

Alaska Rabies Prevention and Control Manual

Prepared by the Alaska Section of Epidemiology

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I. Overview of Rabies Virus

The virus

Rabies virus is an RNA virus classified in the *Rhabdoviridae* family. There are variants of the rabies virus that are adapted to their reservoir species but can be transmitted to other species, e.g., fox variant detected in a dog. Molecular analyses are needed to identify virus variants.

Susceptible animals

Rabies virus can cause acute encephalitis in all warm-blooded hosts, including pets, livestock, wildlife and humans, and the outcome is almost always fatal. Although all species of mammals are susceptible to rabies virus infection, only a few species are important as reservoirs for the disease. In the United States, several distinct rabies virus variants have been identified in terrestrial mammals, including raccoons, skunks, and foxes. In addition, several species of bats are also reservoirs for rabies.

Routes of transmission

Rabies virus can be transmitted when the saliva or neural (brain and nerve) tissue of an infected animal comes into contact with an open wound or mucous membrane of another animal. This is usually from a bite, defined as penetration of the skin by the teeth. Nonbite exposures may also occur, defined as contamination of an open wound, abrasion, mucous membrane, or scratch with saliva or other potentially infectious material (such as neural tissue) from an infected animal. Contact of intact skin with blood, urine, or feces from an infected animal does not constitute an exposure. Rare cases have occurred from organ transplantation or occupational exposures in the laboratory.

Incubation period

The incubation period (time from exposure to virus until development of symptoms) can vary but is generally 3-8 weeks. Since the virus grows along peripheral nerves to the central nervous system (CNS), the distance from the bite to CNS and the innervation at the area of the bite are some of the factors that can influence the length of the incubation period.

Infectious period

The infectious period is the length of time that a rabid animal can potentially shed virus and infect another animal. In general, this period can start from a few days before clinical signs are evident until the animal dies. The time frame for dogs/cats is a maximum of 10 days, which is why there is a 10-day observation period following a bite to a human. If the dog/cat is still alive and not showing signs of illness after 10 days, the animal was not infectious (shedding virus) at the time of the bite. The period of viral shedding for wildlife may vary, which is the reason why there is no standard observation time for wildlife that bite humans.

Virus stability

Rabies virus is not a particularly hardy virus and is inactivated once dried. Freezing will not kill the virus, although repeated freeze-thaw cycles will eventually degrade the virus. Items, such as knives, that are contaminated with secretions from rabid animals can be disinfected with a dilute bleach solution. Properly cured pelts from rabid animals are not considered infectious.

For more information on the natural history of rabies virus, visit the United States Centers for Disease Control and Prevention Rabies website: <https://www.cdc.gov/rabies/>.

II. Alaska Rabies Statistics

Human cases

Historically, there are three reported human rabies cases associated with exposures in Alaska. In February 1914, a sled dog attacked a man in Candle. In January 1942, a man was mauled by a wolf 10 miles east of Noorvik. In 1943, a boy was mauled by a wolf near Wainwright. With effective reporting, testing, and delivery of rabies post-exposure prophylaxis, the Alaska Division of Public Health strives to minimize the likelihood that Alaska will report additional human rabies cases.

Animal cases

Data on rabies testing in Alaska comes from the Alaska State Virology Laboratory in Fairbanks where rabies testing has been conducted for 50+ years. Select specimens are also sent to the US Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, where specialized testing is performed. Wildlife reservoirs for rabies in Alaska are red and arctic foxes. Additionally, there have been five bats from southeastern Alaska confirmed to have rabies: two little brown bats (1993, 2015) and three Keen's myotis (2006, two in 2014). More detailed information is available in a 2016 Epidemiology *Bulletin* available at: http://www.epi.alaska.gov/bulletins/docs/b2016_09.pdf

Following are two tables that describe some of the results from ASVL. It is important to note that the specimens collected were not collected as part of a systematic survey but represent a convenience sample of animals that were submitted for a variety of reasons, e.g., they were involved in an altercation with a human or were displaying aberrant behavior.

Table 1. Types of animals EVER confirmed to have rabies in Alaska since 1971.

Animal	Year of most recent positive
Arctic fox	2017
Caribou	1982
Cat ¹	1976
Coyote ²	2018
Dog	2018
Keen's myotis bat ³	2014
Little brown bat ³	2015
Red fox	2018
Reindeer	1982
River otter	2000
Wolf	2016
Wolverine ³	2012

¹Only two of all the cats ever tested have been positive, including one imported case from the 1960s.

²Only one of all these types of animals ever tested have been positive.

³Some testing performed by dRIT, see page 9.

Many other types of animals have been tested for rabies in Alaska from shrews to bears. It is unlikely that a small rodent would develop rabies if exposed to a rabid fox mainly because smaller animals do not usually survive the initial attack by one of the larger carnivores.

Table 2. Boroughs and census areas EVER confirmed to have rabies in Alaska since 1971.¹

Borough or Census Area	Year of most recent positive
Aleutians East	2000
Bethel	2018
Bristol Bay	1998
Dillingham	2009
Ketchikan ²	1993
Lake and Peninsula	2018
Nome	2017
Northwest Arctic	2013
North Slope	2017
Prince of Wales Island ²	2014
Kusilvak (Wade Hampton)	2018
Yukon Koyukuk	2013

¹Data from testing performed at the Alaska State Virology Laboratory (ASVL).

²The rabid animals in these regions were bats; see http://www.epi.alaska.gov/bulletins/docs/b2016_09.pdf. No cases of terrestrial mammal rabies have been confirmed in this region. Note that the bats from Wrangell and Haines Borough referred to in the 2016 *Bulletin* were not tested at ASVL.

Rabies is enzootic (always present at a certain level) among the fox populations in northern and western coastal Alaska. Epizootics (outbreaks among animals) occur every few years and follow the population cycles of the rodent populations upon which the fox feed. Because patterns of rabies transmission are dependent on wildlife populations, future changes to the ecology or populations may directly or indirectly affect regions of the State generally considered to be enzootic. Ongoing surveillance is therefore critical to rapidly document any changes that may occur. In 2013, a wolf from the Chandalar Lakes region (just south of the Brooks Range) was submitted for rabies testing. The wolf exhibited abnormal behavior and had lunged toward a trapper who shot the animal. Rabies was confirmed at ASVL; this was the first confirmation of rabies south of the Brooks Range since the 1940s (c.f. Williams 1949). The finding prompted an expansion of the zone of Lay Vaccinators in that region as well as a call for enhanced surveillance from trappers and biologists. Additional data are needed to understand whether rabies is established farther south than previously appreciated, or whether the wolves were of more northern origin and simply following migrating caribou herds. More information on enhanced wildlife surveillance techniques can be found on page 9, as well as a FAQ from ADFG available at: http://www.adfg.alaska.gov/static/home/news/pdfs/rabies_faq.pdf.

Seasonality of rabies does seem to occur with peaks in cases documented in the winter and early spring. However, these data may reflect more the patterns of submission and less the total picture of rabies ecology. Rabies has been documented in animals submitted in all 12 months of the year; therefore, rabies activity should be considered a year-round possibility in enzootic areas.

Cases of rabies are attributed to the location of original exposure and not the location of diagnosis. For example, rabies was later confirmed in dogs brought into Anchorage from the Aleutians East Borough (1992); Bethel (2009 http://www.epi.alaska.gov/bulletins/docs/b2009_11.pdf; and 2018) and Kusilvak Census areas (2017 http://dhss.alaska.gov/dph/Epi/Documents/phans/AKPHAN_20170110_Rabies.pdf).

III. General Principles of Rabies Prevention and Control

Prevent rabies in wildlife reservoirs

In the United States, various federal and state programs have been developed to vaccinate wildlife against rabies in certain geographic locations to prevent propagation of rabies virus among wildlife populations and thus potential spillover into domestic animals. Notable projects have occurred in Massachusetts (Cape Cod), Ohio, and the southern Texas border. There is nothing currently underway in Alaska; however, the University of Alaska-Fairbanks (UAF) is collaborating with federal partners to conduct experiments on the use of various baits for foxes. Given the terrain and the migration patterns of foxes on sea ice and across the Arctic, a large scale wildlife vaccination program is not likely feasible in Alaska. However, under certain circumstances, setting out rabies vaccine-laden baits for foxes could be a useful more localized tool to create a buffer zone around a particular area in the future.

Prevent transfer of rabies virus to pets

Sometimes humans are directly exposed to rabid wildlife but more often a domestic pet serves as an intermediate host that can bring rabies from wildlife into a household setting. Vaccinating pets against rabies is therefore a simple step to minimize opportunities for humans to be exposed to the virus.

Prophylax humans that are exposed to potentially rabid animals

The Alaska Section of Epidemiology (SOE) provides 24/7 consultation about a human-animal interaction that may be considered an exposure to rabies. In the past, SOE provided post-exposure prophylaxis free of charge if after consultation with SOE, ACIP criteria for exposure was met.¹ As of January 2014, SOE continued to be available for 24/7 exposure consultation, however, health care providers had to obtain their own PEP supplies.

Rabies PEP is a series of injections given over a 3 to 4-week time period; treatment sheet available online: <http://dhss.alaska.gov/dph/Epi/id/SiteAssets/Pages/Rabies/RabiesPostExposureTreatment.pdf>. The course is shorter for those persons previously vaccinated. Rabies PEP is indicated for anyone exposed to rabies and should be initiated as soon as possible after the exposure. Depending on the circumstances, SOE might recommend waiting for a laboratory result from the suspected animal before starting PEP. There is no specific time-frame for starting PEP, except that if a person has developed clinical signs of rabies, other treatment protocols would be recommended based on consultation with experts.

Section of Epidemiology: **907-269-8000** **Mon – Fri 8 AM – 5 PM**
 800-478-0084 **After-hours**

¹CDC. Human rabies prevention--United States, 2008: Recommendations of the Advisory Committee on Immunization Practices. *MMWR* 2008;57(RR-3) <http://www.cdc.gov/mmwr/PDF/rr/rr5703.pdf>.

Also see *MMWR* 2010 update for a 4-dose series <https://www.cdc.gov/mmwr/pdf/rr/rr5902.pdf>.

IV. Section of Epidemiology Lay Vaccinator Program

Background

According to Alaska state regulations, rabies vaccines can only be administered to animals by licensed veterinarians or state-certified Lay Vaccinators. In the 1970s, the Section of Epidemiology (SOE) in partnership with the Alaska State Virology Laboratory (ASVL) designed a program whereby non-veterinarians could be certified by the State to serve as Lay Vaccinators administering rabies vaccine to animals. The ultimate goal of the Program was to decrease the likelihood of human exposure to potentially rabid animals.

Lay Vaccinator (LV) Program policies

Governing policies for the SOE LV program were updated in 2007 and are available in an Epidemiology Bulletin on-line: http://www.epi.alaska.gov/bulletins/docs/b2007_02.pdf. One of the substantive changes to the policies was to focus LV efforts in areas of the State of Alaska considered to be enzootic for rabies. Based on confirming rabies in two wolves in Spring 2013, the LV program was expanded to some villages near to the Chandalar Lakes region.

Roles of SOE and LV Sponsors and Supervisors

SOE's primary role in the LV program is to provide oversight and consultation for those persons designated as LV Sponsors. SOE maintains the LV database and creates the certificates for LVs, and provides all needed vaccine and supplies to Sponsors. The Sponsors or Supervisors are tasked with actually identifying, training, and communicating directly with LVs in the field. A training template powerpoint is available from SOE; however, regions are encouraged to tailor training programs to their specific conditions. General training aspects that should be addressed include safe and proper methods for handling animals, routes of vaccine administration, completing rabies vaccination certificates, storing and handling vaccines, and handling and disposing of syringes.

SOE contacts Sponsors when their LVs have certificates that will be expiring. Before certificates are renewed, Sponsors should ensure that the LV is still willing and able to competently administer vaccinations. On an annual basis, SOE will distribute the re-certification paperwork required to continue ordering vaccine and supplies.

Rabies vaccine and supplies information

The rabies vaccine supplied by SOE is IMRAB 3 manufactured by Merial®. Vaccine is labeled for use in dogs, cats, and ferrets; and the duration of immunity is 3 years. **For animals receiving their first vaccination and ferrets, the duration of immunity is ONLY ONE year.** Vaccine must be stored at 2°-7°C (35°-45°F) and not frozen. Vaccine should be shaken well before being drawn up into a syringe. Vaccine can be administered by either the SQ (subcutaneous) or IM (intramuscular) routes as indicated on the product label. If vaccine vials are stored at correct temperatures and are not grossly contaminated (i.e., no color change or particular matter noted), multi-dose vials do NOT need to be used in their entirety at a single setting.

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V. Alaska Rabies Surveillance and Testing

Alaska State Virology Laboratory (ASVL)

Testing for rabies at ASVL located in Fairbanks is done on an animal's brain tissue, i.e., the animal must be dead to be tested. ASVL does not evaluate human specimens for rabies. **All questions about suspected cases in humans should be referred to the Section of Epidemiology (SOE): 907-269-8000 or 800-478-0084 after-hours.** After consultation, human specimens will be referred to the CDC (for more information, c.f. http://www.cdc.gov/rabies/specific_groups/doctors/index.html). The ASVL main number is 907-371-1000; for rabies results, call 907-371-1003.

Not all animals are tested for rabies. In general, ASVL tests animals for which their rabies status will impact public health decision-making. **SOE should be consulted about all animals exhibiting behavior compatible with rabies.** SOE will recommend either rabies testing, quarantine of domesticated animals, or carcass destruction. Specimens approved for testing should be shipped directly to ASVL. Animals (pets or wildlife) routinely tested for rabies include:

- Animals that have bitten humans to determine whether rabies post-exposure prophylaxis is indicated.
- Wildlife that have bitten pets to determine the appropriate follow-up for the pet, i.e., euthanasia or variable periods of quarantine/confinement.
- Animals exhibiting rabies compatible behavior as part of surveillance for detecting rabies activity in certain parts of the state.

Specimen submission procedure

Please carefully read ASVL's 2-page specimen submission instructions, making special note that:

- BRAIN must be intact to guarantee a definitive result.
 - Badly decomposed specimens will be deemed "UNSATISFACTORY".
 - If the brain is incomplete, the result will be "UNSAT" if portions tested are negative. However, if any of the brain regions required for testing are positive, the result will be "POSITIVE".
 - Please inform SOE or ASVL prior to submission if the specimen appears compromised.
- ASVL must be aware of shipment tracking information especially if package arrival is after hours.
- Specimens for rabies testing should include the head and upper region of the neck, unless the species is small or lacks a prominent nose. The nose is used to stabilize the animal head for necropsy. Only intact heads will be accepted; dissected brains will not be accepted. Examples of species that should be submitted as a whole carcass are: cats, ferrets, mink, and bats.
- **Persons removing the head from a carcass should wear thick or two pairs of gloves, face protection such as a disposable face mask and eye protection, or a face shield to avoid splatter to the eyes and mouth), and clothing/coverings that can be laundered or disinfected.**
- Paperwork (i.e., the animal bite investigation form) must be completed for the specimen to be processed. Rabies investigation forms, specimen submission instructions, and shipping labels are available on-line at: <http://www.dhss.alaska.gov/dph/Labs/Pages/publications/default.aspx>

Animal carcass disposal

Carcasses of animals should always be disposed of properly, i.e., burial or incineration, see <https://dec.alaska.gov/eh/solid-waste/animal-remains-and-carcasses/>.

VI. Rapid Testing for Rabies in Alaska Wildlife

The Alaska Section of Laboratories' State Virology Laboratory (ASVL) in Fairbanks is the only Alaska facility that performs confirmation of rabies virus presence via DFA (direct fluorescent antibody) techniques. Rabies testing via DFA is labor-intensive and requires specialized equipment. The priorities for testing at ASVL have been animals for which there are public health actions associated, such as to determine whether an exposed human would need administration of rabies post-exposure prophylaxis (PEP), or appropriate follow-up for another animal exposed to the suspected rabid one. Of secondary importance are animals with clinically compatible neurologic symptoms in areas that are both enzootic and not thought to be enzootic for rabies. For enzootic areas, once a community has recorded a positive animal, other animals showing clinical signs of rabies are then only tested if circumstances are unique so as to conserve limited resources.

The testing priorities admittedly create a situation more aptly described as "convenience sampling" and not representative or comprehensive surveillance. There are substantial regions of Alaska that are uninhabited by humans as well as locations from where the logistics of shipping animals are complicated which also impacts the surveillance data and subsequent conclusions made about rabies epizootiology. Therefore, given concern about less than optimal surveillance and interest from wildlife agency and university researchers, CDC graciously visited Alaska to hold a dRIT (direct rapid immunohistochemical test) training session in March 2011. Because most of dRIT training in the United States is associated with an ORV (oral rabies vaccine) project, dRIT capacity in Alaska is unique.

Staff from three major laboratories or agencies – the Alaska Department of Fish and Game (ADF&G), the University of Alaska Fairbanks (UAF), and the USDA Wildlife Services (USDA-WS) – attended. ADFG receives all species of animals (including bats) from statewide locations in varying states of health. UAF has more defined projects that are less likely to specifically target diseased animals. Similarly, USDA-WS is more likely to receive and test animals from specific projects and regions in the state. SOE in conjunction with the Department of Environmental Conservation's Office of the State Veterinarian (OSV) co-sponsored the training and have been collating reports from those persons trained to perform dRIT. In the first year of the program, 2011, the number of animals evaluated by dRIT was ~350, compared to the ~30 evaluated by ASVL. All animals positive by dRIT must be confirmed by DFA at CDC.

Recently, ADFG reported on a wolverine that was determined to be positive for rabies via dRIT and via DFA at CDC. This was an animal that was found dead by biologists and likely would not have typically been submitted for testing at ASVL. Because ADFG had publicized their interest in wolverine diseases and dRIT testing capacity, biologists submitted the carcass to the ADFG wildlife veterinarian. This animal was the first known wolverine to test positive for rabies in Alaska and actually the nation. (For more info: http://www.adfg.alaska.gov/index.cfm?adfg=wildlifenews.view_article&articles_id=582).

In summary, dRIT testing has provided several different benefits to Alaska. From the public health perspective, having more animals evaluated for rabies generates a broader understanding of rabies distribution in the State while continuing to target the limited resources at ASVL for actionable events. From the wildlife health perspective, gaining capacity to screen any animal for rabies contributes to the completeness of knowledge about the contribution of this virus to both the pathology of individual animals as well as the impact to wildlife populations.

VII. Reporting Animal Bites and Other Legal Issues

State requirements

Animal bites themselves are not reportable to the Alaska State Section of Epidemiology (SOE). However, health care providers are legally mandated to report cases of human rabies or suspected exposure to rabies. This means that no statewide statistics on all dog bites are routinely collected and that persons should check with their local authorities to determine what, if any, legal requirements are in place.

Local ordinances and authorities

Across the different localities in Alaska, there may be local ordinances that govern whether animal bites must be reported to certain authorities, e.g., Municipality of Anchorage. Yet other regions have more informal agreements and reporting mechanisms to follow, e.g., CHAs must submit dog bite report forms to a regional Environmental Health Program or equivalent. SOE is always available to consult on what constitutes a possible exposure to rabies and give recommendations on management, but may still refer callers to their local authorities for follow-up if applicable.

Communities are encouraged to develop multifaceted solutions to animal control, to include management of stray dogs and dog bite investigation follow-up. Examples of Model Dog and Cat Ordinances are available from the American Veterinary Medical Association (c.f. <https://www.avma.org/KB/Policies/Pages/Model-Dog-Cat-Control-Ord.aspx>).

State regulations dealing with animals

Several state departments have regulations that concern different aspects of animals in Alaska. The Department of Health and Social Services (where SOE is housed) has regulations that address the potential of animals to transmit disease to humans. The Department of Environmental Conservation (where the State Veterinarian's Office is housed) has regulations that address the movement of animals across state lines, protection of animals from foreign animal diseases, and disposal of animal carcasses. Finally, the Department of Fish and Game has regulations that list which animals can be legally owned. See Appendix D for a list of the citations where these regulations can be found.

VIII. Response and Follow-up to a Confirmed Rabid Animal

Once rabies has been confirmed in an animal in a community, there are several critical actions that need to be taken to minimize the likelihood of rabies transmission to other animals or humans. Circumstances will vary depending on the geographic location, available resources, and the individual scenario; however, for any situation, one of the most important things is to ensure that good communication is maintained among all parties involved or affected by the response.

Immediate response to rabid animal

- Ensure that any and all persons who were exposed to this animal have been contacted and are referred to the appropriate health authorities. Section of Epidemiology (SOE) staff will be coordinating interviews to determine potential exposures and then contacting local and regional health care providers to arrange for administration of rabies PEP as needed.
- Any animal that was exposed to a rabid one must be identified and its rabies vaccination status assessed.
 - Animals that are unvaccinated should be euthanized immediately.
 - Animals that are currently vaccinated may be observed/confined for 45 days; however, if there is no way to reliably quarantine the animal or it shows any sign of illness, it should be euthanized immediately and may be tested for rabies depending on the timing.

The details of these recommendations are spelled out in the National Association of State Public Health Veterinarians (NASPHV) Compendium of Animal Rabies Prevention and Control (Appendix E) that is adopted by reference in Alaska State Regulations (Appendix D). In addition, there is a more succinct Table in Appendix F.

General considerations for the community

Once the immediate response is underway, it is important to ensure additional actions are taken to prevent any future rabies cases in the community. Appendix I has an example of a poster that can be adapted for certain locations. Examples of activities that should be considered include:

- Ensuring that all dogs are up to date on rabies vaccinations.
- Ensuring that all dog bites (as well as bites from wildlife) to humans are reported to the appropriate authority for investigation and follow-up.
- Ensuring that dogs or foxes in the community that are acting strangely are reported to the appropriate authorities to be tested for rabies if indicated.
- Ensuring that any dog bitten or known to be fighting with wildlife is reported to the appropriate authorities to determine a prudent course of action.
- Working with community stakeholders to ensure that loose and stray dogs are managed.

Appendix D. Animal-Related State Regulations in Alaska

DHSS

Regulations in the Department of Health and Social Services relate mainly to rabies vaccination of animals and follow-up of animals that bite humans or are suspected to be rabid.

7 AAC 27.020 – 27.030.

Text available in the Division of Public Health, Conditions Reportable manual, available at <http://dhss.alaska.gov/dph/Epi/Documents/pubs/conditions/ConditionsReportable.pdf> (see pages 33-35).

DEC

Regulations in the Department of Environmental Conservation relate to the movement of animals; reporting requirements for veterinarians who diagnose or suspect animal diseases; and quarantine authority of the State Veterinarian under certain disease circumstances.

Current regulations can be found at <http://www.legis.state.ak.us/basis/aac.asp#18.36>.

DFG

Regulations in the Department of Fish and Game relate to animals that are allowed to be held as pets in Alaska and information about wolf-hybrids. Current regulations can be found at <http://www.adfg.alaska.gov/index.cfm?adfg=wildliferegulations.misc>; see Chapter 92 for statewide provisions (92.029 and 92.030).

All State of Alaska Regulations

Regulations can also be found individually by searching the State of Alaska website of the Alaska Administrative Code: <http://www.akleg.gov/basis/aac.asp>.

Additionally, many of these regulations can be found in the Alaska Board of Veterinary Examiners handbook available at <https://www.commerce.alaska.gov/web/portals/5/pub/vethandbook.pdf> (updated 2013).

Appendix F. Dog Bite Scenarios

Alaska Section of Epidemiology (SOE) General Guidelines for Determining the Disposition of a Dog that Bites or is Bitten¹

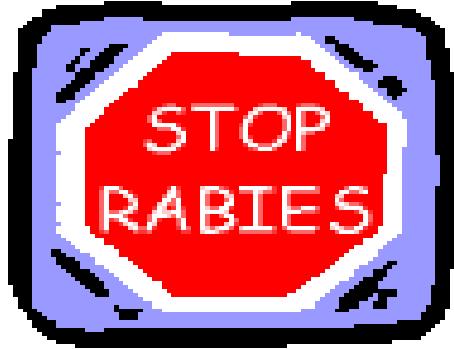
Scenario	Dog vaccinated ²	Dog unvaccinated
Dog bites human	<p>Dog must be quarantined for 10 days.³</p> <ul style="list-style-type: none"> If animal shows any signs of illness, must be euthanized immediately and tested for rabies. 	<p>Dog may be immediately euthanized if sick or stray.</p> <p>If owned and well, dog must be quarantined for 10 days.^{3,4}</p> <ul style="list-style-type: none"> If animal shows any signs of illness, must be euthanized immediately and tested for rabies. Once 10-day period is over, animal should be immediately vaccinated.
Rabid fox bites dog	<p>Dog must be immediately re-vaccinated.</p> <p>Then, confined by the owner for 45 days.</p> <ul style="list-style-type: none"> If the owner cannot reliably and completely confine the animal, SOE strongly recommends euthanasia. If animal shows any signs of illness, must be euthanized immediately and may be tested for rabies. 	<p>Dog may be immediately euthanized if sick or stray.</p> <p>If owner will not allow dog to be euthanized, animal must be strictly confined for 6 months.^{4,5}</p> <ul style="list-style-type: none"> SOE strongly recommends euthanasia and would like complete assurance that the owner can reliably and completely confine the dog. If animal shows any signs of illness, must be euthanized immediately and may be tested for rabies. Dog should be vaccinated upon entry into confinement or 1 month prior to release.

Notes:

1. Please contact SOE for consultation about any suspected human exposures to rabies or other guidance in determining scenario management.
2. Vaccinated means that a dog has received a rabies vaccination at least 28 days prior to the incident. SOE considers a complete vaccination series to be that the animal had one vaccination after the age of 3 months, a booster 1 year later, and then boosters every 3 years thereafter.
3. “Quarantine” facilities must be reviewed by SOE. At a minimum, animal in quarantine must be confined to a single location and unable to freely access other animals and humans. If no acceptable facilities exist, SOE may recommend euthanasia.
4. SOE may seek to obtain a court order requiring euthanasia if the scenario is highly suspicious for rabies.
5. Compendium guidelines reduced observation time from 6 to 4 months in 2016. Current AK regulations have not yet been updated to reflect that change.

Table based on the National Association of State Public Health Veterinarians (NASPHV) Compendium of Animal Prevention and Control as adopted in Alaska State Regulations. Available at <http://www.nasphv.org/Documents/NASPHVRabiesCompendium.pdf>.

Appendix G. Rabies Follow-up Poster



On DATE, 20XX, Rabies Was Found HERE in VILLAGE!!

This means you should:

- Make sure all your dogs and cats are currently vaccinated against rabies.
- If you are bitten by a dog, cat or wildlife, report this to your local Community Health Aide (CHA) or regional **Office of Environmental Health (OEH)** right away.
- If your dog or cat is acting sick or not behaving normally (for example, drooling, walking funny, acting mean or anyway strange), OR if your dog or cat was bitten/exposed to a fox, contact the VPSO, VPO, or regional **OEH** offices right away.
- If you see foxes or other wildlife acting sick (as above), contact the VPSO, VPO, regional **OEH** or wildlife offices right away.
- If you shoot an animal, DO NOT SHOOT IT IN THE HEAD! Rabies testing is done on the brain.

Contact information:

CHA.....	907-XXX-XXXX
VPO/VPSO.....	907-XXX-XXXX
OEH (regional).....	907-XXX-XXXX
Wildlife agency (regional).....	907-XXX-XXXX
Alaska Section of Epidemiology.....	907-269-8000

Appendix H. Alaska Rabies Bibliography

Alaska Section of Epidemiology, Epidemiology *Bulletins* see website:
<http://epibulletins.dhss.alaska.gov/Bulletin/DisplayClassificationBulletins/83>.

Ballard WB, Follmann EH, Ritter DG, Robards MD, Cronin MA. Rabies and canine distemper in an arctic fox population in Alaska. *J Wildl Dis* 2001;37(1):133-7.

Ballard WB, Krausman PR. Occurrence of rabies in wolves of Alaska. *J Wildl Dis* 1997;33(2):242-5.

Castrodale L. Use of rabies post-exposure prophylaxis supplied by the Alaska Section of Epidemiology, Alaska 2002-2007. *Public Health Rep* 2009;124(2):262-6.

Castrodale L, Kuzmin I, Nadin-Davis S, Follmann E, Kandola K, Sobol I, Galanis E, Wandeler A. Alaska Rabies Summit, Anchorage, Alaska – December 11, 2006 [conference summary]. *Emerg Infect Dis* 2007;13(11):e2.

Castrodale L, Walker V, Baldwin J, Hofmann J, Hanlon C. Rabies in a puppy imported from India – Alaska and Washington, USA, March 2007. *Zoonoses Public Health* 2008 55:427-30.

Castrodale L, Westcott M, Dobson J, Rupprecht C. Rabies in a 3-month old puppy, Southwestern Alaska, 2006. *Vet Rec* 2008;163(3):92.

Chapman RC. Rabies: decimation of a wolf pack in arctic Alaska. *Science* 1978;201(4353):365-7.

Dalton LM, Hanns CT, Nelson EA, Hughes T. Public health aspects of stray dogs in Barrow, Alaska. *Arctic Med Res* 1988;47(Suppl)1:83-9.

Donaldson ME, Rico Y, Hueffer K, Rando HM, Kukelova AV, Kyle CJ. Development of a genotype-by-sequencing immunogenetic assay as exemplified by screening for variation in red fox with and without endemic rabies exposure. *Ecol Evol* 2018;8:572-83.

Follmann EH, Ritter DG, Beller M. Survey of fox trappers in northern Alaska for rabies antibody. *Epidemiol Infect* 1994;113(1):137-41.

Follmann EH, Ritter DG, Donald WH. Oral vaccination of captive arctic foxes with lyophilized SAG2 rabies vaccine. *J Wildl Dis* 2004;40(2):328-34.

Follmann E, Ritter D, Dunbar M, Hueffer K. Preliminary evaluation of Raboral V-RG® oral rabies vaccine in Arctic foxes (*Vulpes lagopus*). *J Wildl Dis* 2011;47(4):1032-5.

Goldsmith EW, Renshaw B, Clement CJ, Himschoot EA, Hundertmark KJ, Hueffer K. Population structure of two rabies hosts relative to the known distribution of rabies virus variants in Alaska. *Mol Ecol* 2016;25(3):675-88.

Alaska Rabies Bibliography, cont'd

Hanke D, Freuling CM, Fischer S, Hueffer K, Hundertmark K, Nadin-Davis S, Marston D, Fooks AR, Bøtner A, Mettenleiter TC, Beer M, Rasmussen TB, Müller TF, Höper D. Spatio-temporal Analysis of the Genetic Diversity of Arctic Rabies Viruses and Their Reservoir Hosts in Greenland. *PLoS Negl Trop Dis* 2016;10(7):e0004779.

Hueffer K, Murphy M. Rabies in Alaska, from the past to an uncertain future, *Int J Circumpolar Health* 2018;77:1.

Hueffer K, Parkinson AJ, Gerlach R, Berner J. Zoonotic infections in Alaska: disease prevalence, potential impact of climate change and recommended actions for earlier disease detection, research, prevention and control. *Int J Circumpolar Health* 2013;72, Epub article 19562.

Huettmann FH, Magnuson EE, Hueffer K. Ecological niche modeling of rabies in the changing Arctic of Alaska. *Acta Vet Scand* 2017;59(1):18.

Kim BI, Blanton JD, Gilbert A, Castrodale L, Hueffer K, Slate D, Rupprecht CE. A conceptual model for the impact of climate change on fox rabies in Alaska, 1980-2010. *Zoonoses Public Health* 2014;61(1):72-80.

Kuzmin IV, Hughes GJ, Botvinkin AD, Gribencha SG, Rupprecht CE. Arctic and Arctic-like rabies viruses: distribution, phylogeny and evolutionary history. *Epidemiol Infect* 2007 Jun 29:1-11.

Middaugh J, Ritter D. A comprehensive rabies control program in Alaska. *Am J Public Health* 1982;72(4):384-6.

Pamperin NJ, Follmann EH, Peterson B. Interspecific killing of an arctic fox by a red fox in Prudhoe Bay, Alaska. *Arctic* 2006;59(4):361-4.

Parkinson AJ, Evengard B, Semenza JC, Ogden N, Børresen ML, Berner J, Brubaker M, Sjöstedt A, Evander M, Hondula DM, Menne B, Pshenichnaya N, Gounder P, Larose T, Revich B, Hueffer K, Albihn A. Climate change and infectious diseases in the Arctic: establishment of a circumpolar working group. *Int J Circumpolar Health* 2014;73:25163.

Rausch RL. Rabies in experimentally infected bears, *Ursus* spp., with epizootiologic notes. *Zentralbl Veterinarmed B* 1975;22(5):420-37.

Rausch RL. Observations on some natural-focal zoonoses in Alaska. *Arch Environ Health* 1972;25(4):246-52.

Sage G, Khawplod P, Wilde H, Lobaugh C, Hemachudha T, Tepsumethanon W, Lumlertdaecha B. Immune response to rabies vaccine in Alaskan dogs: failure to achieve a consistently protective antibody response. *Trans R Soc Trop Med Hyg* 1993 Sep-Oct;87(5):593-5.

Sikes RK. Arctic rabies. *Arch Environ Health* 1968;17(4):622-6.

Alaska Rabies Bibliography, cont'd

Weiler GJ, Garner GW, Ritter DG. Occurrence of rabies in a wolf population in northeastern Alaska. *J Wildl Dis* 1995;31(1):79-82.

Wilde H. Rabies post-exposure management. Current issues for Alaskan travelers in Asia. *Alaska Med* 2013;54:33-6.

Williams RB. Epizootic of rabies in interior Alaska. *Can J Comp Med* 1949;13(6):136-43.

Zarnke RL, Ballard WB. Serologic survey for selected microbial pathogens of wolves in Alaska, 1975-1982. *J Wildl Dis* 1987;23(1):77-85.