



# Avian botulism

(*Clostridium botulinum*)

## in Alberta

### Common name

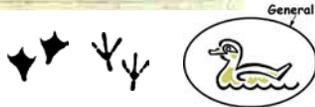
avian botulism, limberneck, botulism poisoning, alkali poisoning, western duck sickness

### Scientific name

a bacterium, *Clostridium botulinum*, and a tiny virus that infects it

### What's Bugging Wild Critters?

Fact sheet #4:  
Avian botulism



### Significance

Avian botulism poisoning causes mortality, sometimes large-scale, in various waterfowl and shorebird species. It does not pose any threat to humans.

### What? Where? How?

Avian botulism is a naturally occurring food poisoning that affects many bird species—primarily waterfowl (largely ducks) and shorebirds—throughout the world. Small-scale mortality often goes unnoticed; however, at times, up to one million birds die annually during avian botulism outbreaks on large prairie lakes in western Canada.

A lethal combination of bacteria, virus, weather, water, and birds can produce a situation where birds die. Poisoning occurs when birds ingest bacteria infected by a particular virus. The virus produces a toxin that affects the nervous system and causes progressive paralysis of birds. Clinical signs start with mildly affected birds that are unable to fly. Later they cannot stand or walk and the inner eyelid often is closed.

This is followed by loss of the ability to hold the head up ("limber neck") or to breathe. Eventually the bird drowns or suffocates or is picked off by a predator.



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### Transmission Cycle

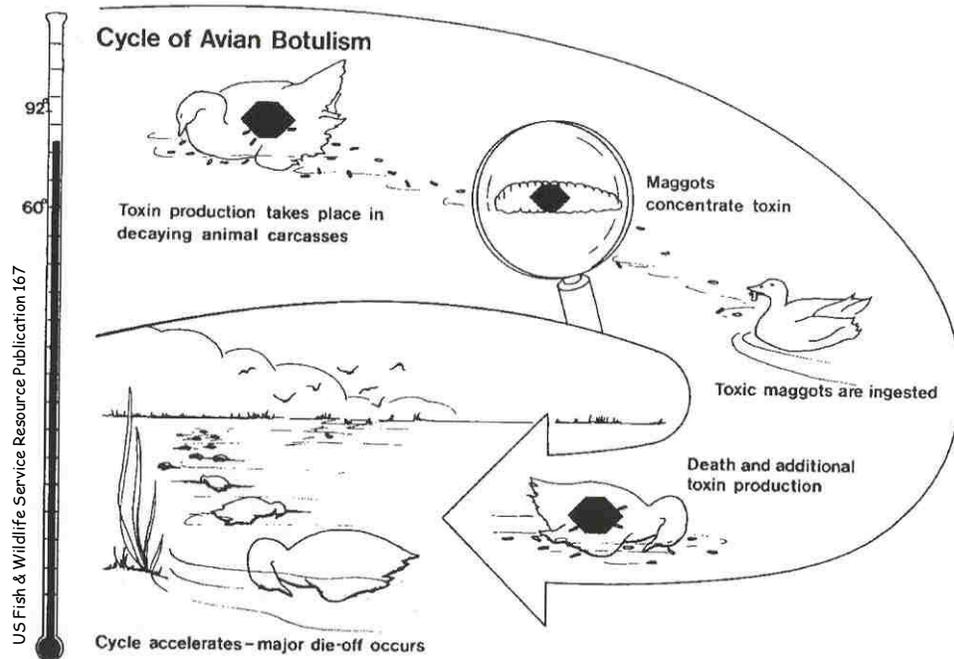
Clostridial (bacterial) spores occur in the bottom sediments of most wetlands. When water birds, particularly dabbling ducks and shorebirds, stir up the sediments they often swallow the spores. At this point, the spores are in a benign resting stage and have no effect on the bird. However, if the bird dies for some reason (e.g., predation, wounding, broken wing), the spores that are in the bird's gut can be activated and, if the virus is present, a lethal toxin is produced in the rotting carcass. Flies are attracted to the carcass as a place to lay their eggs where the growing fly larvae (maggots) will have an abundance of food. The maggots are not affected by the toxin; in fact, they concentrate the poison and later pass it on to live birds that eat contaminated maggots.

Death is ever-present in aquatic ecosystems; yet, outbreaks of botulism poisoning are relatively rare. It is likely that in many wetlands a few individual birds are poisoned each summer and largely go unnoticed.



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However, occasionally the mortality increases and many many birds die. The exact causes of the large-scale die offs are not precisely known; but there is a pattern of occurrence in summer months between mid July and mid September, particularly in periods of hot dry weather when large numbers of waterfowl are moulting.

The cycle appears to be broken when there are not enough carcasses to pass on enough toxin to continue to kill more birds, or when cool weather limits the activity of flies and the development of maggots in the carcasses.

## Distribution in Alberta

Although any water body used by waterfowl is a potential site for botulism poisoning, some lakes have a history of recurrent problems. On average, significant mortality is recorded at three or four lakes each summer. Although outbreaks have traditionally been recorded in the parkland and prairie regions, they may occur anywhere from Hay Zama Lakes in the far northwest to Pakowki Lake in the far southeast. Recent information suggests that previous outbreaks in the boreal region may have been overlooked.

## Importance for Wildlife Management

Thousands of dead birds on a lake are a concern for wildlife biologists, naturalists, and the public in general. Unfortunately, no one has yet been able to determine the impact of botulism losses on overall bird populations.

A prairie-wide task force established in 1997 wrestled with this issue but was unable to determine the impacts of botulism losses on overall duck populations.

In Alberta, provincial and federal wildlife management agencies (Alberta Fish and Wildlife Division, Canadian Wildlife Service) and non-government agencies (Ducks Unlimited Canada, Alberta Conservation Association) have combined their resources and efforts to try to understand the losses of birds. Prior to 2001, field activities were focused on early detection of outbreaks and rapid response to significant numbers of dead birds. Bird carcasses were removed on the assumption that this action would limit the mortality of other birds. However, a three-year prairie-wide experiment concluded that carcass collection did not improve the survival of other ducks.

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As a result, management and conservation agencies in Alberta no longer pick up dead birds. Research activities are now focused on the bacterial spores to see if they may hold the key to breaking the cycle and thus preventing bird losses.

## Public Significance

Mortality is limited largely to birds. Mammals, including humans, generally are resistant to this particular form of botulism toxin. Note that this is not the same as the botulism that can occur when foods are improperly canned or stored. In addition, affected birds quickly lose the ability to fly, and thus hunters are not likely to shoot sick birds. Hunting dogs also are not at risk. Rarely, cattle drinking from lakes during large outbreaks may be at risk if they consume large numbers of toxic maggots.



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## Prevention/Control

There is no known way to prevent an outbreak of botulism poisoning. The bacterium and the virus are natural components of wetlands over broad areas of Alberta; indeed, avian botulism occurs around the world. Birds will always die and some will fall into a wetland and thus set up the potential for more birds to die. To date, we have no useful method of limiting this natural mortality.



## Summary

*Avian botulism is a relatively common mortality factor for waterfowl and shorebird species in Alberta. Cooperative management programs are in place to identify problems and to gain better understanding of how to limit further losses.*

## Additional Information

Alberta Agriculture, Food and Rural Development: <http://www1.agric.gov.ab.ca/app21/rtw/selcat.jsp>

Canadian Cooperative Wildlife Health Centre: [http://wildlife1.usask.ca/ccwhc2003/wildlife\\_health\\_topics.php?&width=1280&height=1024](http://wildlife1.usask.ca/ccwhc2003/wildlife_health_topics.php?&width=1280&height=1024)

Environment Canada: <http://www.pnr-rpn.ec.gc.ca/nature/migratorybirds/avianb/dc22s00.en.html>

USGS, National Wildlife Health Center: <http://www.nwhc.usgs.gov/facts/botulism.html>