1 [6] [7].

Table 1: Host reservoirs and distribution of species in the genus *Lyssavirus* [6] [7].

Phylogroup	Virus Species	Abbreviation	Host Reservoir	Distribution
1	Rabies virus	RABV	Dogs, wolves, foxes, skunks, coyotes, raccoon, mongooses and some bat species.	Worldwide (except for areas considered to be RABV free such as Antarctica, Western Europe, and some islands)
	Duvenhage virus	DUVV	Bats	Africa: South Africa, Guinea, Zimbabwe
	European bat lyssavirus type 1	EBLV-1	Bats	Europe
	European bat lyssavirus type 2	EBLV-2	Bats	Europe
	Australian bat lyssavirus	ABLV	Bats	Australia
	Aravan virus	ARAV	Bats	Kyrgizstan
	Khujand virus	KHUV	Bats	Tajikistan
	Irkut virus	IRKV	Bats	Siberia
2	Lagos bat virus	LBV	Bats	Africa: Ethiopia, Nigeria, Senegal, South Africa, Zimbabwe, Central African Republic
	Mokola virus	MOKV	Reservoir unknown: cases reported in shrews, rodents, cats and dogs	Africa: Cameroon, Central African Republic, Ethiopia, Nigeria, South Africa, Zimbabwe
	Shimoni bat virus	SHIBV	Bats	Kenya
3	West Caucasian bat virus	WCBV	Bats	Caucasus Mountains

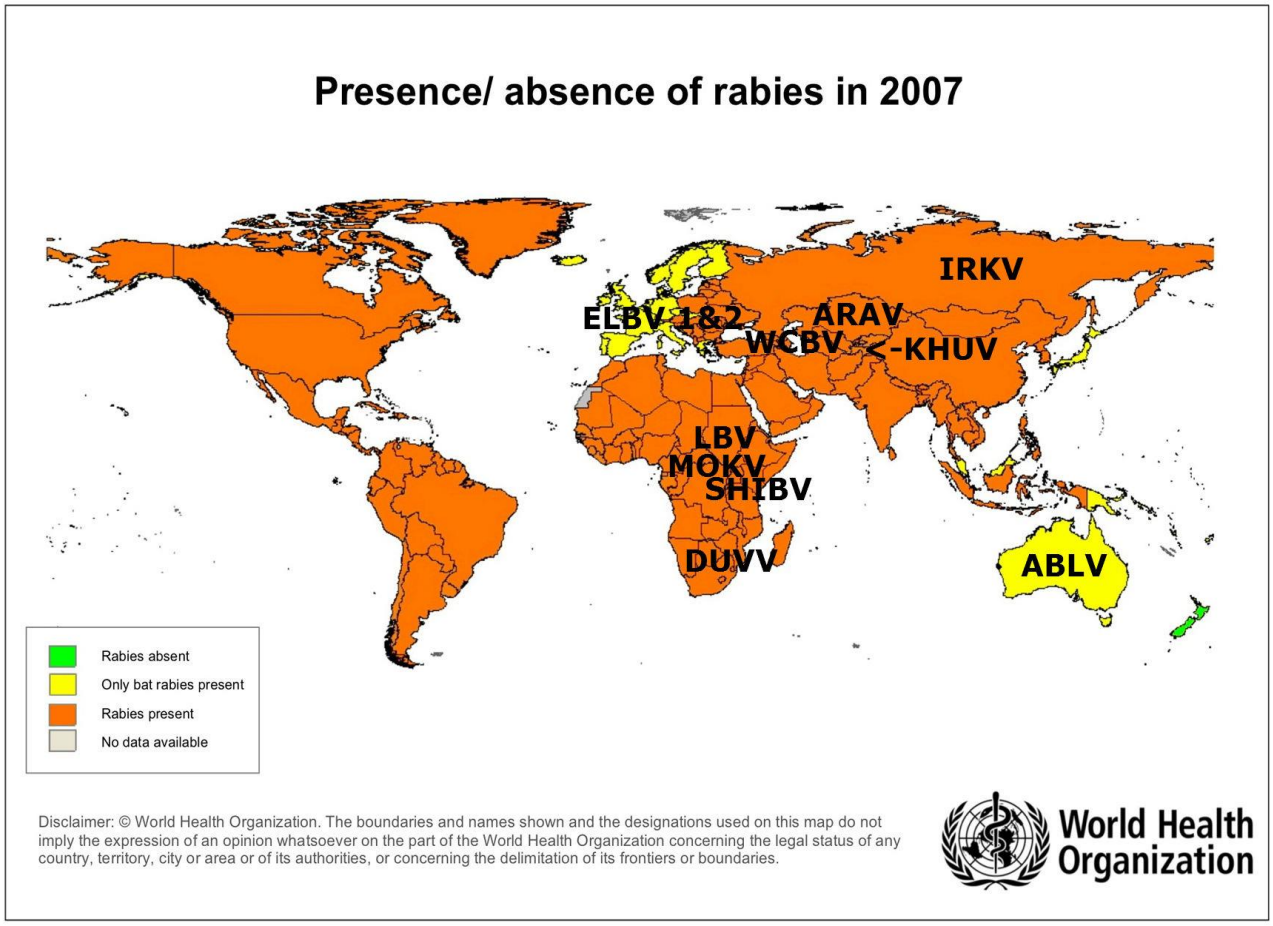

Figure 1: Worldwide distribution of *Lyssavirus* species [6] [8] [9] [1].

B. Molecular Structure and Viral Variants[2]

Rabies virus RNA replication is known to be error-prone, introducing mutations at a high frequency. The primary method for defining the viral variants of *Lyssavirus* is through antigenic typing, and is done using panels of monoclonal antibodies. Each monoclonal antibody in the panel reacts with a specific epitope of the viral protein, showing a positive or negative reaction for the presence or absence of the epitope [6]. Most monoclonal antibodies react with the N protein, which is present in the brains of infected animals. Identifying the molecular differences between rabies virus variants has aided in epidemiological investigations by [10]:

1) Identifying the primary hosts for different variants,
2) Identifying virus spillover among both animals and humans,
3) Allowing interpretation of the geographic distribution of viral variants that can be reliably mapped with precision.

[1] The rabies virus (RABV) is highlighted in orange and is present in almost all countries around the world.
[2] Some authors use the word “variant”, others use “strain”; there is no single accepted terminology.

Viral variants have different properties that enable them to persist in specific host species. These properties may also affect their ability to be transmitted through biting or alternative means [5]. Structures of the rabies virus and genome are depicted in Figures 2 and 3 respectively.

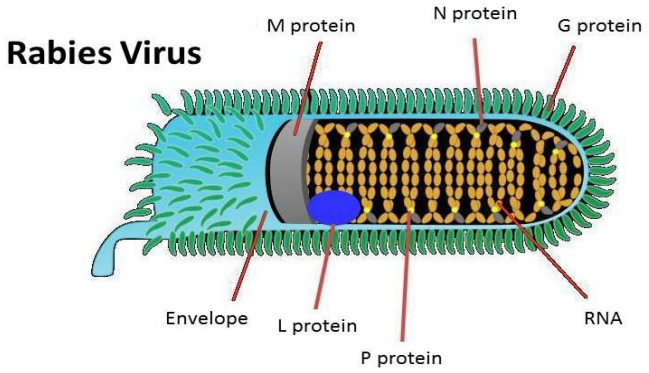

Figure 2: Structure of the rabies virus [11].

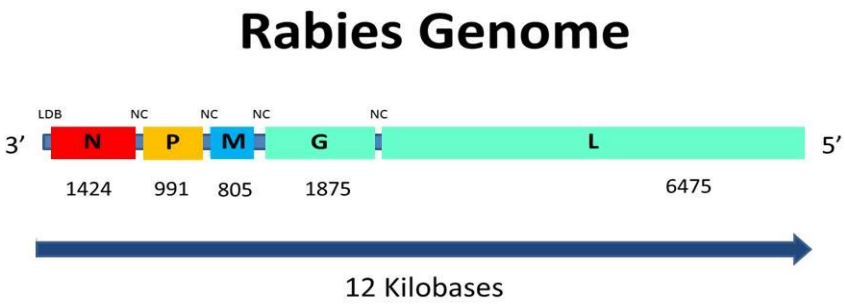

Figure 3: Structure of the rabies virus genome [12].

In North America, there are a number of rabies viral variants, most of which are found in wildlife. Table 2 describes the numerous strains present throughout North America, along with the commonly associated host species and the distribution. The distribution can also be seen on the map of the U. S. depicted in Figure 4 and the map of Canada in Figure 5.

Table 2: Terrestrial rabies viral variants, host species and distribution in North America [13] [14] [15].

Viral Variant	Host Species	Distribution
Arctic	Arctic fox (*Vulpes lagopus*) Red fox (*Vulpes vulpes*)	Northern Canada (Labrador, northern Quebec, Nunavut and Northwest Territories) and U.S. (Alaska)
Raccoon	North American Raccoon (*Procyon lotor*)	Eastern coast of United States. Crossed over into Ontario, New Brunswick and Quebec.
Mid-West Skunk (Canada) (Also known as North Central Skunk (NCSK) in the U.S.)	Striped skunk (*Mephitis mephitis*) Spotted skunks (genus *Spilogale*)	Manitoba, Saskatchewan and Alberta
North Central Skunk (NCSK) (U. S) (also known as Mid-West Skunk in Canada) **South Central Skunk (SCSK)** **California Skunk**	All three skunk variants circulate amongst 10 skunk species: ○ Striped skunk (*Mephitis mephitis*) ○ Hooded skunk (*M. macroura*) ○ 4 species of hog-nosed skunks (genus *Conepatus*) 4 species of spotted skunks (genus *Spilogale*)	Central U. S. Central U. S. California extending into Mexico
Gray-fox associated (1)	Gray fox (*Urocyon cinereoargenteus*)	Texas
Gray-fox associated (2)	Gray fox (*Urocyon cinereoargenteus*)	Arizona
Dog/coyote	Dogs (*Canis lupus familiaris*) or coyotes (*Canis latrans*)	Mexico
Mongoose	Asian yellow mongoose (*Herpestes javanicus*)	Puerto Rico and the Caribbean

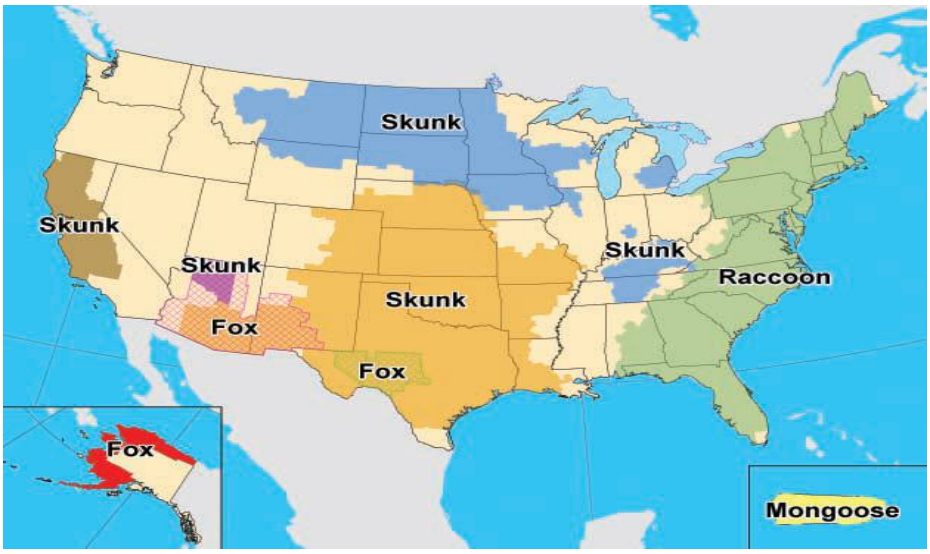

Figure 4: Geographic distribution of wildlife rabies host species in the United States [16].

Figure 5: Approximate geographic distribution of wildlife rabies host species in Canada [17].

In Canada, bat rabies has been reported in every province, with each species commonly carrying its own viral variant. These species include the big brown bat (*Eptesicus fuscus)*, little brown bat (*Myotis lucifugus*), silver-haired bat (*Lasionycteris noctivagans*), hoary bat (*Lasiurus cinereus*), California bat (*Myotis californicus)* and long-eared bat (*Plecotus auritus*) [18]. There are additional rabies viral variants in North America associated with rarely reported bat species (e.g. the western pipistrelle (*Pipistrellus hesperus*) in the United States). However, the reservoir species for many viral variants collected from humans, domestic animals, wildlife and bats is yet to be determined [6].

C. Clinical Progression in Humans

Survival has been documented in very few naturally occurring and experimental cases [10] [19]. This virus affects the central nervous system, causing an encephalomyelitis, and is excreted through the salivary glands. The rabies virus is commonly transmitted from an animal to a human by direct contact of infected saliva to an open wound (e.g. biting) [10]. Transmission is possible 10 days before the development of clinical signs, and extends throughout the duration of the clinical disease [6]. Humans can also contract the virus through wound contamination (e.g. handling an infected carcass, having infected saliva contact a wound, needle prick with a syringe), oral consumption (e.g. consumption of infected meat), inhalation (e.g. aerosolized virus in a cave with infected bats, aerosolized virus in a laboratory), organ transplantation (e.g. from a donor not known to have died from rabies), or transplacental transmission (documented in a single case) [6].

The incubation period in humans, or the time from exposure to the first appearance of clinical symptoms, usually lasts between 20 and 90 days, but has been reported to range from 10 days to several years [20]. The variability in this time period can be explained by the proximity of the wound to the brain, the severity of the wound, the properties of the rabies viral variant involved, the density of viral receptors in the affected area, and the dose of the virus [6] [5]. The prodromal phase (or the first phase of rabies) has symptoms that can include anxiety, insomnia, anorexia, depression, headache, and irritation around the site of the wound. This phase is more often recognized in humans and domestic animals since their normal behaviour patterns may be better known, and the ability to monitor disease progression is easier. Following this phase, the patient can develop encephalitic rabies (“furious rabies”) or paralytic rabies (“dumb rabies”) [6].

Encephalitic rabies affects 80% of those diagnosed with the disease. Patients usually exhibit hyperexcitability and can show signs of hallucinations, confusion, aggressive behaviour, or agitation, which coincide with alternating lucid periods. Fever is commonly associated with this phase, as is sweating, hypersalivation and movement disorders (e.g. spasms). Hydrophobia is the most common symptom, developing in 50-80% of patients. The patient initially has difficulty swallowing, which develops into refusal to drink despite an intense thirst. Spasms of the neck muscles, coughing, vomiting and convulsing are also associated with hydrophobia and may be initiated by merely the mention of water. These convulsions may also be brought on by a draft of air on the skin, loud noises or bright sounds. It is important to note that different viral variants can result in different clinical symptoms. Where bat-acquired rabies is more likely to result in tremors, dog-acquired rabies is more likely to result in hydro- and aero-phobia. Death usually occurs within 14 days of symptom onset, although may be delayed by medical attention [6].

Paralytic rabies results in prominent muscle weakness and can leave the patient mute or literally dumb [6]. In this form of rabies, the patient does not exhibit any form of excitement, but advances steadily downhill displaying paralysis, followed by a coma and death [20]. This form only occurs in 20% of human rabies cases and is often misdiagnosed. When observed, it is commonly confused with Guillain-Barré syndrome, which also exhibits bilateral weakness of the facial muscles. Patients usually feel pain at the infection site in this form, although sensory evaluations are normal. Hydrophobia is not as common in paralytic rabies, although minor spasms may be observed. Survival during this form of the disease is longer than observed in encephalitic rabies, and can last up to 30 days. Death usually results from paralysis of the breathing muscles [6].

In 2005, Jeanna Giese was declared to be the first person to ever survive rabies. Jeanna was bitten by a bat and presented with clinical symptoms several months after the exposure. Because she was never given post-exposure prophylaxis, her chances of survival were grim. It was because of Jeanna Giese that Dr. Rodney Willoughby developed the experimental procedure, the Milwaukee Protocol (sometimes referred to as the Wisconsin Protocol), putting Jeanna into a very deep induced coma. The coma slowed down the progression of the virus just enough to give her body a chance to build up immunity. Jeanna awoke from her coma free of the rabies virus after 10 days, but with neurological damage that is still apparent [6]. Since then, there have been 5 more lives saved, raising the chance of survival of a rabies infection from 8% to more than 20% [21] [22]. The protocol is continuously being revised and improved, however doctors remain skeptical about its overall effectiveness [21].

D. Clinical Progression in Animals

The incubation period in animals commonly ranges from 10 days to 6 months (detailed in Table 3), but can last longer [6]. Similar to human exposure, the incubation period in animals is dependent on a number of factors: the age of the bitten animal, the degree of innervation in the exposed area, the distance from the wound to the brain or spinal cord, the amount of virus introduced, the viral variant, and current vaccination status, among others [5]. The incubation period for a number of animals can be found below in Table 3.

Table 3: Incubation periods for wild and domestic animals[3].

Animal	Incubation Period
Domestic dog	3-24 weeks (average 3-8 weeks)
Raccoon	23-92 days (average 50 days)
Skunk	3-8 weeks
Fox	4 days to 15 months
Coyote	10-26 days
Cat	2–24 weeks (average 4-6 weeks)
Horse	2-6 weeks (average 12 days)
Cattle	Average 15 days
Donkeys	Average 12 days

[3] The information in the sources provided does not specify which rabies viral variant the animals have been infected with [5] [6] [10] [23] [24] [25].

Unlike humans, both domestic and wild animals commonly exhibit all three phases of a rabies infection in sequence; commencing with the prodromal phase, advancing to the aggressive phase ("furious rabies"), and ending with the paralytic phase ("dumb rabies"). It is important to note that clinical rabies can be variable in its presentation. There is no one characteristic that signifies a rabies infection, and numerous atypical signs are often observed [5].

Signs of the prodromal phase of animal rabies could include the animal hiding away in the dark, depression, agitated behaviour, heightened excitability and irritation surrounding the wound. These symptoms last for approximately 3 days [6].

In the aggressive phase the animal becomes very hostile and shows no fear, often chasing and biting after humans, other animals, or inanimate objects. The animal may even bite or chew to the point of breaking its own teeth, swallow inanimate objects, and/or self-mutilate resulting in the ingestion of one of its own body parts. During this time the animal salivates profusely [6].

During the paralytic phase, the animal's neck and head muscles become paralyzed and there is difficulty drinking and swallowing [19]. Many animals exhibit a "dropped jaw" due to paralysis of the larynx and masticatory muscles, and may also display excessive salivation [5]. The animal may exhibit other obvious signs of paralysis in various body parts, commonly seen in the hind limbs. This can happen prior to more advanced flaccid, symmetric, or asymmetric paralysis, which are also clinical signs consistent with rabies [10]. Nearing the end, the animal will likely go into a coma and succumb to respiratory failure. This phase usually lasts 2-4 days [5]. Some animals may pass through the aggressive phase very quickly, or in the odd case, not at all. It has been documented that some cases of rabies in animals are only paralytic [19]. A dog exhibiting signs of paralytic rabies can be seen in Figure 6.

Figure 6: Domestic dog showing signs of paralytic rabies [26].

Rabid raccoons exhibiting clinical symptoms in Ontario showed signs of aggression, fighting with dogs, ataxia, abnormal vocalizations, sick appearance, and the presence of porcupine quills [27]. Animals with porcupine quills embedded in their body should be tested for rabies, as there is a

positive correlation between the presence of quills and a rabies diagnosis. Thirty-four percent of rabid fox samples had porcupine quills embedded in their muzzle. While the possibility of a rabies infection should be considered if an animal presents with porcupine quills, it is not a definitive sign [27]. An image of a rabid fox with embedded porcupine quills is shown in Figure 7.

Figure 7: Rabid fox with embedded porcupine quills [28].

E. Rabies in Newfoundland and Labrador

Both the Island of Newfoundland and the mainland portion of Labrador have had rabies outbreaks in the past. Figure 8 is a detailed map containing all the sites of confirmed rabies cases, as well as risk zones for rabies exposure based on historical accounts. The known history of rabies in this province has been detailed in a book describing rabies management in Canada [29]. The authors indicate that the first confirmed case of rabies was reported in 1955; however there was evidence suggesting that rabies had existed in Newfoundland and Labrador prior to this time. Historically, it was difficult to distinguish between distemper and rabies in dogs; therefore most oral descriptions suggesting a rabies infection must be questioned. Further information on rabies in Newfoundland, Labrador, and North America, including details on all recorded cases in this province, is available at: http://www.faa.gov.nl.ca/agrifoods/animals/health/rabies.html.

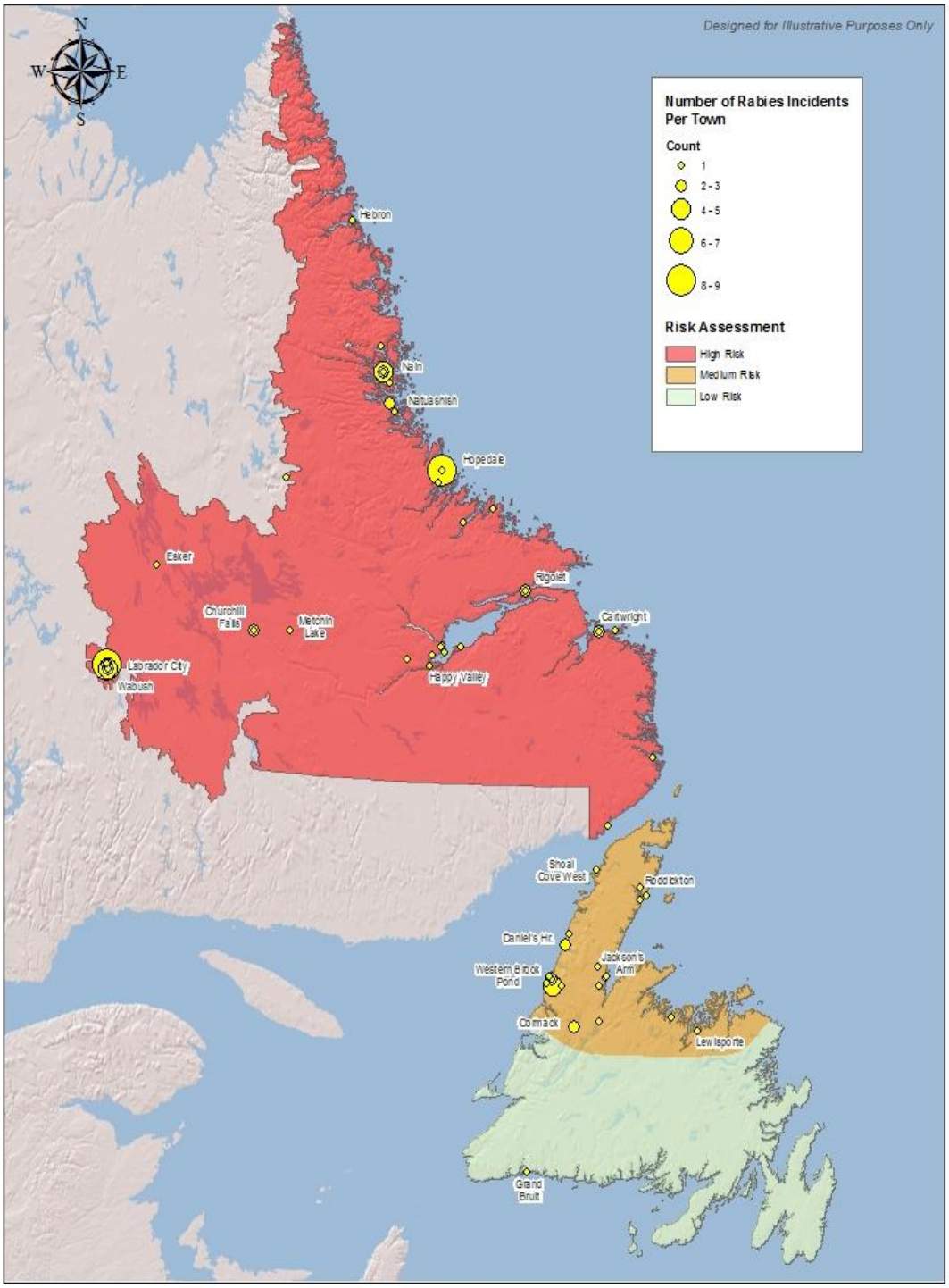

Figure 8: Risk assessment areas for rabies incidents from 1954-2013.

3. Roles of Governmental and Non-governmental Organizations

The provincial Department of Health and Community Services (HCS) is responsible for protecting the health of the public through the control of infectious disease. Upon suspected human exposure to the rabies virus, the Regional Medical Officer of Health (RMOH) or the Chief Medical Officer of Health (CMOH) is responsible for controlling the public health risks by ensuring that everyone who has been in contact with the animal is appropriately identified and treated. Surveillance is essential to management and control, and as such, rabies is a reportable disease. Any suspected case of rabies exposure in humans is to be reported to the RMOH/CMOH, or designated member of the DHCS as per the *Communicable Disease Act* (*CDA*). Any suspected case of rabies in an animal must be reported to the Chief Veterinary Officer (CVO) as per the *Animal Health and Protection Act (AHPA).*

Service Newfoundland and Labrador (SNL) provides Environmental Health Officers (EHOs), who are appointed as inspectors under the *AHPA*, to investigate all potential rabies exposure cases reported in humans. EHOs have the authority to issue a public health controlled 10-day observation period or quarantine of an animal suspected of exposing a human to rabies. EHOs work in collaboration with the RMOH on human exposure cases.

The Department of Fisheries and Land Resources (FLR), through its Animal Health Division (AHD) and the Ecosystem Management Division (EMD), are the primary agencies for the surveillance and control of rabies in domestic or wild animals. This includes enforcement of the *AHPA*, the mandatory reporting of all suspect animal cases to the CVO, training of field personnel in sample collection, the shipment of samples under the federal *Transportation of Dangerous Goods Regulations* (TDG), identification of rabies in animals, laboratory diagnostics, public education and research. Conservation Officers (CO) are the field agents that are responsible for enforcement, surveillance and control. Veterinary and technical staff of the AHD are involved in support of animal health assessment, euthanasia, sample collection and shipping, laboratory testing, and carcass disposal, and can act as inspectors under the *AHPA* as required. The department's Regional Veterinarians (RV) may act as inspectors under the *AHPA* to limit exposure during observation periods or formal quarantines. All necessary reports are submitted to the CVO. If any wild animal is suspected of being infected with the rabies virus, and has not had any contact with a human, it is to be euthanized humanely and sent to the AHD for testing.

The provincial Department of Environment and Conservation (DEC) is responsible for the *Wildlife Act,* and actively participates in, or initiates, wildlife research happening throughout the province. Their expertise in wildlife biology is critical for assessment of wild populations at all times and particularly during rabies eradication programs.

The Royal Canadian Mounted Police (RCMP) and Royal Newfoundland Constabulary (RNC) are inspectors under the *AHPA* and hold other authorities that permit them to assist as required in suspect cases. In many communities they may be the only agencies present with regulatory authority.

Municipal governments, either through their own City Acts, through bylaws under the *Municipalities Act*, or through authorities granted under the *AHPA*, support rabies control by

monitoring stray animal populations, and assisting in the immediate needs of outbreak control. This could include the provision of quarantining facilities, the requirement for mandatory rabies vaccination of pets in the community, or other responsibilities.

In the Nunatsiavut lands claim area of Labrador, the COs of the Nunatsiavut Government (NG) act in the same manner as COs of the provincial government. All training opportunities open to provincial COs are also available to NG COs. In Innu communities, in cooperation with the Band Councils, the AHD, provincial COs, public health nurses and the RCMP collectively support the rabies education and control needs of the communities.

The Canadian Food Inspection Agency (CFIA) provides testing for all domestic animals, wild animals that have made human or domestic contact, and all bats available to be tested during summer months. The agency also provides further confirmatory testing for all dRIT positive rabies submissions and 10% of the negative samples tested by the AHD. CFIA does not participate in sample collection, submission or control programs.

The Canadian Wildlife Health Cooperative (CWHC) provides testing for bats found dead without any suspected human exposure during the winter months. Testing includes rabies and white-nose syndrome.

4. Human Rabies Exposure Guidelines [4]

A. Policy

Following a risk assessment by the RMOH or designate, an EHO will investigate all potential incidents of human rabies exposure. These incidents will be followed up with appropriate wound treatments, rabies prophylaxis, animal observation and testing. All information will be reported to the RMOH and the CVO. Laboratory confirmed cases are reported to the CVO (FLR) as per section 3 of the *AHPA* who reports to the RMOH/CMOH (DHCS) as per list A of the *CDA*.

B. Exposure Assessment

In countries where rabies is currently endemic or has existed in the past, exposures to suspected or confirmed rabid animals are categorized as follows[5]:

- **Category I:** touching or feeding animals, licks on intact skin, contact of intact skin with secretions or excretions of a rabid animal or human. These are not regarded as exposures, and no post-exposure prophylaxis is required.
- **Category II:** nibbling of uncovered skin, minor scratches or abrasions without bleeding. Vaccine should be injected as soon as possible.
- **Category III:** single or multiple transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva from licks and exposure to bats. Vaccine and rabies immunoglobulin should be administered at distant sites as soon as possible. Immunoglobulin can be administered up to day 7 after injection of the first dose of vaccine [31].

[4] *Kansas Disease Investigation Guidelines: Human Rabies Exposure Guidelines* [30].
[5] Taken directly from the *WHO Expert Consultation on Rabies* (2nd Report) [31].

Although these categories are very descriptive, keep in mind that rabies is cyclic in Labrador and does not usually exist on the Island of Newfoundland, therefore it is not “endemic” in the province. To better understand the risk associated with rabies exposure, refer to the risk assessment map of Newfoundland and Labrador detailed in Figure 8. Some areas of the province are perceived to be low risk, however please err on the side of caution when performing a risk assessment.

C. Risk Assessment

A risk assessment is needed to determine if PEP is necessary for the case in question. The risk assessment depends on two things; the category of exposure and the chance that the animal is carrying the rabies virus [30].

All biting incidents must be investigated to determine if the animal was rabid and if so, the potential for passing the virus on to the wounded individual. In regions where rabies has been present in the past or was recently detected, the animal may be placed under observation for 10 days following the incident. If the animal is healthy at the end of the observation period, it is not necessary to continue with PEP.

Some examples of animal exposures that should be concerning:

- Exposure to wild animals
- Exposure to an animal (wild or domestic) that appears ill or is acting unusual
- Exposure to animals that are running wild and no owner has been identified
- Any animal incident about which you feel uncertain
- Any exposure to bats

If there is a chance that an individual has been exposed to rabies, it is important to begin wound management as quickly as possible.

- The wound should be flushed thoroughly for 15 minutes with soap and water, a detergent, 70% ethanol, or a providine-iodine solution (any substance that will kill the rabies virus) [4] [32].
- Medical treatment should be sought immediately. Adequate wound care could decrease the possibility of contracting the rabies virus by 90% [4].
- When there is suspicion of exposure to a rabid animal, PEP should be given as soon as possible by a public health nurse or certified professional, upon approval by the RMOH.
- The wound should also be assessed by a physician the same as any other wound: the tetanus status of the individual must be updated and consideration given to the use of antibiotics [32].
- Administer RIG and/or HDVC as directed in Table 4. If the wound is not obvious or there is too much RIG in the vile, infiltrate the remainder of the dose at a location distal to the vaccination site. **Caution: RIG and the HDCV should never be given at the same injection site or through the same syringe, as it may interfere with the efficacy.** Rabies vaccine can be administered in the same limb as the RIG injection only after the first dose of vaccine has been given [32].

- Avoid suturing if possible. If suturing is necessary, sutures should be kept loose so as to not interfere with bleeding and drainage [20].

a. Investigation Report

An investigation into a biting incident starts with the front line health care worker who learns of the exposure. This could include a family doctor, veterinarian, public health or disease control nurse, or any emergency room hospital staff. The first health care professional involved in the exposure must fill out Part A of the **Rabies Investigation and Referral Form** (Appendix 3) and contact the RMOH (contact information can be found in Appendix 16). The RMOH is to fill out Part B of the **Rabies Investigation and Referral Form**. The information collected during the investigation will be used to determine the risk to the individual and decide if PEP or an observation period is necessary. The **Human Exposure to a Companion or Farm Animal** decision tree can be found in Appendix 1. This flow chart should be used to assist in decision making. If a formal observation period is mandated, the EHO will complete the **Rabies Investigation and Referral Form** by filling out the required information in Part C. If rabies is suspected and testing is involved, all information should be forwarded to the CVO.

b. Review the Type of Animal Causing Exposure

After Part A of the **Rabies Investigation and Referral** form is completed, it is important to determine the risk that the animal in question is rabid. This can be determined from asking the following questions:

- Can the species become infected with, and transmit, rabies?
- Is the animal vaccinated?
- Is it possible that there was any contact between the animal and another rabies host?
- Is the animal exhibiting any signs of rabies?
- Was the incident provoked?

Bats: Bats are an important reservoir for infectious diseases. Rabies transmission via bat bite can occur unknowingly because of their small teeth size, and the bite can be unrecognized or passed off as a scratch [6]. In a sample size of 26 human rabies cases associated with a bat viral variant, only 8% (2/26) of people acknowledged that they had been bitten by a bat, although 50% of the sample had a history of bat exposure [33]. Special attention should be paid if a bat is found in close proximity to a child or someone who is mentally disabled, sleeping or intoxicated, and any type of exposure to a bat should be concerning. If a bat bite goes unnoticed, and the bat is carrying the rabies virus, the absence of wound cleansing and rabies PEP administration could cause the patient to become infected [6]. Figure 9 depicts the bite of a silver-haired bat, along with the size of its skull.

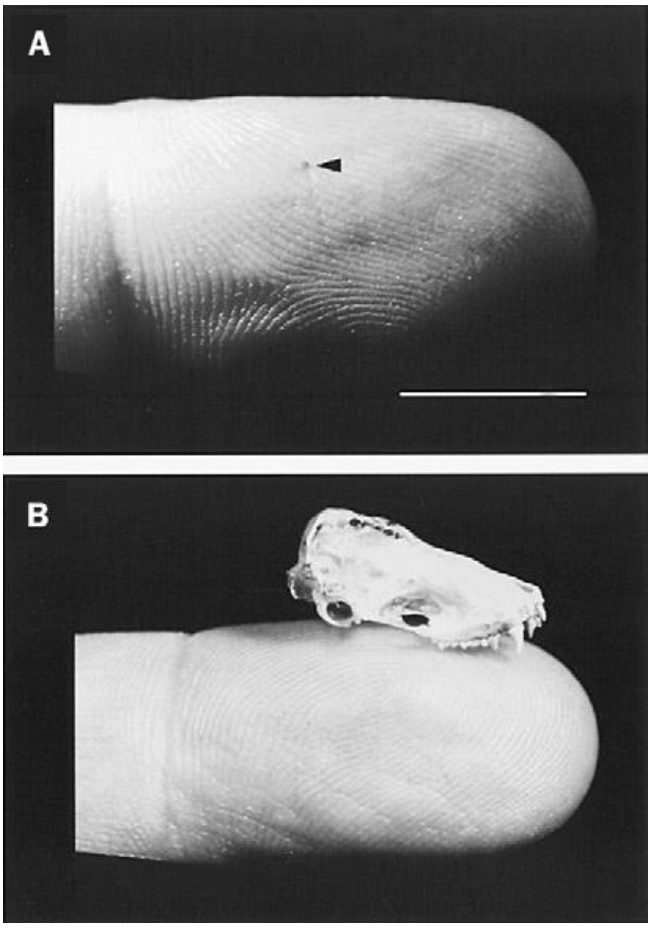

Figure 9: (A) Injury caused by a silver-haired bat bite and (B) the skull of a silver-haired bat [33].

There are two common bat species in Newfoundland and Labrador; the little brown bat *(Myotis lucifugus)* and the northern long-eared bat *(Myotis septentrionalis),* with occasional reports of the hoary bat (*Lasiurus cinereus)*. The little brown bat is more commonly known to form maternal roosting colonies in human buildings, making it more likely to cause human exposure during the summer months [34]. Because rabies has been eliminated from the domestic dog population in most developed countries, human infection by bats has become a more significant public health issue.

In Canada, bats represented the species that most frequently tested positive for the rabies virus from the years 2011-2013 (40.87%, 31.9% and 46.74% respectively) and from 1950 to 2007, there were 6 human cases of bat rabies in Canada [35] [36]. In the United States, 78% of the human rabies cases reported from 2002 to 2010 were traced back to bats [6]. To date, one bat variant case of rabies in a fox on the Island of Newfoundland (Grand Bruit) was recorded in 1989, and there has been one confirmed case of bat rabies (*Myotis lucifugus*) in Labrador (Cartwright) in 2004.

Wild terrestrial carnivores: Animals such as the Arctic fox (*Vulpes lagopus)*, the red fox (*Vulpes vulpes)* and the wolf (*Canis lupus)* are known to be important rabies hosts in Newfoundland and Labrador. It is sometimes difficult to determine if a wild animal is acting strangely, therefore

necessary precautions should be taken if contact is made. Because these animals are not vaccinated they should be considered rabid until tested negative.

Raccoon variant rabies has been reported in Quebec, Ontario and New Brunswick due to crossover of infected animals from contiguous U. S. states. The most recent case of concern comes from St. Stephen (New Brunswick) when a rabid raccoon was detected on May 29, 2014, the first case of raccoon variant rabies in New Brunswick since 2002 [37]. Since the first occurrence of raccoon rabies, there have been 14 confirmed positives (July 2015). Wild animal surveillance has been enhanced to include raccoon, skunk and foxes and a public education campaign has been initiated. Though raccoons do not live in Newfoundland or Labrador, every year they enter the province as hitch-hikers on vehicles or boats. As their origin and disease status is unknown, and as mainland Canadian provinces do not want raccoons of unknown origin, these animals are usually humanely euthanized[6].

Feral dogs and cats: Stray or feral animals are less likely to be vaccinated against rabies and more likely to have had contact with wild animals; therefore, depending on the risk of rabies in the area, these animals should be treated as rabid unless proven negative through testing [2].

Domestic cats and dogs: It is very unlikely that domestic pets with up to date vaccinations will become infected with rabies. The new protocol recommends any domestic animal thought to be exposed to rabies be immediately revaccinated to ensure an adequate immune response [38]. It is also much easier to contain them for the observation period and note any changes in their behaviour. If the animal is older than 12 weeks and was initially vaccinated for rabies at least 14 days prior to the incident, or booster vaccinations have been issued according to recommended guidelines (annually or triennially, depending on the vaccine), then the animal is considered to be vaccinated [2]. For more information on rabies vaccines, consult *The Compendium of Animal Rabies Prevention and Control (Section III)*: www.cdc.gov/mmwr/pdf/rr/rr6006.pdf [39].

Livestock: Vaccinated livestock are unlikely to contract rabies. If there is an obvious change in behaviour and rabies exists in the geographic area, the case should be deemed suspicious. Upon an assessment by an RV, the animal should be quarantined or tested for rabies [2].

Pocket Pet: Any small mammal that is kept as a household pet (e.g. guinea pig, hamster, rat, gerbil, mouse, and hedgehog) is considered to be a pocket pet. Because licensed vaccines for these types of pets are often unavailable, the animal is considered unvaccinated. The risk of rabies exposure would depend on the chance that the pocket pet was exposed to wildlife, or another unvaccinated animal that could carry rabies, and the risk of rabies in the surrounding location [2]. As such small animals would likely die from the bite of a rabid terrestrial mammal; the chances of rabies would more likely come from exposure to a rabid bat.

Non-mammalian animals: This category of animals does not transmit the rabies virus; therefore there is no risk [30].

[6] Raccoons can also carry a nematode of concern to public health, *Baylisascaris procyonis* (the raccoon roundworm) which can cause visceral larval migrans.

d. Investigate Circumstances of Exposure

It is important to determine the circumstances of the exposure. A provoked incident is one resulting from human initiated actions (regardless of human intent), and is less likely to be attributable to rabies, whereas an unprovoked bite may be due to infection of the animal with the rabies virus, if it conflicts with the animal's normal behaviour. Examples of provoking an animal are:

- Invading or interrupting an animal's territory or actions
- Approaching or handling a sick or injured animal
- Interfering with an animal's food or possessions
- Provoking or teasing the animal to get attention
- Rough handling of the animal
- Throwing objects at the animal
- Prodding, trapping, or cornering the animal
- Separating fighting animals
- Cornering the animal

If, after investigation, the incident is uncertain because of conflicting reports or insufficient information, the incident will be handled in the same manner as an unprovoked incident.

e. What is Known About the Exposing Animal

The most important piece of information that must be gathered is the vaccination status of the animal causing the exposure. This will likely require consultation with an RV, a private veterinarian, or any designated authority that can confirm the vaccination status. An animal's vaccination status can be classified as fully vaccinated, primary vaccinated or unvaccinated[7].

- **Fully vaccinated animal:** An animal having documented proof issued by a licensed veterinarian[8] of receiving an initial rabies vaccination and revaccination boosters at the manufacturer's recommended interval(s). This definition could also apply to livestock species – horses, cattle and sheep. An example would be a dog vaccinated as a puppy at 12 weeks of age, followed by a booster at one year of age, and subsequent revaccination according to the manufacturer's vaccine schedule, e.g. every one, two or three years.
- **Primary vaccinated animal:** An animal having documented proof issued by a licensed veterinarian of receiving an initial rabies vaccination in accordance with the manufacturer's guidelines, at least 14 days prior to rabies exposure, and not yet having received a booster to this initial vaccination according to the manufacturer's recommendations. This definition could also apply to horses, cattle and sheep. An example would be a two-year-old dog vaccinated three months ago for the first time, exposed to rabies one month ago, and not yet having received an annual booster to

[7]The following definitions are taken directly from the *CFIA Manual of Procedures* [2].

[8] In areas where there is no access to a vet, the Newfoundland and Labrador College of Veterinarians has permitted non-veterinary public officials to vaccinate pets. These are usually COs or public health nurses.

this initial vaccination as per the manufacturer's recommendations. Both primary and fully vaccinated animals are considered current on vaccinations [38].

- **Unvaccinated animal:** An animal without documented proof of receiving an initial rabies vaccination at least 14 days prior to rabies exposure
  OR An animal whose documented records show that revaccination did not occur in the manufacturer's recommended time-frame
  OR An animal whose vaccination status relies on a vaccination performed within the 14 days prior to exposure. An example would be a six-year-old dog which was fully vaccinated with a one-year vaccine until four years of age, but which has not received the indicated annual rabies booster since then.

The animal's status may vary depending on the type of vaccine used. Any confusion in status may be clarified by referring to the *Compendium of Animal Rabies Prevention and Control* [39]. Proof of vaccination status must be included in the **Rabies Investigation and Referral Form** (Appendix 3) and the **Animal Exposure Investigation Form** (Appendix 7).

f. Make a Decision

It is necessary to use all the information collected to determine the risk of the situation.

- No Risk (Category I): The situation would not be considered a risk if there was touching or feeding animals, licks on intact skin, contact of intact skin with secretions or excretions of a rabid animal or human. These are not considered exposures, and no post-exposure prophylaxis or observation period is necessary [30] [31].
- Low Risk (Category II): If there happened to be nibbling of uncovered skin, causing minor scratches or abrasions without bleeding, the situation is considered to be low risk [31]. PEP is offered to the individual, and if the animal is domestic, it is ordered to be confined for the observation period to determine if it is positive for rabies. If the animal is wild and can be found it is sent in for testing [30].
- High Risk (Category III): If there are single or multiple transdermal bites, scratches, licks on broken skin, contamination of mucous membranes or exposure to bats, the category of exposure is considered to be high risk [31]. If the situation is determined to be high risk, the animal (if domestic) is confined for the observation period to determine if it is positive for rabies. If the animal is wild and can be caught, it is euthanized and sent for testing. Prophylaxis is started for the individual who has been exposed, which can be stopped if the testing comes back as negative [30].
  - **Examples of high risk situations:**
    - **Exposure to an animal or bat that tests positive for rabies**
    - **Exposure to a terrestrial mammal exhibiting characteristic signs of rabies**
    - **Bite above the shoulder by a wild animal or unvaccinated domestic animal**
    - **Bite by a wild animal, dog, cat or ferret that cannot be found and tested within 72 hours of the incident**

If any animal is suspected of rabies infection, regardless of human exposure, it must be reported to the RMOH and the CVO. Suspicion of rabies in an animal will be determined in

consultation with the RMOH, the CVO, the RV, or local veterinarians. Please refer to the risk assessment map in Figure 8 when performing an investigation into a suspect rabies case.

Suspect cases may include, but are not limited to:

- An animal exposed to, or suspected of exposure to, a bat or other wild carnivorous animal.
- Depending on regional epidemiology, unprovoked biting incidents where the animal was not vaccinated for rabies.
- An animal showing signs of illness or unusual behaviour that is suggestive of rabies.

Five **Rabies Decision Trees** can be found in Appendix 1. These flow charts outline the necessary steps to take when encountered with various rabies exposure scenarios.

D. Public Health Controlled 10-day Observation Period

A public health controlled 10-day observation period has four main functions: 1) to protect the public, including the owner, from being exposed to the rabies virus, 2) to provide an easy way to observe an animal's behaviour and look for any change, 3) to protect any other animals from potentially being exposed to rabies, and 4) to avoid unnecessary euthanasia of a dog responsible for biting a person [2]. It should be remembered that if an animal is in the stage of rabies infection where it is capable of transmitting the virus, it will be clinically rabid and likely dead from the disease within that 10-day period.

In regions where rabies is endemic, or there have been recently confirmed cases of rabies, animals may be confined for observation. This can be determined from the evaluation completed by the RMOH, as well as the risk assessment evaluation using the map in Figure 8. The EHO, CO, or RCMP/RNC, in consultation with the RMOH or the RV, have the authority (under the *AHPA*) to issue a mandatory 10 day confinement to observe the animal's behaviour. If at any point during the observation period, the animal shows signs of rabies (e.g. a change in behaviour, excitability or paralysis), or dies, the CMOH and the CVO should be notified immediately [2]. An **Animal Observation Letter** (Appendix 4) may be sent to the owner to provide supportive documentation of the action. In addition, educational materials, such as the **Rabies Information for Animal Observation** (Appendix 6) and rabies educational pamphlets may also be supplied to the owner [40].

Normally, the animal under observation should not be vaccinated for rabies at the beginning of the 10-day period in the case of an adverse reaction [2]. However, if there is evidence that the animal under observation has had contact with a wild animal that could have exposed it to rabies; the animal should be vaccinated or revaccinated immediately. Not to be confused with signs of rabies, the most common adverse reactions to the rabies vaccine include: vomiting, facial swelling, injection site swelling or lump, lethargy, urticaria (hives), circulatory shock, injection site pain, pruritus (itching), injection site alopecia (hair loss), lack of consciousness, diarrhea or death. If the animal has been vaccinated shortly before exposure, it should be dealt with on a case-by-case basis [38].

There must be an age-appropriate family member who will be responsible for the animal during the observation period. In addition, a log of interaction should be kept up to date, recording

people who have had contact with the animal inside the home or off the premises, and any other animals that were exposed during this time. The EHO, or other designated authority, must be comfortable that the animal is confined to an approved observation site for the duration of the formal observation period. If the EHO or designate feels that the site may be questionable, they may visit the observation site themselves, or ask that a site visit be performed by an ancillary organization (e.g. RCMP). For the duration of the observation period, the animal must:

- Be kept indoors, in a caged pen, or on a leash
- Not be taken on walks beyond the owner's property
- Be kept separate from people and other pets, with the exception of animals that have not yet weaned their young
- Be fed and hydrated as normal
- Not be sold, given away, or euthanized

If there is any question about the health status of the animal, seek the advice of a veterinarian. The owner should be instructed to notify the EHO/CO/RCMP (who will notify the CVO/RMOH) as soon as the animal shows any of the following signs:

- Biting indiscriminately (e.g. at its limbs or other objects)
- Paralysis or weakness of hind limbs
- Drooping jaw and/or neck
- Abnormal facial expressions
- Hiding away or depressed
- Change in the animal's usual behaviour
- Increase in drool or saliva

N.B. If an animal must be placed into 10-day observation, it is not acceptable to euthanize and test a low risk animal as a way of avoiding the costs of observation. This would result in the unnecessary killing of animals as well as placing an unnecessary financial burden on the Crown. An example would be an unvaccinated dog in an area with no reported rabies that has a history of biting, or was involved in a provoked bite. There may be a justifiable argument to observe the dog but not to unnecessarily euthanize it.

a. Moving, Selling or Changing Location

While under formal observation, the animal in question is under control of the Government of Newfoundland and Labrador. Therefore, an owner who wishes to move, sell the animal, or change the location of observation must have permission of the EHO, CO or other designated official. The new location must be inspected and the same regulations will apply [2].

b. Competing, Breeding or Showing

The animal cannot participate in any activities that are open to the public (e.g. parades, shows, breeding) nor can it be used for transportation [2].

c. Development of Clinical Signs

If clinical signs of rabies develop during the observation period, the designated person must inform the EHO/CO/RCMP or designate immediately. The inspector, in consultation with the CVO and RMOH, can recommend that the animal be euthanized [2].

d. Euthanasia

If testing or euthanasia is required, COs, AHD officials, or RCMP/RNC officers are trained to humanely euthanize, process and transport the carcasses of potentially rabid animals. An animal carcass should not be processed by anyone other than a qualified professional who has been vaccinated for rabies. The simple handling of a carcass with disposable gloves and its placement into a plastic bag, or the handling of a double-bagged carcass while wearing disposable gloves is not a risk for rabies exposure and therefore does not require prior immunization.

If the animal is domestic, and the owner requests that it be euthanized, the head will be sent directly to the CFIA for rabies testing. If the owner requests for the animal to be euthanized prior to, or during the 10-day owner observation period, the RMOH must be notified and give permission prior to euthanization. Euthanasia is an option for any animal suspected of rabies infection.

The Newfoundland and Labrador Veterinary Medical Association considers four methods acceptable for euthanasia of dogs: 1) lethal injection under the supervision of a licensed veterinarian, 2) by a free bullet from a firearm, 3) using a captive bolt gun, 4) and through the use of a carbon monoxide (CO) gas chamber. However, because the brain material of the animal is required to be tested for rabies, euthanasia using a captive bolt gun is not considered a suitable method. A licensed veterinarian can perform euthanasia, most commonly by injection of a lethal dose of a chemical agent. This is the preferred method when available, as it is quick, painless, and non-intrusive [41].

Shooting an animal for the purpose of euthanasia has a number of advantages: it is quick, cost-efficient, and sometimes the only option if the handler cannot gain control over the animal. Unfortunately, it is unsightly and potentially upsetting to community members. Ricochets also pose a potential problem, which can be limited by the use of a shotgun. Shooting should always take place outdoors away from the public, and can be done with a 22-caliber rifle or a 12-gauge shotgun. The intent should be to kill on the first shot. **It is essential to note that the animal must not be shot in the head**. The target area for an animal suspected of rabies should be the chest [41].

Another option available at numerous locations throughout the province is euthanasia in a gas chamber. A CO cylinder is used in a controlled chamber to euthanize an animal. Although clean and cost-efficient, it is the least preferred acceptable method and requires disinfection. This is mainly due to the potential risk to the operator, who is required to be present for observation [41].

Two methods of euthanasia are considered acceptable for bats; chamber anesthesia/euthanasia and container euthanasia [42]. Both these methods have been approved by the American Veterinary Medical Association (AVMA). Approved inhalant agents to achieve anesthesia are liquid anesthetic inhalants (halothane, enflurane, isoflurane, sevoflurane, methoxyflurant and desflurane), carbon dioxide (CO_2) and CO. Barbiturates and potassium chloride are approved and recommended injectable agents. Euthanasia by ether, blunt force trauma, freezing

or gunshot are all unacceptable methods for euthanizing bats. PPE is required for anyone with direct contact with the bat during capture and euthanasia. For further information on bat euthanasia techniques please consult the Michigan Rabies Working Group document: http://www.michigan.gov/documents/emergingdiseases/Humane_Euthanasia_of_Bats-Final_244979_7.pdf.

The 2013 *AVMA Guidelines for the Euthanasia of Animals* is also a useful resource concerning all domestic and wild animal euthanasia. The document can be consulted: https://www.avma.org/kb/policies/documents/euthanasia.pdf.

e. Conclusion of 10-day Observation Period

If the animal is healthy on the 10th day of observation (confirmed by an EHO or designate) it may be released from confinement. The RMOH and CVO must be notified of its health status. An animal should not be released if there is any doubt about its state of health. An **Animal Release Letter** (Appendix 4) may be sent to the patient and other animal health authorities to provide supportive documentation. If the patient was not the owner of the animal, a **Rabies Negative Result Letter** will be mailed to the animal owner or submitter by from the Office of the Chief Veterinary Officer (Appendix 5).

E. Treatment

Human diploid cell vaccine (HDCV) is the rabies vaccine used in the pre-exposure immunization of humans for rabies. HDCV and RIG are also used in the post-exposure management of rabies, according to recommended schedules in *The Canadian Immunization Guide.* HDCV and RIG are emergency supply products and are to be ordered as such. Release of these products is to be authorized by the RMOH. If any more information is required, please refer to **The Newfoundland and Labrador Immunization Manual** (section 5.5) in Appendix 7.

- **Rabies Vaccine (Human Diploid Cell Vaccine or HDCV):** The vaccine provides the patient with active immunity against the rabies virus in four doses (days 0, 3, 7, 14), which takes up to 10 days to develop and persists for several years [41]. In almost every individual tested, protective antibodies have been detected 14 days post-vaccination. Five doses are recommended (days 0, 3, 7, 14, 28) for individuals with immunosuppressive illnesses, or those taking corticosteroids, other immunosuppressive agents, or antimalarial drugs [44].
- **Rabies Immune Globulin (RIG):** ***This product is administered to those who have not been vaccinated for rabies prior to the incident, or who do not have detectable antibodies to fight the virus***. RIG provides rapid, passive immunity and gives the person a sufficient titre of antibodies to fight the virus until the body can produce its own. Caution should be taken when administering RIG, as exceeding the recommended dosage could suppress active antibody production. If RIG is not administered immediately, it can be injected up to 7 days after the incident. However, RIG offers no protective value if injected 8 days after exposure [44].

Table 4: Human exposure to rabies post-exposure prophylaxis (PEP) guidelines [41].

Patient History	Prophylactic Treatment	Dosage*	Location	Time*
1. Previously vaccinated with complete series of approved HDCV (or an unapproved schedule), **and** demonstrating neutralizing rabies antibodies when tested	HDCV	2 doses of HDCV	Deltoid muscle	Days 0 and 3
2. Previously vaccinated but not meeting above criteria	RIG	20 IU/kg body weight	Infiltrate wound and surrounding area; remainder to be injected intramuscularly at a site distant from vaccine administration	Day 0 -7
	HDCV	Rabies antibodies not present before immunization: *4 doses of HDCV	Deltoid muscle	Days 0,3,7,14, booster if required
	HDCV	Rabies antibodies present before immunization: 2 doses of HDCV	Deltoid muscle	Days 0 and 3
3. No previous rabies vaccination	RIG	20 IU/kg body weight	If possible, infiltrate wound and surrounding area with entire dosage. If not feasible, remainder to be injected intramuscularly at a site distant from vaccine administration	Day 0 -7
	HDCV	*4 doses of HDCV	Deltoid muscle	Days 0,3,7,14, booster if required

*Check with product monograph and current *Canadian Immunization Guide*: http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-rabi-rage-eng.php#sched
*When administering to adults and older children, the injection should be in the deltoid muscle, whereas with young children, the vaccine should be administered in the anterolateral aspect of the thigh. Caution should be taken to never inject the rabies vaccine or rabies immunoglobulin into the gluteal muscle as it may result in a decreased response.
*Immunosuppressed individuals receiving HDCV should receive an additional dose on day 28 post-exposure.

- **Serological Testing**: An individual may have previously been vaccinated for rabies, but is unsure of their vaccination status. The Rapid Fluorescent Focus Inhibition Test (RFFIT) is a serological test that can determine the amount of rabies virus neutralizing antibodies present in the blood [6] [45]. This test is the current WHO gold standard for measuring

serological assays [45]. An acceptable titre present in previously immunized humans is 0.5 IU/ml. If serological testing is required, it should occur on the first day of vaccination (day 0). If the result shows sufficient antibody levels, the vaccine may be discontinued, as long as at least 2 doses of the HDCV have been administered [32].

- **Management of Human Case and Contact:** Transmission of rabies from person to person is extremely rare[9], but the potential for exposure does exist. If a health care worker is caring for an infected individual, caution is advised to prevent contact with respiratory secretions. In cases where humans have been exposed to the saliva of an infected individual, it is recommended that the exposed individual be provided with PEP. Wound management must begin as quickly as possible using the steps for wound cleansing and treatment listed above.

The following flow chart (Table 3) can be used by EHOs or other public health officials to assess a biting incident.

Table 5: Public health assessment of biting incident and rabies report.

1) Call received by public health office/emergency room/ veterinary office concerning a biting incident.
2) Collect caller's name and contact information. Health care professional involved in initial treatment of wound is to complete **Rabies Investigation and Referral Form – Part A.** Forward to RMOH for interview (**1-866-270-7434** after hours).
4) If there is a wound, advise the victim to clean wound with soap and water and a virucidal agent (e.g. providine-iodine solution) or detergent to kill the virus if available. Recommend seeking immediate medical attention.
3) RMOH to collect detailed incident report information (**Rabies Investigation and Referral Form – Part B**)
6) RMOH to determine need for rabies PEP treatment and/or animal observation and testing. Public Health or Disease Control Nurse to give PEP.
7) If animal is not to be tested, the case is referred to an EHO, who is to issue a mandatory Public Health Controlled 10-day Observation Period. This should start as soon as possible following the incident (EHO to complete **Rabies Investigation and Referral Form – Part C**).
5) EHO verifies that all information recorded in Part A is correct.
8) EHO to consult with RMOH and CVO regarding the health of the animal under observation.
9) EHO to follow-up with biting incident victim until mandatory observation is lifted (personal visit/phone call/ancillary organization). **Completed Rabies Investigation and Referral Form to be forwarded to the CVO**.
10) If animal is to be tested for rabies, EHO to contact CO (or RCMP/RNC or AHD) to euthanize animal and send to CFIA. Test results will be delivered to CVO, who will pass on to RMOH and Service NL Regional Director. If the result is negative, the EHO dealing with the incident will report the result to the person involved. If the result is negative, the EHA Environmental Health Manager or RMOH will relay test results to the front line health care worker involved in initial exposure, who will pass along the results to the patient.

[9] There have been documented cases of transmission through ocular exposure during transplantation of corneas and transplantation of solid organs [6] [46].

5. Animal Rabies Exposure Guidelines

A. Policy

All potential animal rabies exposures with the absence of human contact will be investigated by a CO, a member of the RCMP/RNC or AHD, who will report the incident to the CVO. Laboratory confirmed cases must be reported to the CVO as per section 3 of the *AHPA.*

B. Investigation into Suspect Case

If a domestic pet, livestock, horse, or other farmed animal (e.g. fox or mink), is suspected of being exposed to rabies, the following steps should be taken by a CO, member of the AHD, or designate:

1) Interview the owner and document any interactions the exposed animal has had with humans or other animals. If human exposure has occurred, the RMOH should be notified immediately.
2) Investigate and determine the circumstances of exposure. Examples of situations that could provoke one animal to bite another are:
   a. An animal invading or interrupting another animal's territory or actions
   b. An animal approaching another sick or injured animal
   c. An animal interfering with another animal's food or possessions
   d. One animal prodding, trapping, or cornering another animal
3) Determine how much time has passed since the exposure occurred.
4) Any dog, cat or ferret that has potentially been exposed to rabies should be vaccinated immediately, regardless of previous vaccination status. If the animal received a booster vaccine shortly before the exposure, the situation should be treated on a case-by-case basis. The animal should be vaccinated within 7 days of the exposure to ensure optimal efficacy of the vaccine [38].
5) Determine if the animal (dog, cat, ferret or livestock) involved was previously vaccinated for rabies; include a copy of the veterinarian's forms for record [2].
6) An overall assessment of the health of the animal should be conducted, noting if there is any saliva or blood on the fur, bite wounds, scratches, abnormal behaviour or clinical signs of rabies.
7) Complete **Animal Exposure Investigation Form** (Appendix 7) and submit to CVO.

C. Control Measures

a. Domestic Animals

i. Quarantine

Any exposed domestic animal that is up primary or fully vaccinated will be immediately revaccinated within 7 days. These animals do not require a formal quarantine however periodic communication should continue via phone or email concerning the health of the animal. The time between the animal's vaccination and the labelled duration of immunity of the vaccine must not

have elapsed. Both primary and fully vaccinated animals are considered currently vaccinated. If the vaccination is given 7 days after exposure, the animal should be quarantined for a period of 3 months. Any animals that have received a booster vaccination shortly before exposure will be dealt with on a case-by-case basis [38].

Any exposed domestic animal that has never been immunized against rabies should be immediately vaccinated (within 7 days of the event) and quarantined under the owner's control for 3 months. The animal should be vaccinated again after 3 weeks in quarantine [38].

Animals that have not received vaccinations during the first week following the event should be quarantined for 6 months [38]. Any animals that are out of date on their vaccinations or fall outside of these guidelines for any other reasons should be treated on a case-by-case basis considering: the duration since the last rabies vaccinations, the number of previous rabies vaccinations, the delay between the exposure and vaccination, and the overall health of the animal [38].

ii. Vaccination or Revaccination

Recently, research has demonstrated that vaccinating or revaccinating a pet after exposure to a potentially rabid animal can have a beneficial effect [2]. This practice is recommended and vaccination should take place within 7 of the exposure to ensure optimal efficacy. The sooner the animal can be revaccinated the better. In addition, revaccinations corresponding with quarantine guidelines are explained above [38]. In areas without access to veterinary services, alternative vaccination arrangements may be made with approval of the Newfoundland and Labrador College of Veterinarians. It is important to note that this practice does not guarantee protection and an official quarantine for the same duration may still be required. Documented proof of this vaccination should be submitted to the CVO [2].

iii. Euthanasia

Ante mortem testing for rabies is available, but in many cases is not practical. The major limiting factor is the short duration of the clinical symptoms, which would likely cause the animal to succumb to the disease prior to the release of test results [6]. Therefore, euthanasia is always an option for a domestic animal exposed to rabies. This must be performed by a CO, RV, private veterinarian or other designated authority. If euthanasia is decided during an official observation period or quarantine, the CVO must be notified. The decision to test the animal for rabies is made by the CVO, who will consider the history and prevalence of rabies in the area, as well as the circumstances of the exposure [2]. Control options are summarized in Table 6.

Table 6: Control options for owners of domestic pets that may have been exposed to rabies [2] [38].

	Fully Vaccinated Pets	Primary Vaccinated Pets	Unvaccinated Pets
Options	Re-vaccination within 7 days, or	Re-vaccination within 7 days, or	Vaccination within first 7 days and again during the 3rd week in addition to a 3 month quarantine, or
	Revaccination after 7 days and quarantine for 3 months, or	Revaccination 7 days after exposure and quarantine for 3 months, or	If no vaccinations were given 7 days post-exposure, quarantine for 6 months, or
	Euthanasia, or	Euthanasia	Euthanasia

b. Pocket Pets

Any small mammal that is kept as a household pet (e.g. guinea pig, hamster, rat, gerbil, mouse, and hedgehog) is considered to be a pocket pet. Because licensed vaccines for these types of pets are often unavailable, the animal is usually considered unvaccinated, and the control options for pet owners are very limited. The risk assessment for these animals is critical; therefore the circumstances of the exposure and the epidemiology of rabies in the area must be thoroughly investigated. If the chance of rabies exposure is probable, the animal can be quarantined for 6 months or euthanized and tested [2].

c. Livestock, Horses and Other Farmed Animals

i. Farmed Livestock

Although the risk of herbivorous livestock transmitting rabies to other animals is not as great as a carnivorous species, the risk is still significant for handlers becoming infected through the animals' saliva. There are licensed vaccines available in Canada for cattle, horses and sheep, therefore determining the vaccination status of the animal is essential before quarantine [2]. If farmed livestock are potentially exposed to the rabies virus, quarantine is still issued [2].

If there is a suspected index that has contracted rabies, and it is a member of a group of animals (e.g. herd, pack, kennel; whether carnivore, omnivore or herbivore), the virus may have been introduced into the group for some time prior to the diagnosis, and therefore the group must be quarantined for 40 days. If the index case was external to the livestock herd (e.g. a rabid fox invaded a barn and attacked a herd of cattle or swine) and exposure is suspected, the quarantine period for the group is 60 days [2] [38]. Post-exposure vaccination of farm animals within the first 7 days of exposure may reduce the risk of rabies development in livestock [38]. If the entire herd is suspected of being exposed to a rabid animal (e.g. a herd of sheep or cattle in a pasture were exposed to a rabid fox), then the entire herd is ordered to be quarantined and can experience this as a group. If the entire herd can stay isolated on the premises where the index case was found, the herd should remain on-site. If the group cannot remain isolated from other animals on the site where the exposure occurred, then the entire herd or group should be transported to another location for quarantine. Post-exposure vaccination should be administered immediately following an exposure to

a potentially rabies animal as this may reduce the risk of rabies development [38]. During quarantine, full visibility must be allowed to observe potential changes in behavior. Zoo or captive wildlife animals should follow the same quarantine procedures [2].

There have been international reports suggesting the possibility of human rabies infections acquired during the butchering process of infected meat. The CCVO Subcommittee for the Management of Potential Domestic Animal Exposure (2015) state that if any livestock animal is asymptomatic upon exposure to the rabies virus, it can be licensed to slaughter within 7 days [38]. The Food and Agriculture Organization (FAO) claims that the carcass and the viscera of a rabies infected animal are acceptable to enter the food chain within 48 hours of the exposure. The FAO recommends caution when handling the area around the bite [47]. Based on this information, all farmed animals must be evaluated on a case by case basis to determine if they are fit for slaughter. This must be decided by a RV, provincial inspection staff and the CVO [2].

Ante mortem testing has revealed that rabies viral RNA has been detected in the milk of dairy cows [48]. Based on this information, all animals must be evaluated on a case by case basis to determine if they are fit for milk production. This must be decided by a RV, provincial inspection staff and the CVO.

ii. Working Livestock

It is important to take precautions when it is suspected that a working animal has been exposed to rabies, due to their close proximity to humans. In the case of an incident, vaccinated livestock are quarantined for 40 days. If the working animal is unvaccinated, the same procedure recommended for farmed livestock would apply (please refer to section 5. C. c. i above) [2].

iii. Farmed Mink, Fox and Lynx

These animals are considered to be unvaccinated when exposed to rabies, and the necessary quarantine period is 6 months. When pelting these animals, no extra precautions need to be taken for a **quarantined asymptomatic animal**. However, for a **quarantined symptomatic animal**, the pelt should be detained until “hard dried” to ensure the virus has been destroyed, reducing any potential risk [2].

d. Wild Animals

Wild animals that are suspected of exposing a domestic animal to the rabies virus are to be euthanized. This act is the responsibility of COs or the RCMP/RNC and must be reported to the CVO (as per *AHPA*). Caution should be taken not to shoot the animal in the head. The animal carcass will then be transported to the OLF-CFIA, where FAT will be used to confirm the presence or absence of rabies.

If a wild animal is found to be acting strangely or exhibiting rabies symptoms, it should be euthanized and sent to the AHD for dRIT testing. dRIT will detect the presence or absence of rabies. If the animal tests dRIT positive, the sample will be sent to the OLF-CFIA for confirmation.

e. Zoo Animals

These animals are considered unvaccinated and a quarantine period of 6 months should be issued upon exposure to a rabid animal [2].

D. Quarantine

A mandatory quarantine has four main functions: 1) to protect the public, including the owner, from being exposed to the rabies virus, 2) to provide an easy way to observe an animal's behaviour and look for any change, 3) to protect any other animals from potentially being exposed to rabies, and 4) to avoid the unnecessary euthanasia of domestic animals [2]. Authority to require quarantine exists under section 5 (4) (f) of the *AHPA* or section 5 (1) of the corresponding regulations.

Necessary precautions must be taken during quarantine because the animals may be carrying the rabies virus. The handlers must wear gloves when it is necessary to handle the animal's mouth. In addition, it is important that the handler assess the animal's condition prior to initiating training or work. They should look for neurological signs such as lack of coordination and lack of stability. If an animal will be working continuously throughout the quarantine, it should be kept isolated to ensure there is no unnecessary human or animal contact. If this is not possible, the animal should be moved off the premises to ensure isolation while working. The suspect animal should always be transported separately [2]. If the animal is training for racing, jumping, rodeo, showing etc., or participating in farm work, the animal can still do so if the isolation conditions are met [2].

a. Quarantine of a Domestic Animal

i. Procedure

If the owner of the animal understands the seriousness of the issue and agrees to cooperate with authorities, the animal can be quarantined for a specified period on the owner's premises. If the owner, at any time, refuses to comply with any aspect of the quarantine, the animal will be moved off-site to be quarantined at the owner's expense. Quarantine must meet the following requirements [2][10][38]:

1. The exposed animal must be vaccinated for rabies as soon as possible following the exposure, as previously detailed.
2. In addition, all other animals living on the premises must be brought up to date or kept up to date on their rabies vaccinations as per the manufacturer's schedule. Animals that are not yet eligible for rabies vaccinations (less than 12 weeks of age, or according to product directions) should be kept away from the exposed animal until vaccinated.
3. The animal must be isolated and maintained in a quarantine facility (on or off-site) in a secluded area of the premises, including the use of outdoor quarantine if it can be done humanely. For pets, a bedroom or a kitchen is an unacceptable quarantine site in a

[10] Procedure adapted from the *CFIA Manual of Procedures* [2].

home. An unused, properly barricaded, isolated section of a basement or other room is preferred in most situations.

4. Wherever possible, the quarantine enclosure should use a double-door entry, allow visual observation of the animal's behaviour before the handler, or the designated inspector physically interacts with the animal (e.g. for purposes of feeding, cleaning), and prevent any contact with other animals or humans on the premises. An example would be a smaller cage located inside a large cage so that during the quarantine, the enclosure provides adequate protection, ensuring that exposure does not occur. The quarantine enclosure site should be locked at all times.
5. An outdoor quarantine facility can be considered if it provides protection from inclement weather and cold temperatures, and allows for a double-entry system for attending to the animal's needs. It must also allow the observation of the animal by the quarantine-responsible person and the designated inspector.
6. Any access to the outdoors by a quarantined animal must be limited to exercise or veterinary care. The animal must be muzzled and leash-controlled, or secured in a pet carrier, with no physical contact with people or animals. The quarantined animal must not leave the quarantine premises unless permitted to do so by the RMOH (human exposure) or CVO (animal exposure).
7. Only one age-appropriate handler should be identified for the care of the quarantined animal. This person is to be advised to use sanitary precautions and personal protection (e.g. gloves) when attending to the animal.
8. The quarantined animal is to have no contact with any other animals or persons who may be located at or visiting the premises during the entire quarantine period.
9. The quarantined animal must not be left unsupervised for an extended period of time in a room/enclosure where an escape is possible. Precautions must be put in place to ensure accidental escape is highly unlikely.
10. If accidental contact occurs with a person outside the immediate family, name and contact information must be recorded as well as the type of contact that occurred. This must be retained for a minimum of 2 weeks after the incident.
11. It is preferable that the animal be quarantined in a location where it is possible for the designated authority to monitor from a window on a follow-up compliance visit if no one is at the premises at the time of the visit. The installation of a temporary remote control may be considered.
12. The EHO or designate (CO, RV or AHD official) approving the quarantine is to leave forwarding contact numbers with the age-appropriate person attending the quarantine, and he/she should be advised to call immediately if any behavioural changes are observed in the animal (e.g. changes in eating and drinking, aggressive behaviour or depression). If, at any time during the quarantine, private veterinary care is required, the designated caregiver must advise the CVO of this situation. The EHO, if possible, should visit the quarantine premises to assess the situation. If a veterinary visit is deemed necessary, the EHO should contact the attending/receiving veterinary clinic to ensure their knowledge of, and compliance with, the requirements of the quarantine.
13. The EHO or CO will monitor the premises regularly to ensure compliance with the order to quarantine the animal. If monitoring in person is not an option, the designate will

regularly follow-up with phone calls or request aid from an ancillary organization such as the RCMP.

14. The EHO or CO is to advise the designated person attending to the quarantine that non-compliance with the terms and conditions of the quarantine is a contravention of the *AHPA* (Part VIII *Offenses and Penalties* (76 (1))) and could lead to the removal of the animal from quarantine, its subsequent destruction, and the consideration of more formal legal action (e.g. ticketing or charges).

ii. Off-site Locations

Where off-site quarantine is available and preferable to the owner, the EHO or CO must approve the site for the quarantine, and ensure that the facility operators are aware of their responsibilities to meet the requirements of the quarantine [2].

b. Managing Events During Quarantine

i. Development of Rabies Symptoms

If clinical signs of rabies develop during quarantine, the designated responsible inspector must connect with the CVO immediately to discuss euthanasia [2].

If the animal is a **domestic pet** and the owner requests movement to a local facility for euthanasia, he/she is required to bear the cost of transport and euthanasia. The private veterinarian must be informed of the animal's condition and waiting rooms should be avoided.

ii. Euthanasia

If the owner decides to euthanize the animal without clinical signs of rabies, precautions are to be taken as if the animal was considered to be rabid. The owner will bear this cost if it is to be performed by a private veterinarian [2]. If the owner requests that the animal be euthanized, the RMOH and CVO must be notified immediately for approval.

iii. Rabies Testing

If clinical signs of rabies develop during quarantine and the animal is euthanized, the CVO will have the head/brain submitted to the OLF-CFIA for confirmatory testing [2].

iv. Parturition

Dogs & Cats: The pups or kittens are to be quarantined for 6 months because transplacental transmission of the rabies virus has been documented [2] [6]. They may be kept with the dam until weaned at 8-10 weeks. They are to be vaccinated at 12 weeks. If the dam is healthy at the end of quarantine, the offspring can be released as well [2].

Livestock: The offspring are to be kept with the dam during quarantine.

v. Competing, Breeding or Showing

The animal cannot participate in any activities that are open to the public (e.g. parades, shows, breeding) nor can it be used for transportation [2].

vi. Moving, Selling or Changing Location

While in quarantine, the animals are under control of the Government of Newfoundland and Labrador. Therefore, an owner who wishes to move, sell the animals, or change the location of quarantine must have permission of the CVO. The new location must be inspected and the same regulations will apply [2].

6. Sample Collection and Submission

If any animal is to be tested for the presence of rabies, it is essential that the head of the animal be submitted while adhering to the strict sampling and packaging guidelines. In most cases the entire brain is required for testing, along with a portion of the spinal cord or brainstem for large domestic or wildlife species (e.g. cows, horses and bears). If there has been any human or domestic animal exposure, the head is to be removed and sent directly to OLF-CFIA [2].

The carcass can be disposed of in two ways: burial or incineration. Although buried carcasses are at risk of being retrieved and scavenged by another animal, incineration is not always a practical solution, and transporting a potentially rabid carcass could lead to TDG issues. Therefore, the carcass disposal of each rabies suspect case should be considered individually.

In order to conserve the integrity of a sample, it should be refrigerated or frozen. Time-sensitive samples should not be frozen and should be shipped within 24 hours to ensure the testing is not delayed. Samples that are not time sensitive can be frozen before being submitted to the AHD.

The AHD will perform preliminary rabies testing for wildlife (other than bats) in Newfoundland and Labrador, which are not involved in human or domestic animal exposure. This division accepts the heads (or bodies) of all wild animals that are thought to be rabid. If a bat is captured, and there is no human or domestic animal contact, it will be sent by the AHD to the Atlantic Veterinary College (CWHC) in PEI for white-nose syndrome and rabies testing during the winter months and OLF-CFIA for surveillance during the summer.

A. Safe Work Practices

Prior to collecting and processing potentially rabid samples or specimens (e.g. during capture/euthanasia/decapitation), or performing rabies laboratory testing with live virus, the staff in question must have a rabies titre of 0.5 IU/ml. For employees coming into contact with a potentially rabid sample during transport or packaging, only disposable gloves are required.

a. Personal Protective Equipment (PPE)

Gloves are the most important PPE, and should always be worn when collecting samples and tissues, or handling live animals, especially bats. In addition to gloves, coveralls and boots should be worn when collecting samples from the field. If a disarticulation tool is needed (e.g. saw, axe), eye protection should be worn to ensure that no tissue infected with live virus can get into eyes. A chain-mail mesh glove should also be worn if using a sharp tool to remove the head (e.g. on the hand not holding the sharp tool) [2].

b. Safety Considerations

It is essential that all staff submitting a sample to be tested ensure that the animal is dead. The animal must be humanely euthanized by an acceptable method (e.g. injection, gunshot or in a gas chamber). In addition, no needles from chemical euthanasia should remain, and all protruding sharp fragments (e.g. bone fragments, teeth) following head detachment, should be removed [2].

c. Head Removal

Everything required for safely sampling and transporting a specimen can be found in Appendix 9, and the animal head removal procedure is detailed in Appendix 10. If the animal sustained injuries to the head (e.g. shot or crushed), a portion of the cervical spinal cord should be included in the sample submission [49].

B. Quality of the Submission

A sample that is of poor quality not only compromises the health of the public, but could also delay testing in a time sensitive situation [2].

Rabies testing is performed on the brain of the animal. The more brain matter present the better the results, therefore prior to submission, the brain is not to be dissected. Whenever possible, the entire brain, entire head or entire carcass should be submitted [2]. If the animal was shot in the head or is slightly decomposed, include a portion of the spinal cord for testing [49].

All identifying information (e.g. lab number) should be included with the specimen, in a clearly labelled separate bag, to avoid identification gaps. Unique identifiers should also be described in the documentation accompanying the sample [2].

Frozen samples are accepted; however they cannot be tested until thawed. If the situation is time sensitive, it is recommended that the specimen be refrigerated and submitted with ice packs as opposed to frozen prior to submission [2]. Guidance material provided by CFIA can be accessed via the Canadian Veterinary Medical Association website: http://www.canadianveterinarians.net/resources/rabies-guidance.aspx#.U9evPvldUWd

a. Transportation of Dangerous Goods (TDG)

All staff responsible for submitting samples for rabies testing must be certified with TDG training. This training is provided by the AHD (Zoonotic Diseases Consultant) and is available to all provincial and Nunatsiavut government (NG) employees who may encounter this scenario. TDG requirements are designed to protect all parties involved from potential risks to the public [2]. A list of equipment and supplies required for sampling and submitting rabies samples can be found in Appendix 9.

b. Packaging

Packing materials produced by Saf-T-Pak® are approved for the submission of a rabies specimen by meeting the TDG requirements. Although these are not the only packaging materials that meet the TDG standards, the safety of all parties involved is a priority and **packaging that is not approved cannot be used to ship a sample being tested for rabies** [2].

The head should not be trimmed or modified (e.g. shorten snout, cut off ears, skin the head) in order to fit multiple specimens in a green can or styrofoam cooler. If the specimen is too large for the green can or cooler, other packaging materials are to be sought that still meet the TDG requirements. All specimens should be packed using previously frozen ice packs. TDG requires that the specimen is double bagged with an additional absorbent layer placed outside the two bags, providing protection for leakage. The sample and absorbent material should then be double bagged again. Any sharp fragments should be covered prior to bagging to avoid protrusion. If there are any porcupine quills, jagged bone fragments or possible bullets that cannot be removed, notification must be included in the comments section of the CFIA and AHD's sample submission forms (Appendices 11 and 13 respectively) [50]. In addition, the green can, or an alternate TDG approved package, must be tightly secured before final packaging. If there are any jagged bone fragments, porcupine quills, or bullets in the sample it must be mentioned in the submission form comments section [50]. Unsecured packaging may pose a risk to anyone in contact with the specimen during handling. A sturdy fibreboard box is always required, regardless of the packaging materials [2]. A photo displaying a TDG approved package is presented in Figure 10 and more information on packaging and shipping a sample to be sent to the CFIA can be found in Appendix 12.

Figure 10: Package according to TDG requirements [50].

More information on correct packaging and shipping a rabies submission can be found in Appendices 9, 10 and 13 [51].

c. Submission Documentation

A sample that is related to a human exposure will take priority at the OLF-CFIA over a sample relating to the exposure of an animal. Therefore, it is essential that correct documentation is submitted. Inconsistencies in the information on the form can cause confusion, leading to delays, possibly jeopardizing the outcome of the individual. There should be accurate contact information for a local public health authority, so that results can be given as soon as they are made available [2]. The **Rabies Sample Submission Form** required for OLF-CFIA submissions can be found in Appendix 11. A paper copy of this form is required to be printed and attached to the specimen being tested inside the package, as well as submitted online [51].

If a wild animal is suspected of having rabies and there has been no human or domestic animal exposure, it is humanely euthanized and sent to the AHD for testing. The **Wildlife Rabies Surveillance Form** can be found in Appendix 13 and must accompany the sample to be tested. A standard sample submission lab form is also accepted and can be found at:

http://www.faa.gov.nl.ca/agrifoods/animals/health/pdf/sample_r581-01.pdf

If a bat has been found, and has not been in contact with a human or domestic animal, it is to be sent to the CWHC in P.E.I. to be tested for rabies and white-nose syndrome (winter months).

The **Wildlife Specimen Submission Form** can be found in Appendix 14. Additional information on packaging and shipping the sample can be found at:

www.ccwhc.ca/forms/CCWHC_Packaging_Shipping_instructions.pdf

d. Tracking

Tracking of a rabies sample could be valuable in many situations, especially if a sample has been misplaced along the way. Regardless of the method of transportation (e.g. courier or plane), the original waybill must be retained by the sender, which should then be copied and emailed to the recipient. This is the case for samples being shipped to the OLF-CFIA, the AHD in St. John's, or the CWHC in P.E.I. Once the package has arrived, the receiving laboratory will assign the sample with an internal identification number.

e. Results

Results for rabies tests submitted to the OLF-CFIA can be completed in as little as 72 hours. Therefore, any rabies case that involved human exposure should have results within 3 days of sample submission, depending on the state of the sample when it arrived (e.g. frozen). There is no service standard for viral variant determination. Every effort will be made to determine the viral variant of the positive test [2].

Wild animal testing in the AHD commonly takes 24 hours to complete, depending on the state of the sample. Turnaround time will vary however, based on laboratory workload and priorities.

Rabies test results will be reported to the CVO. In the case of human exposure, the results will then be relayed onto the RMOH/CMOH, Service NL Regional Director and Manager of Operations, the Director of Population Health in the Regional Health Authority (RHA) involved, Forestry and Agrifoods Regional Compliance Manager and members of the Nunatsiavut Government, if applicable. Each manager/director informed has the responsibility of reporting the results directly to the applicable front-line employees. In the case of a positive result, it will be the responsibility of the RHA to report the result to the exposed person, likely along with PEP recommendations if not already started. In the case of a negative result, the EHO performing the investigation will report to the exposed person.

If a domestic animal was exposed but there was no human contact, the result will be reported to the CVO, who will relay the report to the Directors and Regional Compliance Managers of the Forestry Services Division of the Forestry and Agrifoods Agency, as well as the Regional Veterinarians. Similar to the structure described above, in the case of a negative result, the CO or ZDC already in contact with the animal owner will report the result. If the test comes back positive for rabies, a member of the Regional Health Authority will contact the animal owner with the result and PEP recommendations. The **Rabies Result Reporting Scheme** can be found in Appendix 16.

7. Rabies Testing

A. Fluorescent Antibody Test (FAT)

A WHO recognized rabies test, FAT combines a fluorescently labelled anti-rabies virus antibody that binds to rabies antigen in infected brain tissue. Upon a positive result, the combinations of the antibody and antigen create a green glow under a fluorescent microscope, shown in Figure 11 (A) [40] [52]. All domestic and wild animals that had previous contact with a human and are suspected to be infected with rabies are to be sent to OLF-CFIA for testing with FAT.

B. Direct Rapid Immunohistochemical Test (dRIT)

The dRIT test is a more recent development which is comparable in accuracy and specificity to the FAT test [53]. It is, however, only certified to be used on non-contact wild animals, excluding bats. All positive dRIT samples tested at the AHD are sent to the OLF-CFIA for confirmation testing (FAT), along with 10% of negative samples. Positive and negative controls for FAT and dRIT are shown in Figure 11.

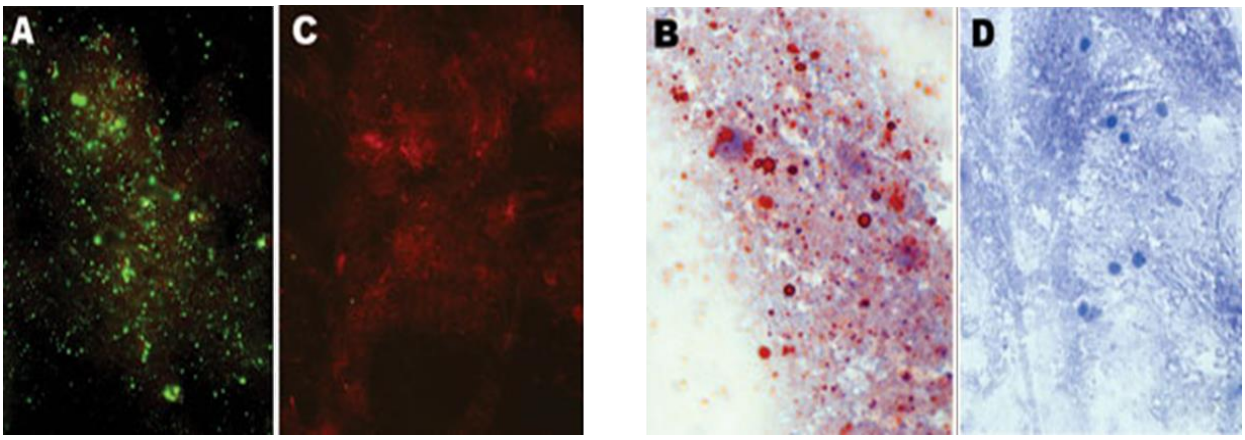

Figure 11: Detection of rabies virus antigen in brain tissue using FAT; A) positive control, C) negative control. Detection of rabies virus antigen in brain tissue using dRIT; B) positive control, D) negative control [52].

8. Outbreak Management[11]

This province has successfully eradicated rabies twice from the Island of Newfoundland. Though the reality of any outbreak will vary depending upon the time of year, the animals infected and the geographic location of the outbreak, the conceptual approach to disease control is as follows [54]:

[11] OIE: *Guidelines for Animal Disease Control*, section 6: Outbreak Investigation [54].

A. Preparation for Field Work

The experience of routine animal disease work is valuable for larger-scale disease control work. In addition to this, specific training may be necessary for 1) veterinary staff, 2) laboratory staff (e.g. TDG training, specific laboratory diagnostic training), and 3) enforcement staff (e.g. disease details, TDG and enforcement training for COs, EHOs, RCMP/RNC). Adequate personal health protection is also important. This can include access to personal protective equipment and prior immunization.

Sufficient infrastructure is necessary to collect, sample, ship and dispose of potentially infected carcasses. The AHD's Molecular Diagnostics Laboratory, associated postmortem facility and incinerator have been expanded to support the needs of a larger scale disease outbreak. The laboratory has the capacity to provide screening for rabies detection (dRIT) and the incinerator has the capacity to burn 2 000 kg of animal carcasses at a time.

Sufficient legal authority is necessary to be able to take those steps necessary for the larger benefit of provincial society or the economics of an industry. These exist under the *AHPA*. The CVO, RVs, COs, EHOs and RCMP/RNC are all inspectors for the purposes of this Act.

A network of contacts within the related fields of wildlife (wildlife biologists, COs, Canadian Wildlife Services, Parks Canada), public health (federal and provincial), and CFIA is also extremely valuable when there is a need to rapidly develop a cooperative control plan.

B. Establishment of the Validity of the Report Triggering the Investigation

Primary reporting may occur by a number of means; reports from the public, or observations by field professionals (agricultural, wildlife, public health). The follow-up to the report may be by COs, EHOs, veterinary staff, or uniformed police depending upon the details reported.

C. Confirmation of Diagnosis

dRIT testing is performed in the St. John's laboratory but is only suited to surveillance testing for wild terrestrial mammals. All suspect positives are submitted to the OLF-CFIA for confirmation. Variant typing is critical to establish whether the source is bats, foxes, or some other host species.

D. Intensive Follow-up and Tracing

Dependent upon the details of the confirmed case, this would be of necessity. If it were a bat variant case, in either a bat or a terrestrial mammal, it would be expected that the spread would be minimal and the possibility of other cases unlikely. At times clusters of bat related cases or just single cases can occur (e.g. Cartwright, 2004).

In the case of a terrestrial mammal variant (most likely Arctic fox variant but potentially raccoon as well), the location of the case would suggest different reactions. As fox rabies occurs regularly in Labrador, a new case needs to be followed up to provide assistance in the prediction of how widespread the new outbreak might be, in the advisories to the public on affected areas and to support any research activities. However no attempts at eradication are possible in Labrador due to its connection to the rest of northern Canada which would also likely be infected at the same time.

In a case of terrestrial rabies found on the Island of Newfoundland, follow-up and tracing is critical as it could be the first identified case in a new incursion of the disease as in 1988 and 2002. It can never be assumed that a first diagnosed case is necessarily the first case on the island. If the ultimate source was an infected animal crossing on the ice from Labrador, the first animal may bite a local fox and then die, unnoticed by anyone. We may find this second fox or a subsequent one, or a dog or other domestic animal bitten by a rabid fox unwitnessed by anyone. Support will likely be required from wildlife biologists, COs, trappers, hunters, municipal councils, police and others in the area.

E. Collection and Analysis of Data

Data would include the characterization of the event, describing the animals involved, and the spatial and temporal distribution. This is the function of the Zoonotic Diseases Consultant (AHD), to assure that samples are properly collected, identified, packaged, shipped and submitted. Once analyzed, a database is maintained that includes geolocation. If GIS expertise is required it will either be provided within FLR or externally.

F. Implementation of Control and Prevention Measures

Depending upon the location of the case(s) and the ability to control and/or eradicate it, the appropriate measures will be taken. Normally this starts with existing divisional funding but may require additional funds as the scope of the program becomes more apparent. This would involve public education, domestic animal vaccination, determination of the extent of infection and the options available for further control measures (wildlife baiting, trapping, etc.).

G. Documentation and Reporting

Routine internal documentation would occur for the purpose of a summary report but also for possible financial auditing. Normally all media requests would be dealt with by the CVO, in cooperation with the Communications Division. Spokespeople may also exist for the other disciplines if involved (wildlife, public health).

All purchasing and expenditures would go through the Program Manager (AHD) and follow normal financial practices unless exemption was provided due to an emergency. A final report and scientific publication would be appropriate depending upon the circumstances.

9. Rabies Prevention

A. Animal Vaccination and Control

The health care of domestic animals is primarily the responsibility of the animal owner. Animal owners must ensure that their pets are vaccinated and the vaccines provided should have duration of immunity lasting approximately 3 years [31]. The provincial government provides free or subsidized vaccinations for dogs and cats in Labrador. In communities that have access to private veterinarians (currently Happy-Valley Goose Bay and Labrador West), the provincial government subsidizes rabies vaccination at $10 per animal. In communities with no access to private veterinarians, the vaccination is provided by provincial staff, Innu Band Council, or NG field staff. The provincial government also financially and logistically and supports the Chinook Project (Atlantic Veterinary College) that provides veterinary support to Labrador communities without veterinary access in June/July of each year.

Municipalities must ensure that stray animals are controlled and do not roam freely in their community. In regions where rabies is endemic, or is a growing concern, animal control may be used to reduce the at-risk population. Stray animals can be removed from the community by either municipal animal control officers, provincial officials, or the RCMP/RNC. These animals may be confined for at least 3 days to determine if human exposure has occurred, and to give the owner a chance to claim their animal.

B. Vaccination of Humans

Humans whose occupations put them at risk for exposure to the rabies virus are recommended to receive pre-exposure prophylaxis. These populations could include veterinarians, rabies laboratory workers, public health professionals, animal handlers (e.g. municipal animal control, veterinary clinic employees, wildlife biologists, graduate students), enforcement personnel (COs, RCMP), and international travelers who are visiting countries where rabies is prevalent. As an occupational risk, it is the employer's responsibility to cover the cost of immunization. DHCS will provide the rabies immunization to government employees in high risk areas (refer to Figure 8) who are likely to come in contact with rabies during their service (e.g. AHD employees, COs, wildlife biologists). The rabies vaccine, HDCV, is given in 3 doses on days 0, 7, 21 or 28, and should be verified by a titre check to ensure protection for at risk populations [55]. People at continued risk should check their antibody level via titre at least every 2 years, and those who work in a laboratory with live rabies virus should check their titre every 6 months. A booster should be given if the result is lower than 0.5 IU/ml [6].

10. Rabies Surveillance

Rabies is a federally (*Health of Animals Act*) and provincially reportable disease in both humans (*CDA*) and animals (*AHPA*). If any human, domestic, or wildlife animal is suspected of being infected with rabies, timely reporting to local authorities (RMOH and CVO) is essential. Upon verification of a positive diagnosis in wildlife, the CFIA is advised of the status and the specimen is sent to OLF-CFIA for confirmatory testing. Surveillance and variant typing are of great importance in order to recognize the potential threat to public health. Variant typing is used to describe the epidemiology and emerging trends of the rabies virus, which is necessary to determine the effectiveness of current prevention programs, to recognize the need for new programs, and to guide officials in making PEP decisions. Information on animals submitted for rabies surveillance testing should include the species submitted, the location, vaccination history, rabies virus variant (in positive specimens), and potential human and animal exposures [31].

11. Public Education

Talks can be given to any interested groups as required. PowerPoint presentations are available for this purpose through the AHD.

Printed materials are available in the form of pamphlets (Figure 11) and a children's book "*Uapikun Learns About Rabies*" (Figure 12) available in English, Innu-aimun (Sheshatshiu and Mushuau dialects), Inuttitut and French. Educational posters are also available based on the Uapikun books (Figure 13).

Figure 12: Rabies pamphlets provided by Government of Newfoundland and Labrador Forestry and Agrifoods Agency

Figure 13: *Uapikun Learns About Rabies* children's book (English, Innu-aimun, Inuttitut and French)

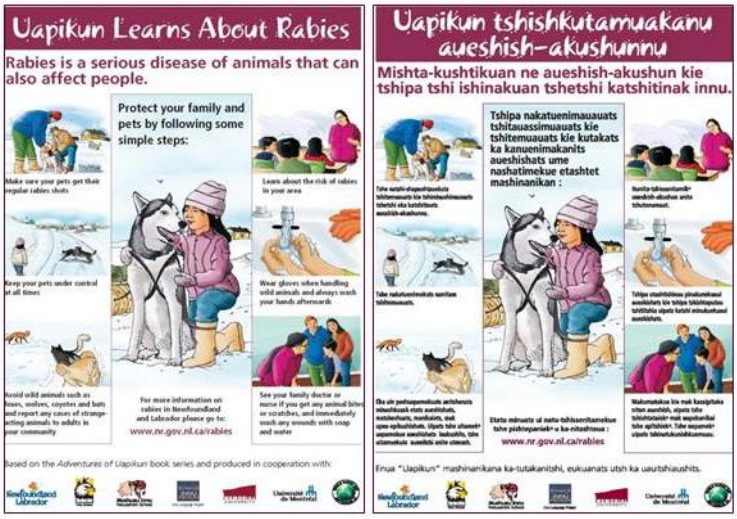

Figure 14: *Uapikun Learns About Rabies* poster (English and Innu-aimun).

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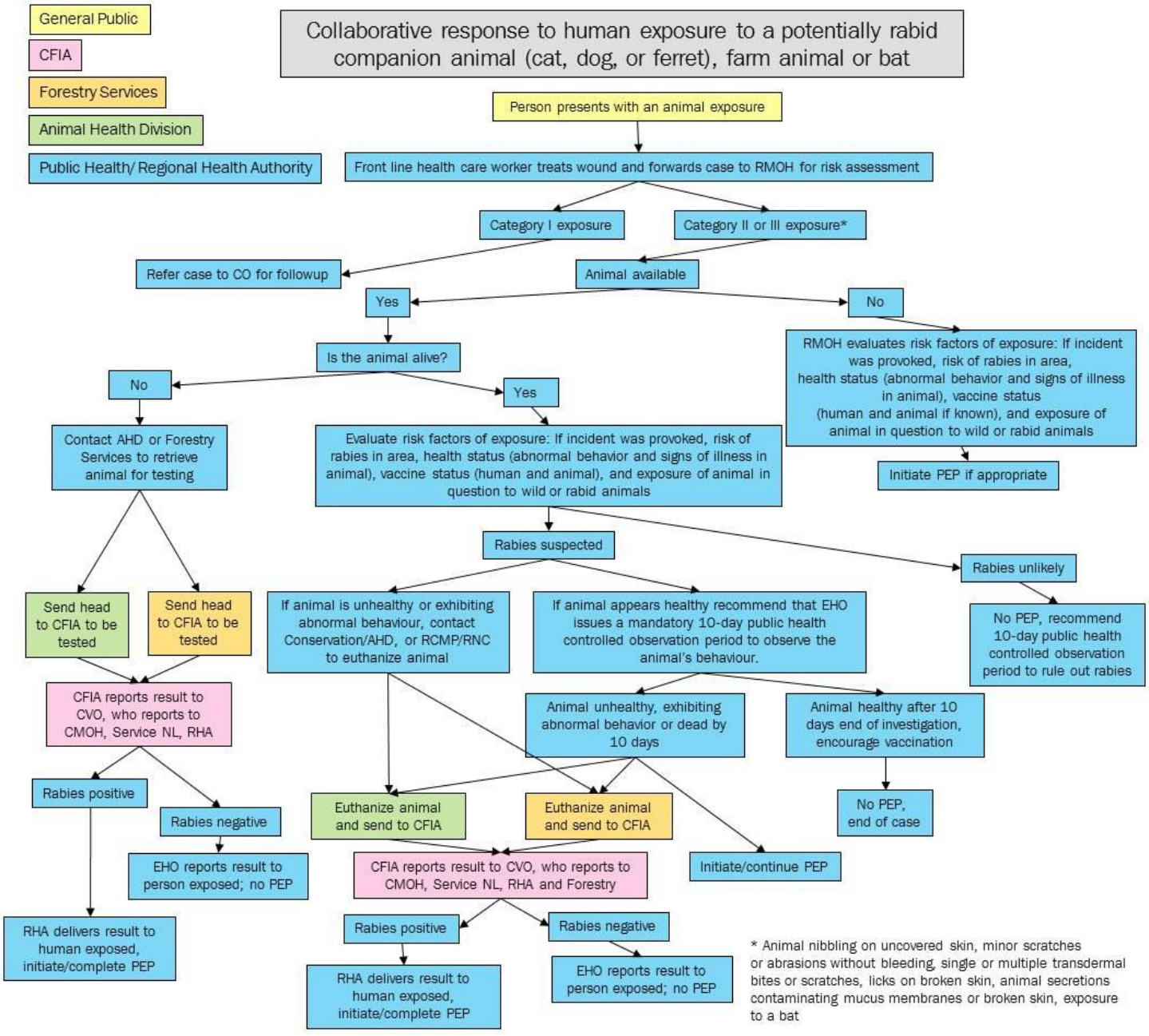
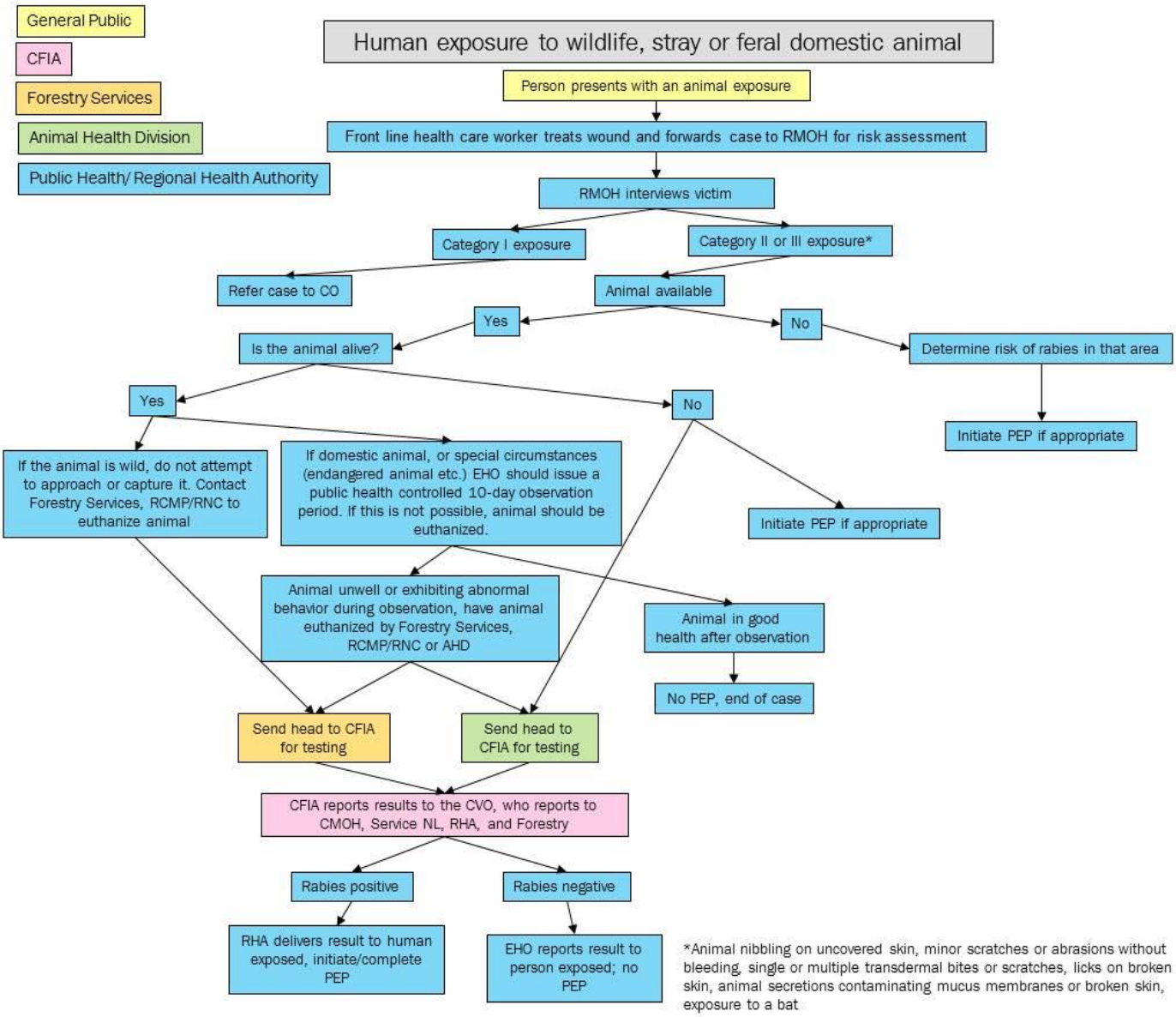
Appendix #1: Decision Trees

1) Human Exposure to Companion or Farm Animal

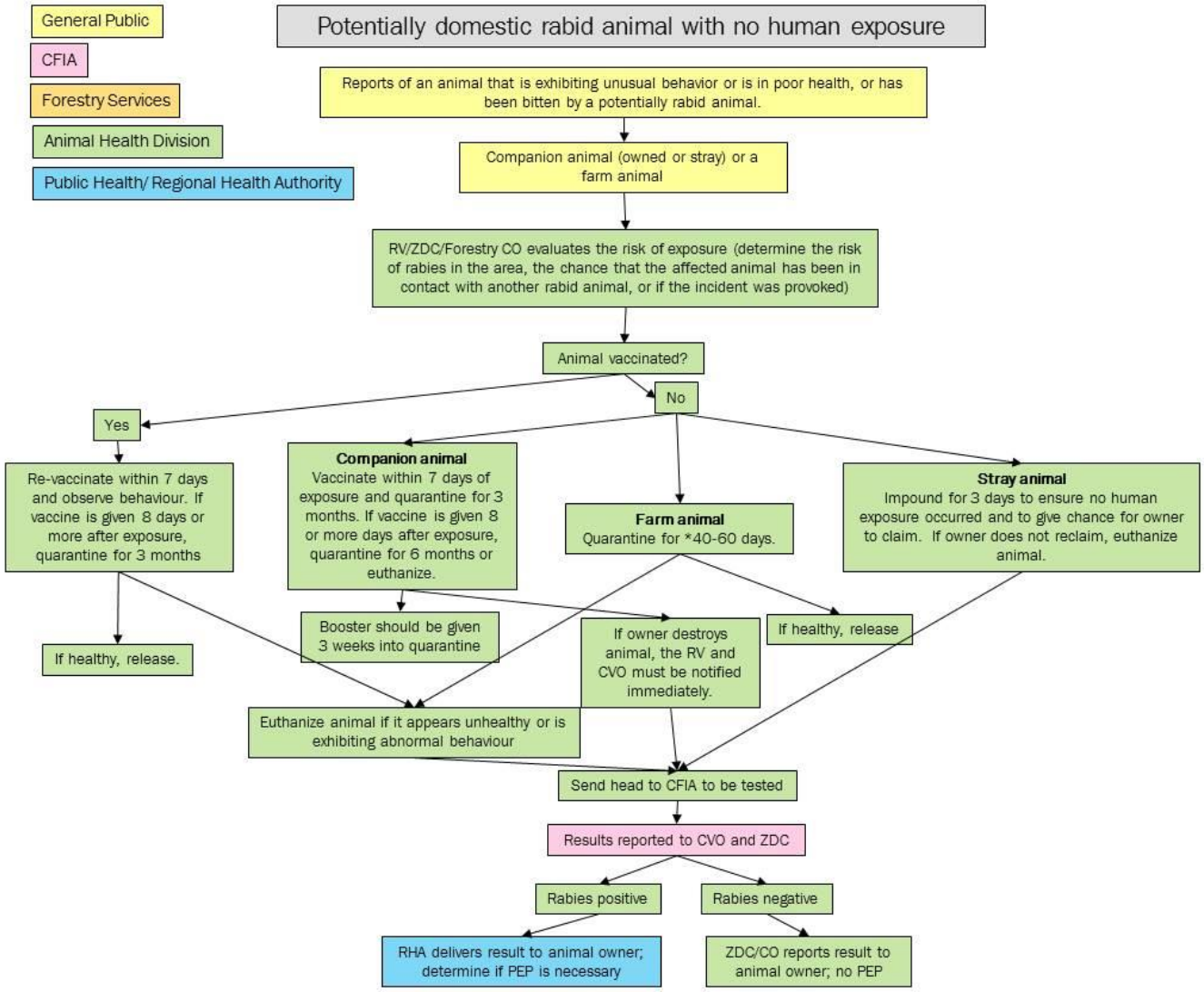


2) Human Exposure to Wildlife, Stray or Feral Domestic Animal



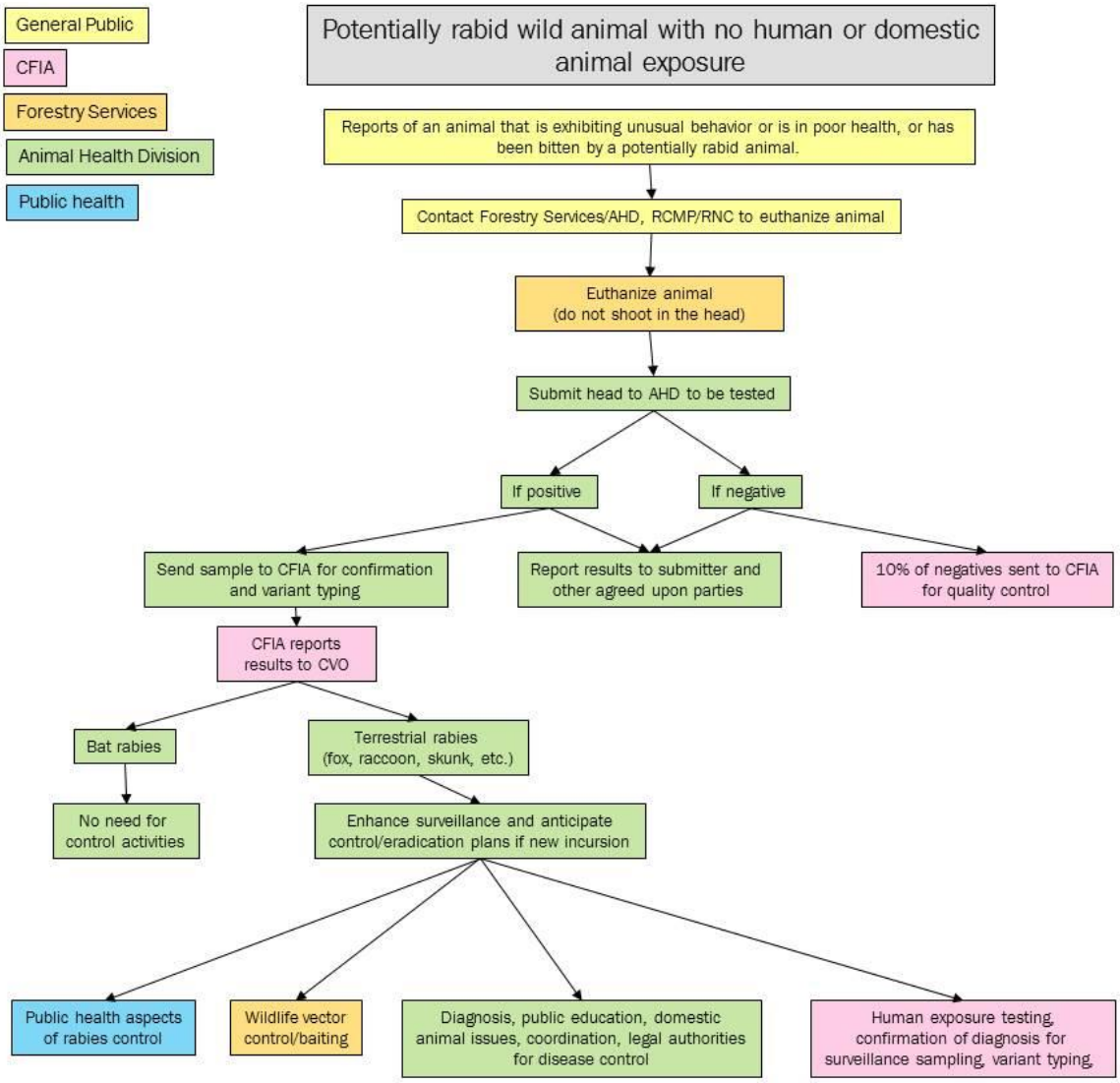
Note: Small rodents (squirrels, chipmunks, rats, mice, hamsters, guinea pigs, gerbils rabbits, hares) are not considered reservoirs for the rabies virus. Contact RMOH to make decision about whether or not to initiate PEP

3) Potentially Rabid Companion or Farm Animal Without Human Exposure



*Duration determined by nature of index case: If index case was membrane of the herd, 40 day quarantine is required. If index case was an animal that attacked the herd, then 60 day quarantine is required.

4) Potentially Rabid Wild Animal without Human Exposure



Appendix #2: Rabies Investigation and Referral Form

Newfoundland Labrador

Rabies Investigation and Referral Form

Government of Newfoundland and Labrador
Department of Health and Community Services
P.O. Box 8700
1st Floor, West Block Confederation Building
100 Prince Phillip Drive, St. John's, NL, A1B 4J6
www.gov.nl.ca/health/

Under the authority of the *Animal Health and Protection Act* and *Communicable Disease Act*, personal information may be collected for the purpose of surveillance and testing. This information is kept confidential and handled as required by the *Access to Information and Protection of Privacy (ATIPP) Act*. It may be shared within the Government of Newfoundland and Labrador and with involved parties for program delivery purposes only. Any questions or comments related to collection or use of this information please contact the Animal Health Division at 709.729.6879.

Part A: Referral - To be completed by front line health care professional

1. Referral Request

☐ Emergency department or Medical clinic	Location:	Date:
☐ Public health office	Location:	Date:
☐ Other:	Location:	Date:

2. Biting Incident Information

Name of exposed patient:	Date of birth:	Sex:
Address:	City:	Postal code:
Home phone:	Work phone:	
MCP:	Occupation:	
Parent/Guardian name:		Exposure date:
Patient weight (lb):	Exact location of incident:	
Was the incident provoked?		
Short description of the incident:		
Physician's name:	Location:	Phone:

3. Wound Information

Location of wound:		
Description of wound:		
Treatment:		
Given by:	Date:	
Is tetanus immunization up to date?	If yes, date of the last vaccination:	
	If no, was tetanus given?	
Date tetanus was given:	Dose:	Lot Number:
Was the patient previously vaccinated for rabies?		
If yes, date of previous rabies vaccination or titre check:		

4. Animal Information

Name:	Species:	Breed:
Sex:	Age:	Colour:
Tattoo:	Microchip:	
Other ID:	Animal origin location:	
Reason for complaint: ☐ Human exposure ☐ Signs of illness ☐ Other:		
Is the animal alive?	Can the animal be found?	
Has the animal had any access to the wild or contact with a wild animal?		
Date of contact:	Has the animal been vaccinated for rabies?	
Last vaccination date:	Name of vaccine:	
Name of vaccinating veterinarian:	Clinic:	
Are there any other animals in the house?	Are they up to date on their rabies vaccine?	

5. Animal Owner Information

Name:	Address:	
City:	Province:	Postal code:
Home phone:	Work phone:	Cell phone:

6. Contact Information		
During business hours contact local Environmental Health Manager or Communicable Disease Control Nurse		
Labrador Grenfell Health: (Happy-Valley Goose Bay) 897.3110 (St. Anthony) 454-0375		
Western Health: 637.5000 ext. 5419 or 637.5417		
Central Health: (Gander) 651.6234 (Grand Falls-Windsor) 692.8881		
Eastern Health: 229.1576 or 752.3918		
After business hours contact Medical Officer of Health		
1.866.270.7437		
Part B: Public Health Assessment & Recommendations- To be completed in consultation with the RMOH		
6. Post-Exposure Prophylaxis		
***Rabies vaccine is released only on authority of Regional MOH or MOH on call*		
Exposure category: ☐ Category I	☐ Category II	☐ Category III
HDCV required?	Dosage:	Lot #:
RIG required?	Dosage:	Lot #:
Referral to public health nurse for continuation of PEP?		
7. Investigation Follow-up? ☐ Y ☐ N		
If yes, see below for specific recommendations: ☐ Public health controlled 10-day observation period? ☐ Other (please specify):		
Additional comments:		
Section completed by:	Date:	
Part C: Investigation - to be completed by enforcement officer (EHO/CO/RCMP/RNC or designate) *Note: Please verify any missing information from Part A as well as verifying the details of the biting incident with both the exposed patient and the animal owner. ***This section to be completed on the recommendation of the RMOH*		
8. Animal Observation Information		
Observation by: ☐ EHO ☐ CO ☐ Other:	Date of referral:	
Date observation period started:	Date observation period will end:	
Description of animal behaviour prior to incident:		
Condition of the animal at the end of the observation period:		
Additional comments:		
9. Rabies Suspected? ☐ Y ☐ N **(If rabies is suspected, report to RMOH and CVO)**		
10. Animal Submitted for Testing? ☐ Y ☐ N		
Date:	CFIA reference number:	Results:
11. Supplementary Information		
This form should be forwarded to the RMOH involved and CVO upon completion.		

Note: All events involving bats should be treated as high risk.
Category I: touching or feeding animals, licks on intact skin, contact of intact skin with secretions or excretions of a rabid animal or human. These are not regarded as exposures, and no post-exposure prophylaxis is required.
Category II: nibbling of uncovered skin, minor scratches or abrasions without bleeding. Vaccine should be injected as soon as possible.
Category III: single or multiple transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva from licks and exposure to bats. Vaccine and rabies immunoglobulin should be administered at distant sites as soon as possible.
RMOH: Regional Medial Officer of Health; CVO: Chief Veterinary Officer; EHO: Environmental Health Officer; CO: Conservation Officer; RCMP: Royal Canadian Mounted Police; RNC: Royal Newfoundland Constabulary

Appendix #3: Sample: Animal Observation Letter

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Health and Community Service

[Name of Animal Owner]
[Address of Animal Owner]

Dear [Name],

It has been reported that your [species of animal] was involved in a biting/scratching incident on the [date]. You are asked to keep this animal under household observation until [date of release] to ensure that your animal has not passed rabies virus to the victim.

Please ensure the following during this period:

- Keep your pet separated from other animals and people, including family members.
- Feed and provide water for your pet as normal during this time.
- Use a leash when walking your pet on your outdoor property.
- Refrain from allowing your animal to roam free outside.
- Notify me **immediately** if your pet begins to show any of the following signs:
  - Change in animal's usual behaviour or any signs of illness
  - Biting indiscriminately (e.g. its limbs or other objects)
  - Weakness or paralysis of hind limbs
  - Drooping jaw and/or neck
  - Abnormal facial expressions
  - Hiding away or depressed
  - Increase in drool or saliva

You will be contacted at the end of this observation period to ensure that your animal is healthy. If deemed healthy, the animal may be released from observation at that time.

Thank you for your cooperation in this regard.
Yours truly,

_____

[Name of Investigator]
[Phone number]
cc. [MOH or designate]
cc. [CVO or designate]

P. O. Box 8700, St. John's, NL, Canada A1B 4J6 t 1.866.270.3430
website: www.gov.nl.ca/health

Appendix #4: Sample: Animal Release Letter

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Health and Community Service

[Name of Animal Owner]
[Address of Animal Owner]

Dear [Name],

It has been reported that your [species of animal] was involved in a biting/scratching incident on the [date]. As your animal was found to be healthy at the end of the observation period there was no risk that rabies virus was passed to the victim. Therefore, your animal is officially released from its home observation.

In spite of this release, please consider the following recommendations:

- Ensure your pet is vaccinated.
- Never allow your pet to roam free. Keep it indoors, caged, penned, or on a leash.
- If your animal tends to bite people or other animals, seek advice from a veterinarian.
- Never approach or feed wild or stray animals.
- Report any unusual animals to the Department of Natural Resources or Conservation

Thank you for your cooperation during this observation period.

Yours truly,

_____
[Name of Investigator]
[Phone number]
cc. [MOH or designate]
cc. [CVO or designate]

P. O. Box 8700, St. John's, NL, Canada A1B 4J6 t 1.866.270.3430
website: www.gov.nl.ca/health

Appendix #5: Rabies Information for Animal Observation

Newfoundland Labrador

Government of Newfoundland and Labrador
Department of Health and Community Service

1. What is Rabies?
Rabies is a deadly disease of animals which can also affect people. It is caused by a virus that can be passed in the saliva of an infected animal. The virus can infect another animal or a person when the infected saliva enters a bite, scratch, or a mucous membrane such as the eyes, mouth, or nose. The virus then slowly travels to the brain of the infected animal or person, at which point it will cause changes in their behaviour.

2. Why do I need to keep my pet under observation?
Your animal is being observed as a result of a biting or scratching incident. An animal infected with rabies can pass the virus as much as ten days before showing rabies symptoms. If your pet shows symptoms of rabies within ten days of the incident, then there may be a chance that the rabies virus was passed in its saliva.

3. How do I look after my pet during the observation period?
Your pet must be kept indoors, in a caged pen, or on a leash during the observation period. It may not be taken on walks beyond your property. It must be kept separated from people and other pets. Please feed and provide water for your pet as normal during this time.

4. Is my family at risk by keeping our pet in the house?
There is no risk of getting rabies if you keep your pet confined and separated from you and your family.

5. Can I keep my pet around other animals?
No. Your pet must be kept apart from animals and people during the ten day observation period. One exception is in the case of pets with unweaned young, which may continue to be fed by their mother.

6. Can I sell or give away my pet, or have my pet 'put to sleep'?
No. You must have permission from the investigator to have your pet destroyed, sold, given away, or otherwise disposed of during the observation period.

7. What should I do if my pet starts to act strangely?
Please notify the investigator **immediately** (see phone number below) if your pet begins to show any of the following signs:

- Change in the animal's usual behaviour or any signs of illness
- Biting indiscriminately (e.g. its limbs or other objects)
- Paralysis or weakness of hind limbs
- Drooping jaw and/or neck
- Abnormal facial expressions
- Hiding away or depressed
- Increase in drool or saliva

8. Is it too late to get the rabies shot for my pet?
If your pet is healthy after the observation period, and has not had its rabies shots, **we strongly recommend** that you arrange for your pet to have its shots.

P. O. Box 8700, St. John's, NL, Canada A1B 4J6 t 1.866.270.3430
website: www.gov.nl.ca/health

Government of Newfoundland and Labrador
Department of Health and Community Service

9. Do any of my family members need to get rabies shots?
If your pet is healthy after the 10-day observation period, you do not need to worry about getting rabies shots. If your pet is found to have rabies, the Medical Officer of Health will decide on the course of action to avoid the risk of rabies to you and your family.

10. How can I keep this from happening again?

- Ensure that your pets have their rabies shots up to date.
- Keep your pets under control indoors, or on a leash when outdoors.
- If your pet tends to bite or scratch people, talk to a veterinarian about their behaviour.
- Keep away from, and refrain from feeding, any stray pets and wild animals.
- If you see any animals acting strangely, please report to public health officials or wildlife conservation officers.

Contact Information:
Investigator:
Name: _____
Telephone #: _____

Appendix #6: Sample Rabies Negative Result Letter

Government of Newfoundland and Labrador
Forestry and Agrifoods Agency

[Name of Animal Owner]
[Address of Animal Owner]

Dear [Name],

The [species of animal] that was submitted on your behalf for rabies testing has come back negative. The [species of animal] was tested on [date] at the [OLF-CFIA or AHD] Laboratory in [location].

Please understand that rabies is a deadly disease of animals which can also affect people. It is with the upmost concern that the Government of Newfoundland and Labrador manages rabies as a critical public health risk. We apologize for any inconvenience that this may have caused.

Thank you for your cooperation during this time.

Yours truly,

_____
[Name of Investigator]
[Phone Number]
Office of the Chief Veterinary Officer

cc. [MOH or designate]
cc. [CVO or designate]

Appendix #7: Animal Exposure Investigation Form

Newfoundland Labrador

Rabies Animal Exposure Investigation

Government of Newfoundland and Labrador
Forestry and Agrifoods Agency
Animal Health Division
P.O. Box 7400, St. John's, NL, A1E 3Y5 (Mail)
308 Brookfield Road, St. John's, NL, A1E 6J5 (Courier)
Email: ocvo@gov.nl.ca
Phone: 709.729.6897
Fax: 709.729.0055
http://www.faa.gov.nl.ca/agrifoods/animals/health/rabies.html

Under the authority of the *Animal Health and Protection Act* and *Communicable Disease Act,* personal information may be collected for the purpose of surveillance and testing. This information is kept confidential and handled as required by the *Access to Information and Protection of Privacy (ATIPP) Act.* It may be shared within the Government of Newfoundland and Labrador and with involved parties for program delivery purposes only. Any questions or comments related to collection or use of this information please contact the Animal Health Division at 709.729.6879.

1. Incident Information		
Owner's name:	Address:	
City:	Province:	Postal code:
Home phone:	Work phone:	
Exposure date:	How many animals exposed?	
Exposure category: ☐ Category I **Please see following page for details*	☐ Category II	☐ Category III
Short description of the incident:		
Description of wound:		

2. Exposed Animal Information		
Name:	Species:	Age:
Breed:	Sex:	Colour:
Tattoo:	Microchip:	
Other ID:		
Reason for complaint: ☐ Human exposure ☐ Signs of illness ☐ Interaction with wildlife		
Other (please specify):		

3. Animal Vaccination Status		
Vaccination status of animal in question: ** Vaccination status must be confirmed*	☐ Unvaccinated ☐ Fully vaccinated	☐ Primary vaccinated ☐ Not known
Are there any other household pets?	Are they current on vaccinations/been given a booster?	
Is exposing animal known to be vaccinated?	Is follow up required?	
If yes, describe:		
Follow-up completed by:	Date:	

4. Exposing Animal Information		
Exposing animal's name:	Age:	Sex:
Species:	Breed:	
Owner's name:	Address:	
City:	Province:	Postal code:
Home phone:	Work phone:	
Animal Origin:		
Can the exposing animal be found/alive?		
Would the exposing animal have had contact with wild animals?		
If yes, date of contact:		
Specimen submitted for testing?	Date submitted:	Test results:

AHD lab number:	CFIA reference number:
5. Animal Quarantine Mandated? ☐ Y ☐ N	
6. Animal Quarantine Information	
Quarantine issued by:	Date of referral:
Date quarantine started:	Date quarantine will end:
Description of animal prior to the incident:	
Condition of animal at the end of quarantine:	
7. Rabies Suspected? ☐ Y ☐ N **(If rabies is suspected, report to the CVO)**	
Information completed by:	Date:
8. Supplementary Information and Comments	

Note: All events involving bats should be treated as high risk.
Category I: touching or feeding animals, licks on intact skin, contact of intact skin with secretions or excretions of a rabid animal or human. These are not regarded as exposures, and no post-exposure prophylaxis is required.
Category II: nibbling of uncovered skin, minor scratches or abrasions without bleeding. Vaccine should be injected as soon as possible.
Category III: single or multiple transdermal bites or scratches, licks on broken skin, contamination of mucous membrane with saliva from licks and exposure to bats. Vaccine and rabies immunoglobulin should be administered at distant sites as soon as possible.

****For dogs and cats:**
Fully vaccinated animal: An animal having documented proof issued by a licensed veterinarian of receiving an initial rabies vaccination and revaccination boosters at the manufacturer's recommended interval(s). This definition could also apply to livestock species – horses, cattle and sheep. An example would be a dog vaccinated as a puppy at 12 weeks of age, followed by a booster at one year of age, and subsequent revaccination according to the manufacturer's vaccine schedule, e.g. every one, two or three years.

Primary vaccinated animal: An animal having documented proof issued by a licensed veterinarian of receiving an initial rabies vaccination in accordance with the manufacturer's guidelines, at least 14 days prior to rabies exposure, and not yet having received a booster to this initial vaccination according to the manufacturer's recommendations. This definition could also apply to horses, cattle and sheep. An example would be a two-year-old dog vaccinated three months ago for the first time, exposed to rabies one month ago, and not yet having received an annual booster to this initial vaccination as per the manufacturer's recommendations.

Unvaccinated animal: An animal without documented proof of receiving an initial rabies vaccination at least 14 days prior to rabies exposure, **OR** an animal whose documented records show that revaccination did not occur in the manufacturer's recommended time-frame, **OR** an animal whose vaccination status relies on a vaccination performed within the 14 days prior to exposure. An example would be a six-year-old dog which was fully vaccinated with a one-year vaccine until four years of age, but which has not received the indicated annual rabies booster since then.

Note: Primary and fully vaccinated animals are considered currently vaccinated. Currently vaccinated animals that receive a booster within 7 days of exposure do not require quarantine.

Appendix #8: *Newfoundland and Labrador Immunization Manual* (Section 5.5)

5.5 Rabies Immunization Program

Background

Rabies is a viral disease that can infect all mammals. Disease, once established, will result in death.

Rabies has been reported in wildlife from almost all regions in Canada, but the Island portion of Newfoundland has normally been considered free of terrestrial rabies. Bat rabies can potentially be anywhere that bats are found. Cases of rabies in foxes, wolves and dogs are seen on a cyclic basis in Labrador, and occasionally on the Island of Newfoundland if the virus crosses on the ice or otherwise, as in 1988 and 2002 (Northwestern areas of the island).

The Department of Health and Community Services has a role in the investigation of possible rabies incidents when there may be human contact. The public health nurse is very often the first person notified if an incident occurs within a community. When a report is made, it is essential to obtain as much detail on the incident as possible, as this will determine the action taken, especially in situations of human involvement.

Please refer to product monograph for specific content of commonly used vaccine closures.

For information on rabies reporting and investigation please see the *Newfoundland and Labrador Disease Control Manual.*

Post-Exposure Management of Rabies

Once an investigation has been completed, in consultation with the MOH, and definite or suspected exposure determined, the following should be initiated as soon as possible post-exposure.

Both **Human Diploid Cell Vaccine (HDCV)** and **Rabies Immune Globulin (RIG)** are used to treat persons who have been bitten (Category III) or had other skin breaks (Category II) associated with animals that may be rabid.

The combination of passive **(RIG)** and active **(HDCV)** immunization is considered to be highly effective in preventing rabies in exposed individuals. Post-exposure immunization must be considered in every instance of an animal bite, unless it is known that rabies is absent within that population of animals. It is essential that decisions around post-exposure management be made fairly rapidly, since delays in initiating treatment can compromise effectiveness.

The most important treatment is immediate and thorough washing and flushing of the bite or other skin break with soap and water.

A number of factors must be considered for each individual case, and the *Canadian Immunization Guide* provides treatment protocols and guidelines for various situations, such as the procedure for post-exposure management of a previously immunized person, treatment for a bite from a domestic vs. wild animal, etc.

It must be noted that in any situation where **RIG** is to be given, the following must be taken into consideration in consultation with the MOH and attending physician:

1) **Amount of RIG administered**. The recommended dose is 20 IU/kg bodyweight. Excessive dosages can interfere with active antibody production.
2) **Time frame within which HDCV and RIG are given**. Rabies Immune Globulin given more than eight days following vaccine administration is of no protective value.
3) **Method of administration**. **RIG** and **HDCV** must **never** be given at the same site, or delivered through the same syringe and needle.

For information on dosages please see product monograph and the *Canadian Immunization Guide.*

Policy on Use of Rabies Vaccine and Rabies Immune Globulin

Policy:

Rabies Vaccine (Human Diploid Cell Vaccine or HDCV) is used in the pre-exposure immunization for rabies. HDCV and Rabies Immune Globulin (RIG) are to be used in the post-exposure management of rabies, according to recommended schedules in the *Canadian Immunization Guide (2012).*

http://www.phac-aspc.gc.ca/publicat/cig-gci/p04-rabi-rage-eng.php

Rabies Vaccine and Rabies Immune Globulin are emergency supply products and are to be ordered as such. Release of these products is to be authorized by the Medical Officer of Health.

Passive Immunization with Rabies Immune Globulin

Product Used:

16.5% solution of gamma globulin fraction of human venous plasma containing rabies antibodies.

Indicated For:

Passive immunization against rabies, post-exposure.

Related Information and Dosage:

- *Canadian Immunization Guide*
- Newfoundland and Labrador *Control of Communicable Diseases Manual*
- Product monograph

Appearance and Availability:

Clear, colourless liquid that is thick and viscous. Requires large bore needle for injection (19G). Available in 2.0 ml vials.

For dosage see product monograph.

Screening Questions:

Has the person ever demonstrated any adverse reaction to any immune globulins?

Yes: Consult with MOH/designate. Immunoglobulin **must** be given in a controlled setting.

Has the person received the measles, mumps, rubella and varicella vaccine (MMR-Var) within the previous 14 days?

Yes: Consult with MOH/Designate. Immunization may need to be repeated.

Is there an MMR-Var scheduled?

Yes: **Review schedule**. Advise the vaccinee that the effectiveness of a live vaccine can be compromised if it is given within the immediate four months following administration of RIG.

Note: This product should only be administered to those who have not been vaccinated for rabies prior to the incident, or who do not have a detectable level of antibodies to fight infection.

Immunization with Rabies Human Diploid Cell Vaccine

Product Used:

Vaccine product that contains rabies virus grown in human diploid cell culture, and subsequently inactivated. This is **not** a live viral vaccine.

Indicated For:

Pre-exposure immunization against rabies for regularly exposed workers as noted, and as a component of post -exposure treatment.

Related Information:

- *Canadian Immunization Guide*
- Newfoundland and Labrador *Control Of Communicable Diseases Manual*
- Product insert or monograph

Screening Questions:

Is the person immunocompromised (e.g. lymphoma, leukemia, HIV, AIDS, generalized malignancy, antimetabolite therapy, radiation or corticosteroid therapy)?

Yes: **Give Rabies HDCV.** This is not a live vaccine, and may be given in these persons if they are having no contraindications, see product monograph. Due to immunosuppression the response may be suboptimal.

Is the person pregnant?

Yes: **Defer Rabies HDCV** until after pregnancy, unless there is a risk of exposure during the pregnancy.

For dose see product monograph.

Appendix #9: Supplies Required for Sampling and Transportation of Dangerous Goods (TDG) Shipping

Prior to sampling:

Any individual qualified to obtain a suspect rabies sample from the field must have obtained a complete set of rabies vaccinations prior to sampling. In order to be considered "vaccinated", a sufficient titre level must be verified following the third and final booster. In the case of an outbreak, all employees within the affected geographic area that could be potentially exposed to a rabies suspect should have their titres checked every 2 years. This activity should be recorded and monitored in a database.

It is essential to ensure that the animal has been humanely euthanized prior to sampling. This is to ensure the safety of all people who will handle the shipment, while maintaining the integrity of the sample. Further training may be required.

Equipment and supplies required for sampling:

- Face shield.
- Chain mail mesh glove
- Tight-fitting latex gloves
- Disarticulation tool (e.g. saw, axe, very sharp butchers knife)
- Disinfectant (Virkon: should be prepared to the recommended strength detailed in the Virkon kit and tested with the Virkon paper.)
- Coveralls and/or splash apron
- Boots
- Eye protection
- Absorbent material (e.g. newspaper)
- 95kPa TDG bag
- Laminated instructions on head disarticulation detailing safety precautions and disarticulation technique.

Prior to shipping:

The shipper must have valid TDG IATA certificate for class 6.2.

Supplies necessary to ship a package according to TDG requirements:

- Wildlife Submission form or Sample Submission Form for the Animal Health Laboratory to signify that the sample is suspected of carrying rabies virus.
- Labeled UN3373 coolers (available in a variety of sizes).
- A rigid fibreboard box is required to go outside the cooler.
- Rigid ice packs (frozen prior to packaging).

Appendix 10: Animal Head Removal Instructions

The procedure for animal head removal is taken directly from the Virginia Department of Health head removal document [56]:

Step 1

a. Lay animal on its back and extend the head by pushing top of nose toward ground or bend neck back over edge of table.

b. Locate the larynx. Immediately behind the larynx (see example that follows), using a sharp knife, make an incision through the skin and continue cutting down through the trachea and esophagus to the backbone.

c. If you have cut in the correct place, you can identify the membrane covering the spinal cord between the first vertebrae (atlas) and the skull (occipital bone). The joint made by these two bones can be visualized and palpated as the animal's head is flexed and extended.

d. Disarticulate the atlanto-occipital joint. It is possible to dissect the ligaments connecting this joint, but probably easier and faster to hyperextend the head and manually tear the ligaments. You will hear and feel a snap when this is accomplished.

e. After disarticulation of the atlanto-occipital joint, the remaining muscle and skin can be cut with a knife to completely free the head from the body.

Step 2

Some individuals may prefer to cut through the vertebra instead of disarticulating the joint. After cutting down to the backbone, use shears or a hacksaw to cut through the first vertebra. If the sample is a large domestic animal or wildlife species, a portion of the spinal cord or brainstem should be included in the sample.

The location of disarticulation is exhibited in Figures 1 and 2. The correct location to make an incision in this case can be seen in Figure 2.

Additional videos detailing animal head removal can be found at:

- https://youtu.be/UQYgy9Kf78c
- https://youtu.be/lBlfsXJOKyw
- https://youtu.be/C8W9QytpK3Y

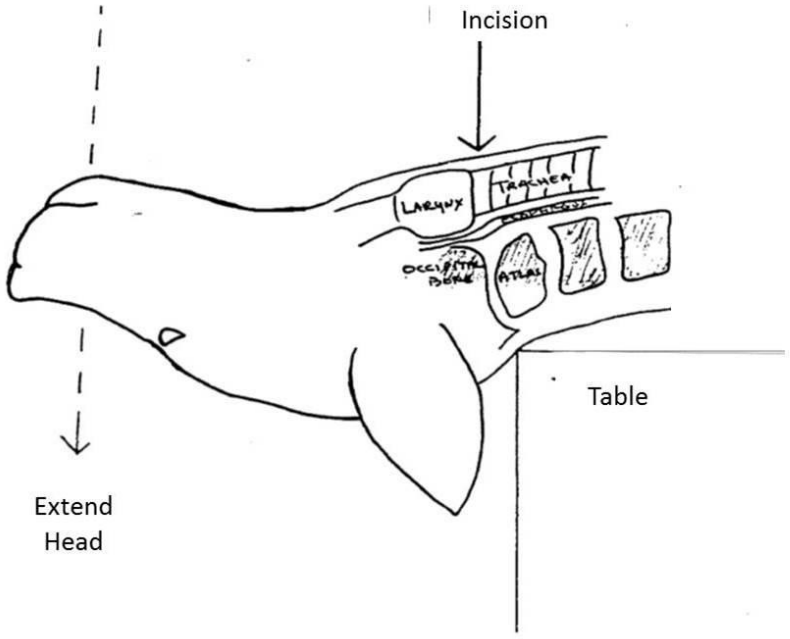


Figure 1: Location of disarticulation for animal head removal NOT including the spinal cord [56].

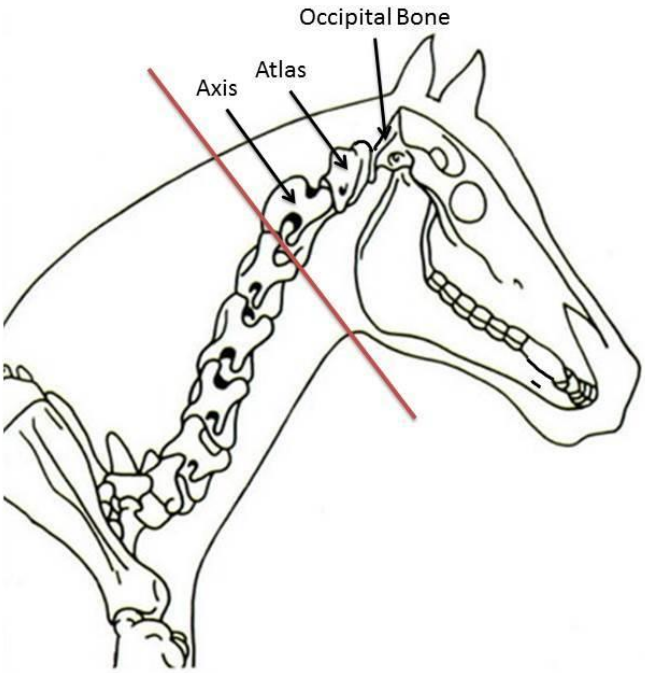
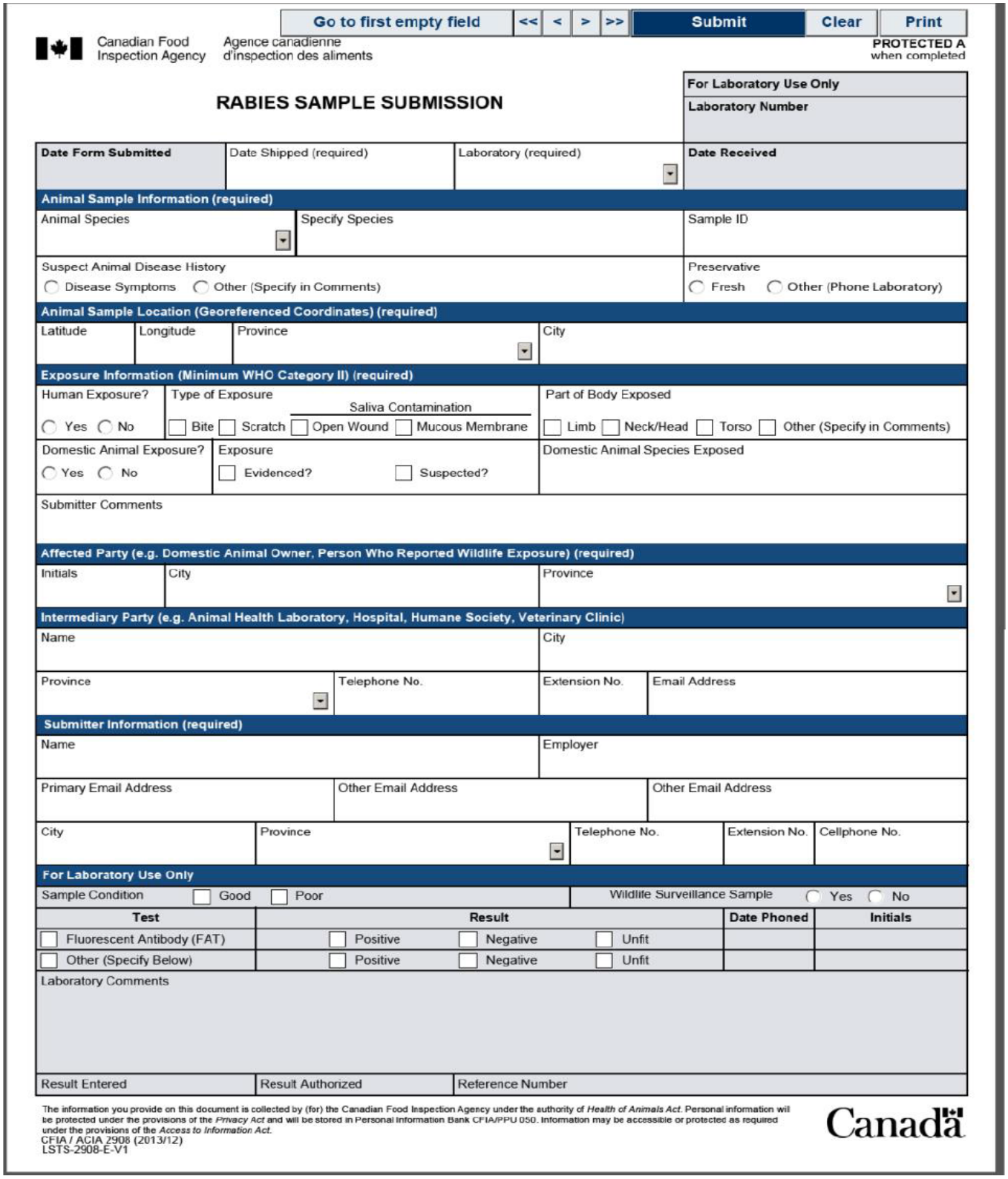


Figure 2: Location of disarticulation for animal head removal including the spinal cord [57].

Appendix 11: CFIA Rabies Sample Submission Form

NOTE: This form is to be filled out online. Instructions are provided (www.inspection.gc.ca/DAM/DAM-aboutcfia-sujetacia/STAGING/text-texte/c2908V1_re_1396296694437_eng.pdf).



Go to first empty field | << | < | > | >> | Submit | Clear | Print

Canadian Food Inspection Agency / Agence canadienne d'inspection des aliments

PROTECTED A when completed

RABIES SAMPLE SUBMISSION

For Laboratory Use Only
Laboratory Number

Date Form Submitted	Date Shipped (required)	Laboratory (required)	Date Received

Animal Sample Information (required)

Animal Species	Specify Species	Sample ID

Suspect Animal Disease History: ○ Disease Symptoms ○ Other (Specify in Comments)

Preservative: ○ Fresh ○ Other (Phone Laboratory)

Animal Sample Location (Georeferenced Coordinates) (required)

Latitude	Longitude	Province	City

Exposure Information (Minimum WHO Category II) (required)

Human Exposure? ○ Yes ○ No

Type of Exposure: Saliva Contamination — ☐ Bite ☐ Scratch ☐ Open Wound ☐ Mucous Membrane

Part of Body Exposed: ☐ Limb ☐ Neck/Head ☐ Torso ☐ Other (Specify in Comments)

Domestic Animal Exposure? ○ Yes ○ No

Exposure: ☐ Evidenced? ☐ Suspected?

Domestic Animal Species Exposed

Submitter Comments

Affected Party (e.g. Domestic Animal Owner, Person Who Reported Wildlife Exposure) (required)

Initials	City	Province

Intermediary Party (e.g. Animal Health Laboratory, Hospital, Humane Society, Veterinary Clinic)

Name	City		
Province	Telephone No.	Extension No.	Email Address

Submitter Information (required)

Name	Employer	
Primary Email Address	Other Email Address	Other Email Address

City	Province	Telephone No.	Extension No.	Cellphone No.

For Laboratory Use Only

Sample Condition ☐ Good ☐ Poor

Wildlife Surveillance Sample ○ Yes ○ No

Test	Result	Date Phoned	Initials
☐ Fluorescent Antibody (FAT)	☐ Positive ☐ Negative ☐ Unfit		
☐ Other (Specify Below)	☐ Positive ☐ Negative ☐ Unfit		

Laboratory Comments

Result Entered	Result Authorized	Reference Number

The information you provide on this document is collected by (for) the Canadian Food Inspection Agency under the authority of *Health of Animals Act*. Personal information will be protected under the provisions of the *Privacy Act* and will be stored in Personal Information Bank CFIA/PPU 050. Information may be accessible or protected as required under the provisions of the *Access to Information Act*.

CFIA / ACIA 2908 (2013/12)
LSTS-2908-E-V1

Canada

Appendix #12: CFIA Shipping Fact Sheets

Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

Our vision:
To excel as a science-based regulator, trusted and respected by Canadians and the international community.

Our mission:
Dedicated to safeguarding food, animals and plants, which enhances the health and well-being of Canada's people, environment and economy.

Key Learning Points

- Regulations for Transport of Rabies Suspect Samples
- Selection of Appropriate Samples
- Packaging
- Labeling

Index:

Material Necessary for Testing	2
Sample Preparation	2
Temperature Conditions	2
Packaging Materials	3
Labels	3
Leaking or Damaged Parcels	3
Checklist for Packaging	4

RABIES TESTING AT THE CFIA: PACKAGING OF SAMPLES

CANADIAN FEDERAL LEGISLATION

The *Transportation of Dangerous Goods Act* and *Regulations* are administered by Transport Canada. Information on shipping infectious substances can be found in the Transportation of Dangerous Goods (TDG) Bulletin May 2013: http://www.tc.gc.ca/media/documents/tdg-eng/RDIMS-8210418-SHIPPING_INFECTIOUS_SUBSTANCES_-_TDG_BULLETIN_FINAL.pdf

It is the responsibility of the submitter to comply with all applicable federal, provincial and territorial legislation related to shipping dangerous goods.

GENERAL COMMENTS

This document is not meant to replace a proper training program for TDG. It is for reference purposes only for the submission of rabies samples. Please inquire directly with couriers for information on their specific terms and conditions related to shipping dangerous goods:

Fedex
http://images.fedex.com/ca_english/shippingguide/preparepackage/pdf/UN3373_CDN_ENG.pdf (accessed Jan 2014)

Purolator
http://www.purolator.com/assets/pdf/legal/terms_conditions2_en.pdf (accessed Jan 2014)

SELECTION OF MATERIAL TO SUBMIT FOR TESTING

For most animals:
⇒ submit the entire head.
⇒ include cervical spinal cord if the skull has been damaged, e.g., shot in the head

For small animals (<500 g):
⇒ submit the entire carcass to aid species identification (e.g., bats).

For large animals (>100 kg) and all livestock:
⇒ submit the entire brain and portion of cervical spinal cord;
⇒ If entire brain can not be submitted, collect portions of brain tissue bilaterally from the cerebellum, hippocampus and brain stem.

Canada

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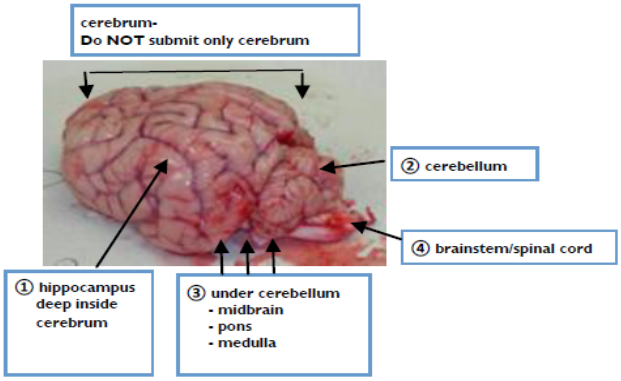
MATERIAL NECESSARY FOR TESTING

SUBMISSION OF THE ENTIRE BRAIN IS REQUIRED TO MAXIMIZE DIAGNOSTIC SENSITIVITY.



SAMPLE PREPARATION

DO:

- Ensure that animals are dead before packaging
- Spray with insecticide, if infested with ticks or fleas
- Remove maggots
- Remove any needles or darts
- Make level cuts during disarticulation
- Leave the head intact and do not remove skin, ears, or snout
- Note quills, jagged bone fragments, possible bullets or shot on the submission form in "Submitter Comments"
- Remove excess bags, or ones that are opaque, before packaging
- Use absorbent material, such as newsprint, between primary and secondary package, and as cushioning in the outer container
- Use rigid ice packs
- Ship sample as soon as possible after collection

DON'T:

- Submit whole bodies of skunks
- Wrap brain with absorbent material or place into whirl-pak bags
- Use gel sachets as absorbent material
- Use wet ice, frozen water bottles, soft gel packs or dry ice for cooling sample
- Use Styrofoam or other granular packing material

TEMPERATURE CONDITIONS

THERE IS NO NEED TO FREEZE SAMPLES PRIOR TO SHIPMENT.

To ensure timely results, samples submitted should be refrigerated, and not frozen. Samples received frozen must be completely thawed before testing can begin, which can delay results by a day or more.

USE ICE PACKS TO KEEP THE SAMPLE COOL DURING SHIPPING ACCORDING TO OUTDOOR TEMPERATURE:

Winter (<5°C): **DO NOT** use ice packs

Fall/Spring (5-30°C): **USE** ice packs

Summer (>30°C): **USE** additional ice packs

Canada

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PACKAGING MATERIALS

◯ PRIMARY PACKAGE

⇒ Consists of 2 plastic bags

OR

⇒ 1 plastic container and 1 plastic bag

⇒ Choose size appropriate for sample

⇒ Clear

⇒ For open end bag, knot tightly to make leak-proof

⇒ For bag with zipper closure, fold over and seal with moisture-resistant tape

⇒ Plastic container must be leak-proof

◯ UNIQUE SAMPLE IDENTIFIER

⇒ Durable, adhesive label, printed with indelible ink

OR

⇒ Commercially-purchased identification tags

◯ SECONDARY PACKAGE

⇒ Single plastic bag,

OR

⇒ For air transport, must be pressure compliant to 95 kPa (disposable single bag OR disposal 2 part bag OR reusable vessel)

◯ OUTER SHIPPING CONTAINER

⇒ Sturdy fiberboard box

⇒ One surface must be 100mm x 100mm

⇒ For air transport must satisfy PI 650, 1.2 m drop test

◯ RABIES SAMPLE SUBMISSION FORM AND CLEAR PLASTIC BAG

◯ ADDRESS LABEL/S– Shipper and Recipient

◯ LABEL WITH PROPER SHIPPING NAME "BIOLOGICAL SUBSTANCE, CATEGORY B" OR "EXEMPT ANIMAL SPECIMEN"

◯ HAZARD MARK, UN3373 DIAMOND-ON-POINT LABEL, IF APPLICABLE

◯ RIGID ICE PACKS

◯ ABSORBENT MATERIAL SUCH AS NEWSPAPER

EXAMPLE OF ADDRESS LABEL - FOR BOTH SHIPPER AND RECIPIENT ADDRESS USE MINIMUM16 POINT FONT, BOLDFACE TYPE, INCLUDE TELEPHONE NUMBERS

YOUR COMPLETE NAME YOUR EMPLOYER YOUR STREET ADDRESS CITY, PROVINCE POSTAL CODE YOUR PHONE NUMBER	R-UNIT, OTTAWA LABORATORY FALLOWFIELD CANADIAN FOOD INSPECTION AGENCY 3851 FALLOWFIELD ROAD OTTAWA, ON K2J 4S1 (343) 212-0340 **OR** R-UNIT, LETHBRIDGE LABORATORY CANADIAN FOOD INSPECTION AGENCY TOWNSHIP ROAD 9-1 LETHBRIDGE, AB T1J 3Z4 (403) 382-5559

LEAKING OR DAMAGED PARCELS

When a parcel is received damaged or leaking, potentially resulting in the accidental release of the sample from the packaging, CFIA internal policy is to notify our management, and the consigner (the submitter).

Note, that the carrier may also notify the provincial authority (usually police) and Canutec 613-966-6666.

Ensure that the sample is packaged according all relevant Transportation of Dangerous Goods Regulations for the safety of all involved in the shipping and receiving process.

THE SHIPPER IS SOLELY RESPONSIBLE FOR PROPERLY PACKAGING THE SAMPLE.

Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

CHECKLIST for Packaging

IT IS THE RESPONSIBILITY OF THE SUBMITTER TO FOLLOW ALL APPLICABLE TRANSPORT CANADA REGULATIONS AND GUIDELINES.

Keep sample in refrigerator prior to packaging. Freezing should be avoided as it may delay testing. If the sample is already frozen, ship it without ice packs.

★ Each sample must have its OWN unique sample identification number and Rabies Sample Submission form.

- ◯ Unique sample identifier
- ◯ Rabies Sample Submission form
- ◯ Labels
- ◯ Outer shipping container
- ◯ Absorbent material
- ◯ Rigid ice packs
- ◯ Clear plastic bags
- ◯ Moisture resistant tape

① ____ Place head into first bag and tie; if possible, use two knots OR use a zipper bag, fold over and seal with tape to make leak-proof. Extracted brain or bats should ideally be placed into a screw-cap leak-proof container.
② ____ Place first bag or container into plastic bag and tie; if possible, use two knots OR use zipper bag, fold over and seal with tape to make leak-proof. This completes the **PRIMARY PACKAGE**.
③ ____ Attach **UNIQUE SAMPLE IDENTIFIER** to the primary package.
④ ____ Wrap the primary package with **ABSORBENT MATERIAL**.
⑤ ____ Place into **SECONDARY PACKAGE**: single bag, or for air transport, a 95 kPa pressure capable system .
⑥ ____ Fill out **RABIES SAMPLE SUBMISSION** form online and submit electronically. Print the completed form, place into a plastic bag and secure to secondary package with tape.
⑦ ____ Place absorbent paper into **OUTER SHIPPING CONTAINER** to cushion sample. If shipping by air, box must be 1.2 m drop test compliant.
⑧ ____ Place sufficient **RIGID ICE PACKS** so that sample remains cold/ cool for at least 48 hours. Do not use ice packs during winter months (<5°C) or if the animal head is frozen.
⑨ ____ Place secondary package inside box and add additional cushioning material.
⑩ ____ Seal box securely.
⑪ ____ Apply **LABELS** to box: Submitter's name, address and phone number; CFIA lab name, address and phone number.
⑫ ____ In boldface type, label with proper shipping name: "**BIOLOGICAL SUBSTANCE, CATEGORY B**" OR "EXEMPT ANIMAL SPECIMEN".
⑬ ____ For Category B samples, affix **UN3373 diamond-on-point hazard mark** label.
⑭ ____ For Category B samples, affix label with 24-hour emergency contact phone number.

For further information, contact:

R-Unit, Ottawa Laboratory Fallowfield
Canadian Food Inspection Agency
3851 Fallowfield Road
Ottawa ON K2J 4S1

Mon-Fri 8 am-4 pm ET

Phone: 343-212-0340
Fax: 343-212-0202
E-mail: OLF_Rabies-LOF_Rage @inspection.gc.ca

R-Unit, Lethbridge Laboratory
Canadian Food Inspection Agency
Township Road 9-1
Lethbridge AB T1J 3Z4

Mon-Fri 7 am-3 pm MT

Phone: 403-382-5559
Fax: 403-382-5562
E-mail: LethbridgeRabiesLab @inspection.gc.ca

We're on the Web
www.inspection.gc.ca

Appendix #13: Wildlife Rabies Surveillance Form

Newfoundland Labrador

Wildlife
Rabies Surveillance

Government of Newfoundland & Labrador
Department of Natural Resources
Animal Health Division
Animal Health Laboratory
P.O. Box 7400, St. John's, NL, A1E 3Y5 (Mail)
308 Brookfield Road, St.John's, NL, A1E 6J5 (Courier)
t 729.6897 t 729.0388 f 729.5825

Attention!

All rabies testing of wildlife that have been involved in the exposure of domestic animals or humans to rabies is under the authority of the CFIA as per the Health of Animals Act and is not permitted as a part of provincial/academic surveillance programs. The CFIA must be contacted for direction whenever there is an exposure of a domestic animal or human to wildlife suspected of being rabid.

District CFIA Veterinarian: Tel: 709.772.4714 Cell: 709.687.9012 Or CFIA Animal Health Office Tel: 709.772.8344, 709.772.5641

Submitter:	Date Collected:		Species:
Sample ID:	Age:	Sex: ☐ Male ☐ Female	Specimen:
Location:			☐ Lat/Long ☐ UTM ☐ Landmark
Cause of Death: ☐ Killed ☐ Found Dead		Submitter TDG No.:	

History

Lab number

Internal Laboratory Use Only

No. of Samples:	Condition:
Received by:	Storage Location: ◯ Sp. Proj. Freezer FZ2 ◯ PMB Freezer

Test Results

Sample ID	Neg	Pos	Comments
	☐	◯	
	☐	◯	
	☐	◯	
	☐	◯	
	☐	◯	
	☐	◯	
	☐	◯	
	☐	◯	
	☐	◯	
	☐	◯	

All positive samples are to be sent to the CFIA rabies laboratory in Ottawa (Fallowfield) for confirmation. This test is for screening purposes, confirmation is required for final results.

Quality Assurance

Controls	Lot Number	Validated	Tested by:		Tested on:	
Positive		◯				
Negative		◯	Checked by:		Checked on:	

Laboratory Comments

Authorization:		Date:	

ID: R5102-17 Revised: Jan 26, 2012 Approved by: L. Rogers

Appendix #14: Wildlife Specimen Submission Form

CANADIAN COOPERATIVE WILDLIFE HEALTH CENTRE
ATLANTIC REGION
Department of Pathology and Microbiology
Atlantic Veterinary College
University of Prince Edward Island
550 University Avenue
Charlottetown, PE, C1A 4P3
Telephone: (902) 628-4314 / FAX: (902) 566-0851
Web: atlantic.ccwhc.ca Email: atlantic@ccwhc.ca

LAB USE ONLY

Necropsy #: _____

Incident #: _____

Date Received: _____

Weight: _____ AIV Sample ☐

WILDLIFE SPECIMEN SUBMISSION FORM

FINDER -and- SUBMITTER INFORMATION

FINDER'S NAME: _____

Street Address: _____ Postal Code: _____

Town: _____ Telephone #: _____

Email Address: _____

SUBMITTER'S NAME (if different from above): _____

Organization Name: _____

Mailing Address: _____ Postal Code: _____

Telephone #: _____ Fax #: _____

Email Address: _____

SPECIMEN INFORMATION

Species: _____ # Submitted: _____ (Separate form for each species, please)

Specimen Identification # (if any): _____

Sex: ☐ Male ☐ Female ☐ Unknown Age: _____

Date When Specimen Was Found: _____

Location Where Specimen Was Found (Include as much detail as possible, please): _____

_____

(If possible include Latitude: Longitude: -OR- UTM coordinates:)

HISTORY

Found Dead: Yes ☐ No ☐

If found alive, what was the date of death? _____

Held in Captivity: No ☐ Yes ☐ If yes, how long? _____

If specimen found alive, what was the method of killing/euthanasia?:

Additional Observations (Use back of page if necessary and give special consideration to things such as abnormal behaviour, potential for poisoning, proximity to roads or powerlines, etc.):

***PLEASE NOTE**: Submission of this form signifies permission for the retention and use of the personal information contained herein for the purposes of correspondence, follow up investigation, reporting of results and geographic analysis of incidents.*

Appendix #15: Examples of Rabies Scenarios and How to Proceed

Scenario #1

A dog on the Island of Newfoundland presents with hind leg paralysis and bites his owner on their way to the vet. Its condition could be explained by a degenerative disk problem; however the dog has not been vaccinated for rabies. The dog also spends most of its time inside, only leaving the house to relieve itself, suggesting minimal contact with animals. Because the Island of Newfoundland is not designated as a high risk area when it comes to rabies, this scenario may cause confusion when determining an exposure category, particularly when considering the possibility of the dog having received exposure to a bat. Nevertheless, it is important to remain cautious when submitting a sample to CFIA for testing. The dog was euthanized and submitted to the CFIA for testing. The end result was negative for rabies.

Scenario #2

A puppy in the U. S. (Massachusetts) developed neurological symptoms at 14-weeks of age and its health condition quickly deteriorated. The puppy was put to sleep and tested positive for rabies. Upon further investigation it was found that the puppy came from a private vendor who caged the mother and her litter outside. It was also reported that there may have been a skunk in the kennel with the positive puppy, one other puppy and the mother. The positive puppy had visited 3 different animal hospitals upon presentation of symptoms. The dogs were placed under strict quarantine and everyone who had contact with the puppy from birth had to be contacted and offered PEP [58]. This situation could easy happen in the province; however the exposing animal would likely be a fox. It is important to house breeding puppies inside until they are fully vaccinated against rabies.

Scenario #3

A man from an area in the U. S. where rabies is endemic was out for his daily jog when he stopped to pet a neighbour's family dog. The dog was tied on to a fence and bit the man on the hand. The man is unaware of the dogs' vaccination status or what exactly the protocol is for these types of situations [59]. If an incident similar to this arises, please advise that it is important to seek medical attention if the wound is serious. If there was a small bite or laceration, the first step is to contact the local public health authority to initiate an investigation into the vaccination status of the dog. If an investigation is to take place, the RMOH and the CVO must be notified.

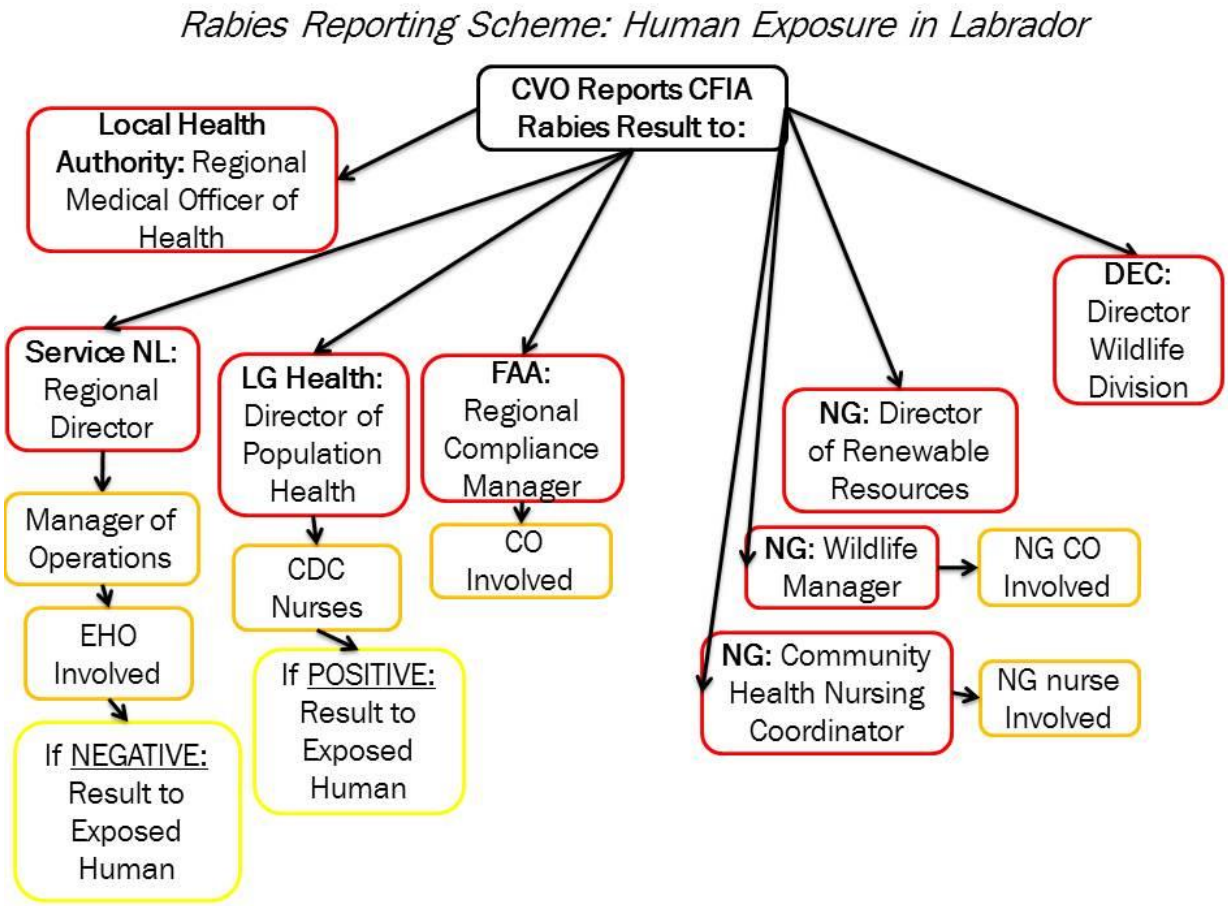
Scenario #4

A man in Labrador finds a dead wolf frozen in the snow outside of town. He takes it home to skin it and finds that the wolf has bitten off and swallowed its own tail. The finding of a dead wolf can be suspicious in itself, but the fact that it bit off and swallowed its own tail makes it even more so. In this case the wolf was positive for rabies and the man received post-exposure treatment as he had placed his bare hands inside the wolf's mouth while also handling a sharp knife.

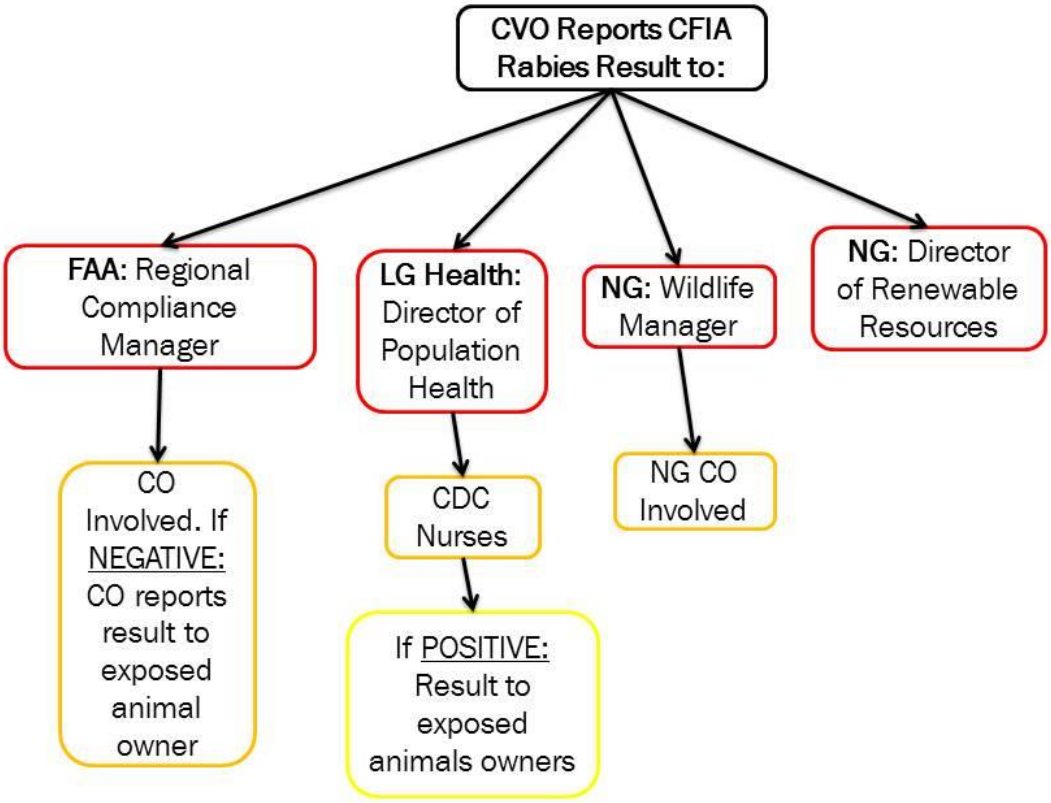
Scenario #5

A young child in Labrador is bitten on the face by a local dog. The dog is acting normally and the potential for a provoked attack is considered. The dog is put under quarantine for 10 days and the child's wound is washed. After 7 days the dog's behaviour changes dramatically and it is euthanized on day 8. The child is immediately given post exposure treatment. The dog was diagnosed with rabies.

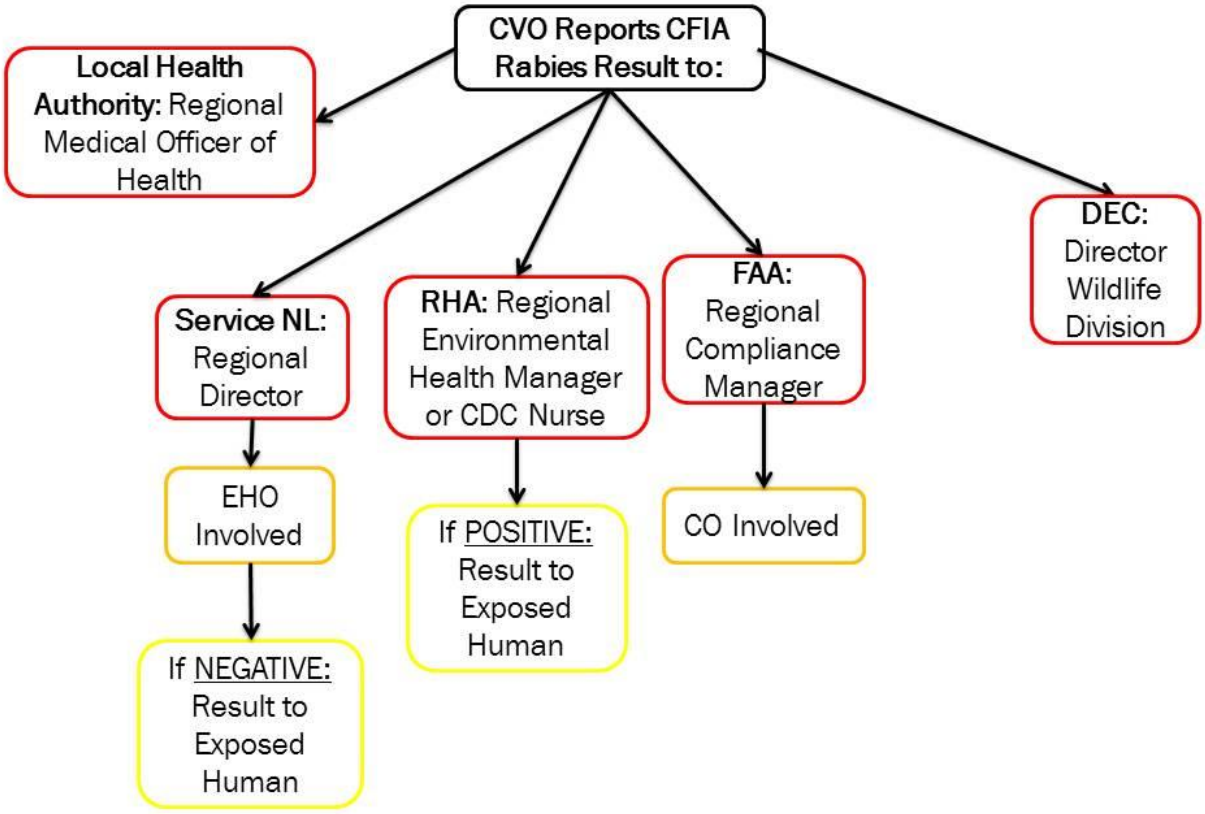
Appendix #16: Rabies Result Reporting Scheme



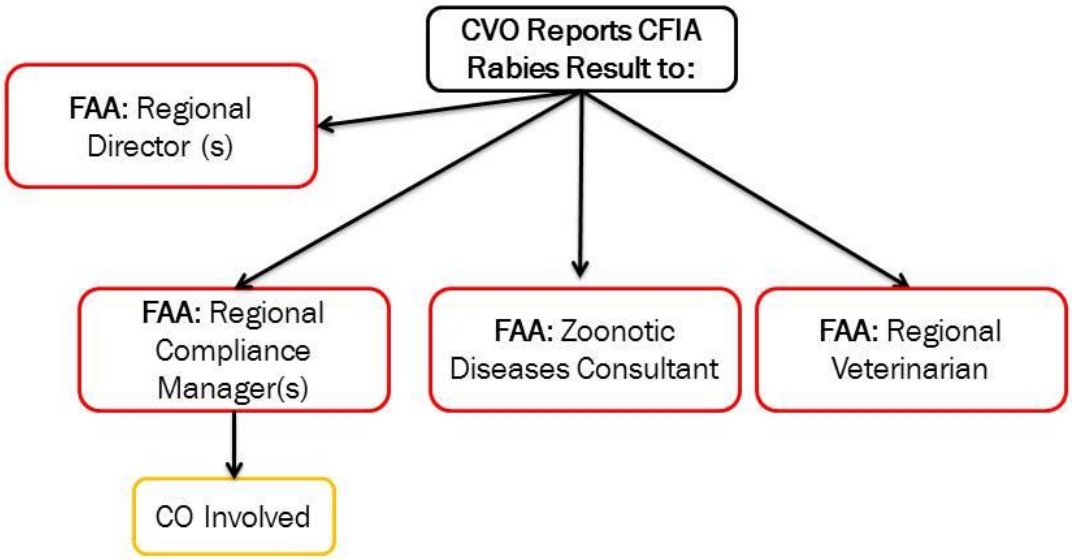
Rabies Reporting Scheme: Animal Exposure in Labrador



Rabies Reporting Scheme: Human Exposure in Newfoundland



Rabies Reporting Scheme: Animal Exposure in Newfoundland



Appendix #17: Title and Contact Information

Title	Name	Email
Chief Medical Officer of Health	Claudia Sarbu	claudiasarbu@gov.nl.ca 1.866.270.7437
Medical Officer of Health	Delphine Grynszpan	Delphine.grynszpan@easternhealth.ca
Medical Officer of Health		
Chief Veterinary Officer	Laura Rogers	laurarogers@gov.nl.ca 1.709.729.6879
Environmental Health Manager (Western Health)	Brian Moores	brianmoores@westernhealth.ca
Environmental Health Manager (Eastern Health)	Chris Nolan	chris.nolan@easternhealth.ca 709.229.1576
Clinical Nurse Manager Public Health (LG Health)	Diane Oliver-Sclaes	Diane.scales@lghealth.ca 709.897-2308
CDC Nurses (Central Health)	Hayley Cooze	709.651.6238
CDC Nurses (LG Health)	Cora Foster	709.897.3110
Service NL – Manager of Operations (HVGB)	Ken Russell	krussell@gov.nl.ca
Service NL - Manager of Operations (Western NL)	Jeff Pickett	jeffpickett@gov.nl.ca
FLR: Regional Compliance Manager (Western NL)	Maureen Ivany	maureenivany@gov.nl.ca
NG: Director of Renewable Resources	Todd Broomfield	todd_broomfield@nunatsiavut.com
NG: Wildlife Manager	Jim Goudie	jim_goudie@nunatsiavut.com
NG: Community Health Nursing Coordinator	Tina Buckle	tina_buckle@nunatsiavut.com