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## CANADA GEESE DAMAGE MANAGEMENT

### PUBLIC HEALTH ISSUES

Canada geese (*Branta canadensis*) are a modern success story for wildlife management. At one time, numbers of Canada geese were in serious decline. However, the actions of various wildlife agencies have brought their numbers in North America to an estimated 5,600,600 (U.S. Fish and Wildlife Service 2009).

Unfortunately, this dramatic increase in population has resulted in some negative consequences.

First, large numbers of geese leave large quantities of feces. A single goose can defecate every 20 minutes (Bowen and Valiela 2004) up to 1.5 pounds of feces each day (French and Parkhurst 2009). This problem is magnified when we realize that approximately 67% of those geese are non-migratory or resident geese (Dolbeer 2006). In other words, land and lakes frequently do not get a sustained rest from geese presence. If large numbers of geese congregate, one must wonder if there is a health risk related to the feces left on ground and in the water. French and Parkhurst (2009) note that "beaches and other public areas littered with accumulated goose feces have been closed due to the contamination or the threat of personal injury resulting from falls as people lose footing on the slippery material." So concerns regarding goose droppings are not simply speculative.



Many have raised concerns about the diseases found in the droppings of Canada geese. Photo Stephen M. Vantassel.

Research has shown that the excrement of geese contains a wide variety of pathogens capable of infecting humans. (Diseases transmitted from animals to humans are known as zoonotic diseases). Yet geese can also be a means of transmitting (vector) other diseases in ways unrelated to their defecation. As goose numbers continue to increase, concerns have been raised regarding the negative impact Canada geese may have on water quality and disease transmission (Fallacara et al. 2001).

One of the significant challenges in surveying infectious diseases of Canada geese is distinguishing their having zoonotic diseases from the likelihood of their vectoring those diseases to humans (Bonner et al. 2004). As Smith et al. (1999) characterized the situation, "Transmission of disease or parasites from geese to humans has not been well documented, but the potential exists." This potential is in no small way related to the number of geese and their high mobility (Fallacara et al. 2001). In light of the gaps in our knowledge, we caution readers that presence of a disease does not necessarily translate into a threat to public health. Nevertheless, we advise caution as the research in this field continues to evolve.

Canada geese presence at parks and golf courses raised the question of the potential of disease transmission to humans via contact with goose droppings (Converse et al. 1999). The droppings of Canada geese have been found to carry a significant number of diseases, however, only a few are of significant concern to humans.

## PARASITES

### Cryptosporidium.

Cryptosporidium is a parasite that causes an enteric disease called cryptosporidiosis. As few as 30 oocysts are needed to cause infection (Kassa et al. 2004). While healthy people usually recover following a bout of diarrhea, the infection can endanger immune-compromised individuals, such as those suffering with AIDS ((Corso et al. 2003). Canada geese have been found to be carriers of cryptosporidium (Kassa et al. 2004) but not in all surveys (Fallacara et al. 2001). However, the genotypes of the human-borne infections and the geese's potential in contaminating water sources is considered low (Zhou et al. 2004).



Cryptosporidium. Image: CDC

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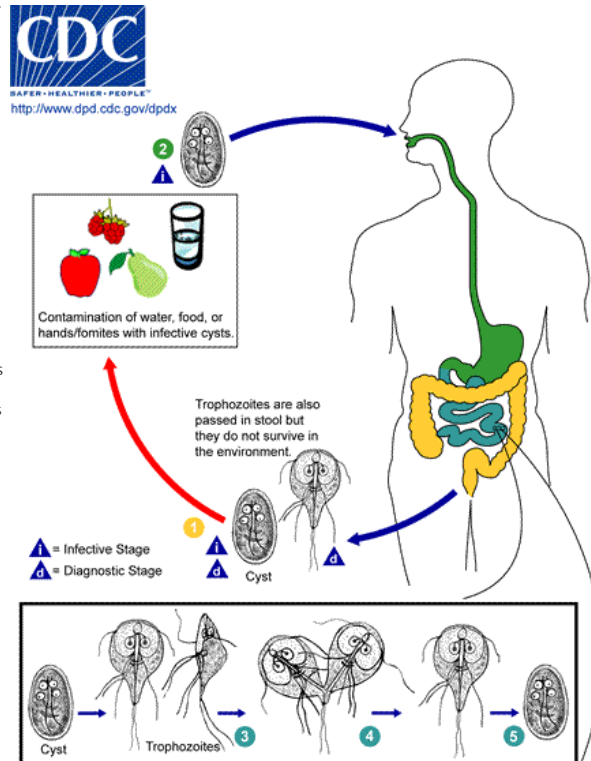
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Despite the insignificant role geese may play in the transmission of human-infectious cryptosporidium, protection of water purity remains important. A chief concern lies in cryptosporidium's ability to remain viable after traditional chlorination practices (Corso et al. 2003). The cyst stage of the organism is relatively resistant to normal disinfection procedures and tends to persist even in dry environments (Brown et al. 1999; Kassa et al. 2004). People have become infected even when they swam in chlorinated water (Kassa et al. 2004). Although no confirmed reports of cryptosporidiosis has been reported from direct contact (as opposed to contact with focally contaminated water) with goose feces (Zhou et al. 2004), individuals exposed to geese feces should take reasonable precautions. These include, avoid swallowing contaminated water, washing hands thoroughly and drying with disposable paper towels, scrubbing contaminated shoes and clothing with disinfectant, and keeping hands away from mouth and face until showering. Although geese have been shown to transmit infectious cysts (Graczyk et al. 1998), they are merely mechanical carriers of cysts as geese do not become infected (Jellison et al. 2004).

**Giardia.** The cysts of giardia have been found in the feces of Canada geese (Graczyk et al. 1998; Kassa et al. 2004, Centers for Disease Control Giardia Factsheet). Giardia is a protozoan parasite that causes gastrointestinal infection in humans (Centers for Disease Control Giardia Factsheet). Giardia infection is of particular concern due to the organism's ability to survive various environments including its resistance to waste water treatment (Brown et al. 1999). For example, giardia can survive in salt water for up to 21 days and longer in freshwater (Brown et al. 1999). It is important not to consider all geese infected as this is not true (Fallacara et al. 2001).

**Toxoplasmosis.** *Toxoplasma gondii* infection has been found in a single Canada goose (Dubey et al. 2004). Humans typically become infected through eating undercooked meat containing the parasite or by drinking contaminated water (Dubey et al. 2004). Human exposure to the organism does not necessarily lead to infection. Due to the paucity of *Toxoplasma gondii* infections in geese found in the survey (n=1) further surveillance of disease prevalence among geese is warranted. Although the risk of humans being infected by this disease by geese is low, we encourage pregnant women to use caution when eating geese or drinking water with large numbers of geese.

**Other Parasites.** Canada geese feces can carry parasites from phyla Apicomplexa, Nematoda, and Arthropoda with the majority from the nematode group (Fallacara et al. 2004). Geese also are subject to a wide variety of blood borne parasites including *Leucocytozoon*, *Haemoproteus*, microfilariae, and *Plasmodium*. But *plasmodium* and *haemoproteus* infections were light (Bradshaw and Trainer 1966).

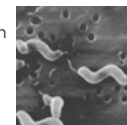


Giardia lifecycle. Image: CDC.

## BACTERIA

### *Campylobacter jejuni*.

*Campylobacter jejuni* is a bacterium usually associated with food-borne pathogens (The Center for Food Safety and Applied Nutrition 2009). Although recent findings have demonstrated that geese are significant carriers of *Campylobacter jejuni* (Fallacara et al. 2004), overturning previous negative findings (Converse et al. 1999), the public health impacts of these positive results are unclear for several reasons. First, the eggs of Canada geese were found to be free of the bacterium (Bonner et al. 2004). Second, researchers are still determining which of the bacterium's strains are pathogenic (The Center for Food Safety and Applied Nutrition 2009). It should be noted, however, that chicken borne strains tend to be pathogenic (The Center for Food Safety and Applied Nutrition 2009).



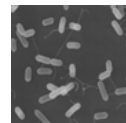
*Campylobacter*. Image: CDC

**Chlamydiosis** (a.k.a. Psitticosis). Chlamydiosis is a common infection of birds which when it infects people is called Psitticosis. (Compendium 1997). Canada geese can transmit this disease to humans and the agent is viable in goose eggs (Bonner et al. 2004). Its official name is *Chlamydiosis psittacii* and is transmitted to human via a variety of birds (Bonner et al. 2004). Infected birds shed the bacteria through feces and nasal discharge. Humans normally

manifest infection by pneumonia (Johnston 2000). Unless one is working with Canada geese or involved in feces clean up, the risk of infection is quite low (Bradshaw and Trainer 1966; Palmer and Trainer 1969).

**E-Coli.** A survey of goose droppings at Fort Collins, Colorado discovered E-coli in 16.7% of the samples. Although the highly virulent O157:H7 strain of E-coli was not found, 4 serotypes of E-coli were (Kullas et al. 2002). Prevalence of E-coli did not correlate to numbers of geese. E-coli presence correlated to temperature with 94% of droppings tested in June containing E-coli with only 2% in February (Kullas 2002). Similar seasonal variation was also found by Fallacara et al. (2004). Perhaps most disturbing was how the strains of E-coli found were resistant to several antibiotics (Fallacara et al. 2001, 2004).

**Listeria.** Converse et al. (1999) found *Listeria* spp. including *Listeria monocytogenes*, in goose droppings. Listeriosis is a serious medical threat as infection can cause abortions in pregnant women and result in septicemia and meningitis (The Center for Food Safety and Applied Nutrition 2009).



Listeria.  
Image: CDC

**Pasteurella multocida.** *Pasteurella multocida* is the bacterium that causes avian cholera (Blanchong et al. 2006). It is transmitted between birds via direct contact, breathing of droplets (e.g. when they sneeze) or through contaminated water (Blanchong et al. 2006). Fortunately, the bacteria does not persist in lakes provided infected birds or their carcasses are not present (Blanchong et al. 2006). Fallacara et al. (2004) found that *Pasteurella multocida* was not present in healthy birds. Humans typically only encounter this bacterium following a bite, typically from a dog or a cat (Cummings et al. 2002). We do not consider this infection to be a significant public health threat. However, anyone bitten by a Canada goose should consider this infection a possibility if the wound does not respond to normal treatment.

#### Salmonella.

Fallacara et al. (2004) asserts that geese are not significant carriers of salmonella but believes that they can be carriers (2001). While the bacterium has not been found in the eggs of Canada geese (Bonner et al. 2004), it has been found in their droppings (Converse et al. 1999, Fallacara et al. 2001). While salmonella can survive for up to 9 months in the environment, connecting salmonella infections in humans with Canada geese remains unproven (Converse et al. 1999). Nevertheless, picnickers should wash their hands before handling food and before eating when in areas where geese droppings are present (Centers for Disease Control 2009 "Salmonellosis"Å,Å).



Salmonella.  
Image: CDC

## VIRUSES

**Avian Influenza.** Canada geese are members of a group of birds that have been known to contract avian influenza more commonly known as fowl plague (Rosenberger and Kraus 1975; Ellis et al. 2004). The infection is transmitted through the birds' mucous membranes and is shed in the feces. Avian influenza comes in two forms, low path and high path. Low path can exist in birds and is generally asymptomatic and results in few bird deaths and is of little threat to humans. High path, on the other hand, can result in massive die off of birds (Centers for Disease Control 2005 Avian Influenza). As we learned in the 2002, a high path avian influenza known as H5N1 can infect and kill humans (Ellis et al. 2004). In 2004, researchers confirmed that Canada geese could in fact contract H5N1 (Clark and Hall 2006). While H5N1 has not become a problem in the United States at this time, researchers have been concerned that migratory birds (including Canada geese) could introduce the disease. Pasick et al. (2007) found Canada geese are susceptible to high-path avian influenza (H5N1) and could act as a sentinel species for monitoring of H5N1 outbreaks.

In laboratory tests and linear modeling it was found that Avian Influenza virus (AVI) viability was significantly extended in water temperatures with 17 C and with pH 7.4-7.8 with low dissolved salt. Researchers also found that infectivity is inversely related to salt content and the virus viability improves with increased acidity (Stalknecht et al. 1990a). In other findings, the authors suggested that large flocks of waterfowl in winter water habitats could raise AIV high enough to infect other animals that shared the water (Stalknecht et al. 1990a). Bonner et al. (2004) summarizes the issue as follows, "Since most of the lakes are visited frequently by people for recreational purposes, questions arise as to the possible risk of transmission of zoonotic agents from these birds to man. It is currently unknown whether influenza A and paramyxoviruses are carried and shed by free-living Canada geese; eggs were collected in the study area and examined."

**Encephalitic Viruses.** Geese are not significant carries of encephalitic (e.g. Eastern encephalitis virus EEV, western encephalitis virus WEV, St. Louis encephalitis virus SLEV, Venezuelan encephalitis virus VEV and California encephalitis virus CEV) or Chlamydial diseases (Bradshaw and Trainer 1966; Palmer and Trainer 1969). Canada geese can carry West Nile Virus (WNV) (Centers for Disease Control West Nile Virus: Bird Species 2009). Since WNV is carried by a number of birds (Centers for Disease Control West Nile Virus: Vertebrate Ecology 2009), control of Canada geese to manage WNV would be impractical and imprudent.

## FUNGUS

**Histoplasmosis.** *Histoplasma capsulatum* is the fungus that causes the disease histoplasmosis (Centers for Disease Control 2009 Histoplasmosis). The fungus grows in soil enriched with bird droppings, including those from geese. When these contaminated soils are stirred up, the fungal spores can become dispersed and inhaled, thereby infecting individuals (Centers for Disease Control 2009 Histoplasmosis). Lenhart et al. (2004) says that goose droppings have not been identified as a source for histoplasmosis. However, in light of the conflicting information, we suggest individuals practice prudent caution when raking or stirring up soil enriched with goose droppings. It does not appear that goose droppings on sidewalks and other non-soil surfaces pose a risk (Lenhart et al. 2004).

## WATER-BORNE DISEASES

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According to Edgcumbe Ford (1999), it is difficult to define water borne diseases because "In principle almost all enteric pathogens and opportunistic pathogens that are transmissible by the fecal-oral route can be transmitted through water." He suggests focusing on diseases that have been directly or strongly associated with transmission via drinking water. Several of the diseases mentioned above (giardia, cryptosporidium, E-coli) would affect water quality. It is for this reason that Edgcumbe Ford (1999) suggests that watershed protection should include practices "to reduce the impact of waterfowl, particularly near water intake sites."

## PROTECTING YOURSELF FROM THESE DISEASES

As a general rule, keeping one's distance from geese and areas frequented by geese will be sufficient to prevent exposure to goose borne diseases. Individuals with compromised immune systems should pay particular attention to sanitation procedures. Kassa et al. (2001) provides several practices to protect individuals who work in areas contaminated with goose dropping from contracting cryptosporidium, giardia, and campylobacter.

1. Wear protective gloves while working
2. Wash hands after performing activities that could contaminate hands with goose feces. It is highly recommended to wash hands before eating or touching your mouth.
3. If goose contaminated soils will be disturbed, follow guidelines for protecting yourself from [histoplasmosis](#) infection.
4. Launder work clothes daily and shower at the end of each workday
5. Those who develop gastrointestinal infections have their stools tested for cryptosporidium, giardia, and campylobacter (Kassa et al. 2001).

We would suggest, however, that anyone coming into contact with goose contaminated areas follow the above sanitation recommendations.

## Recommended Control Techniques

These techniques should be used particularly to keep geese away from water intake areas.

Hazing

Capture and Removal

For details on these techniques visit [Goose Control Methods](#)



## Recommended Citation

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<http://icwdm.org/handbook/Birds/CanadadGeese/Default.aspx>

Picture (left) is a Canada goose track. Photo: Wildlife Control Consultant, LLC.

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