

AVIAN BOTULISM MONITORING

2012 REPORT FOR EMMET AND CHARLEVOIX COUNTIES



**Over 950 bird fatalities
Loons were hit hardest -
over 420 reported fatalities**

Introduction

Botulism Type E, also known as “avian botulism”, is a paralytic condition in birds, fish, and other wildlife caused by the ingestion of large quantities of the naturally-occurring botulism toxin. During the last 50 years, thousands of birds and fish deaths from avian botulism outbreaks have been documented throughout the Great Lakes. However, the Northern Lake Michigan region has suffered atypically high and alarming losses in recent years.

Since 2007, Tip of the Mitt Watershed Council has taken the lead to coordinate avian botulism monitoring in the Northern Lower Peninsula in an effort to better understand the underlying factors contributing to outbreaks. In the fall of 2012, the Watershed Council continued working with the Emmet County Lakeshore Association (ECLA) and community volunteers to monitor outbreaks of avian botulism along the Lake Michigan shoreline in Emmet and Charlevoix Counties. Twenty-five volunteer monitors, known as Beach Rangers, patrolled over 30 miles of shoreline throughout

the fall (Figure 1), collecting data on dead birds and fish, as well as disposing of carcasses. The Watershed Council also received dozens of reports of avian fatalities from the concerned public.

What did the Beach Rangers report during the fall of 2012?

We don’t even need to look at the data to tell you that 2012 was a bad year for avian botulism outbreaks. The number of dead birds reported from certain sections of shoreline was shocking. Over 950 bird fatalities were documented in Charlevoix and Emmet Counties. Loons were hit hardest this year with over 420 reported fatalities (Figure 2). Loon die-offs of similar magnitude were observed along the Lake Michigan shoreline from Benzie County through the eastern UP this fall, as reported by other monitoring coordinators in the Northern Lake Michigan region. Horned and red-necked grebes were similarly affected.

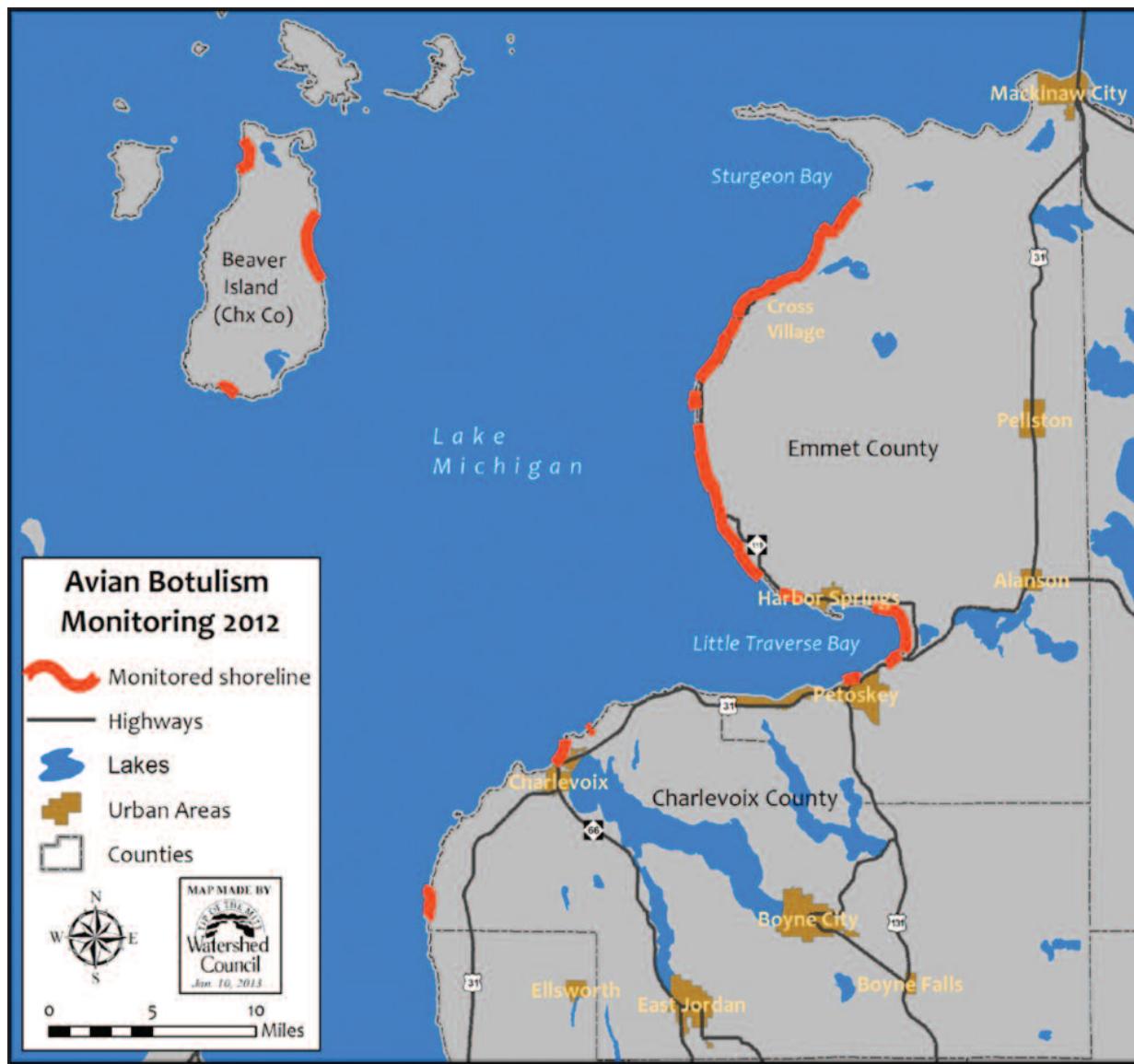


Figure 1: Shoreline areas monitored by Beach Rangers during 2012.

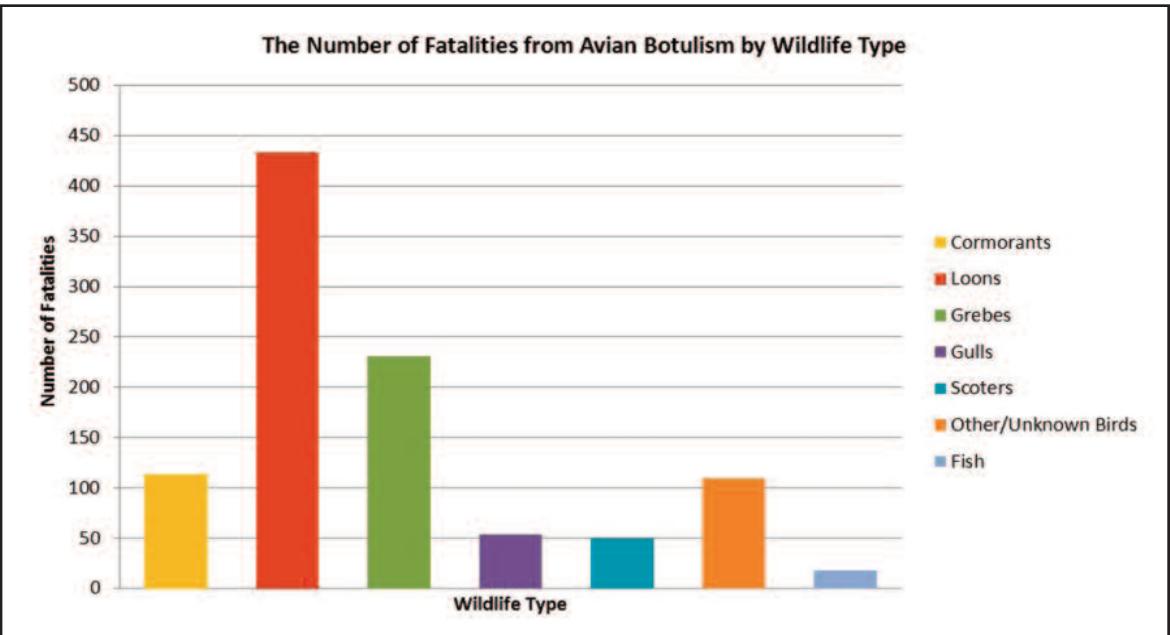


Figure 2: The number of fatalities from avian botulism reported by wildlife type.

Figure 3:
Avian botulism bird fatalities documented at two-week intervals.

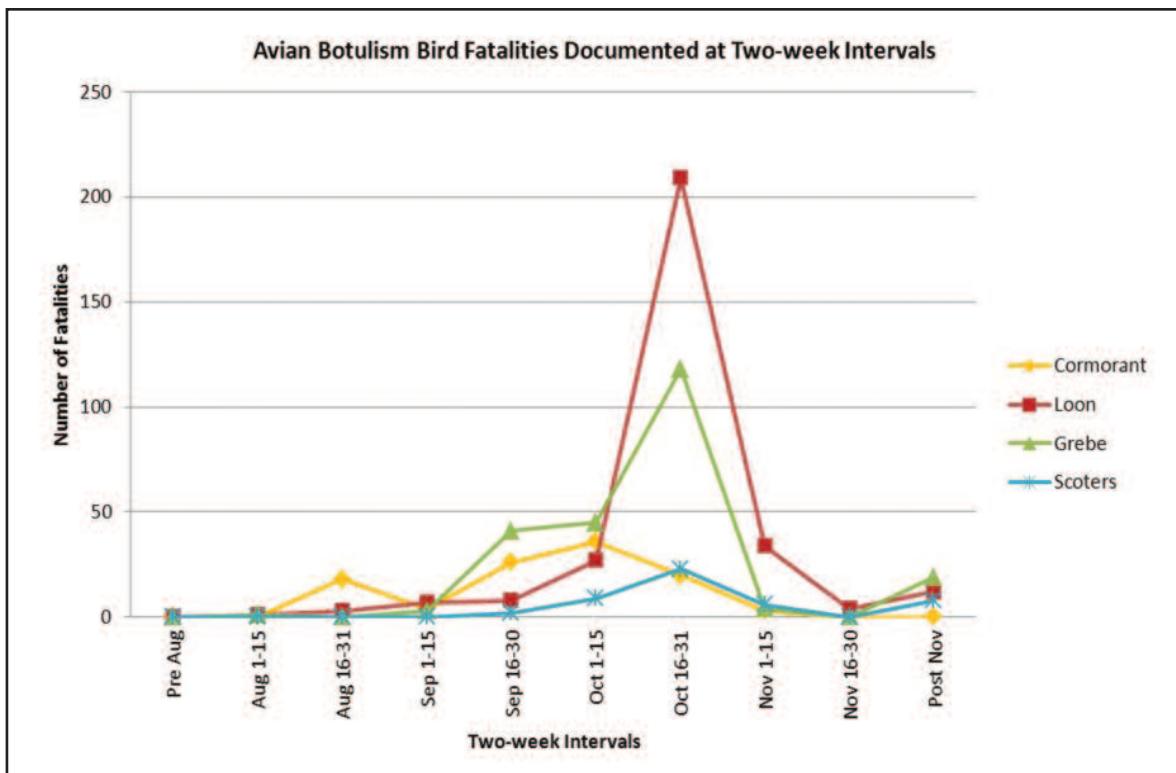


Figure 3 shows the avian fatalities reported in two-week intervals for the four largest categories of birds. Most cormorant fatalities occurred late-August through mid-October, which is earlier than other affected birds. The peak of documented fatalities for loons, grebes, and most of the other birds occurred in mid- to late-October, which is the time period when avian botulism outbreaks climaxed in past years.

What caused the intense avian botulism outbreaks this fall?

Do you remember the warm summer weather we experienced last year in Northern Michigan...back in March? And then a long, warm, and dry summer? Although greatly appreciated and enjoyed by many, the nice weather likely contributed to the avian botulism outbreaks. These outbreaks typically occur from late-summer through November, which is when algae and aquatic plants are dying and decomposing, and water temperatures are warmer.

The botulism toxin is produced by a bacterium called *Clostridium botulinum*, which occurs naturally throughout the waters and soils of Northern Michigan. The bacteria produce the toxin under anaerobic (without oxygen) conditions, which can occur in areas of lakes where large amounts of dead algae and other vegetation settle and decompose. In general, toxin production is

limited, but the severe avian botulism outbreaks that occurred in the northern Lake Michigan region during recent years suggest an environmental change is contributing to the problem.

Experts believe that recent outbreaks are the results of ecosystem alterations in Lake Michigan brought about by invasive species, in particular zebra and quagga mussels. These filter-feeding mussels have disrupted the lake's natural nutrient cycle by removing nutrients from the water column as they filter-feed on free-floating planktonic algae and subsequently concentrating nutrients, excreted in their waste, at the lake bottom. This concentration of nutrients, coupled with increased water clarity that allows sunlight to penetrate deeper into the lake, fuels heavier than normal growth of periphytic (bottom-dwelling) algae on the lake bottom. When the algae die and decompose, aerobic (oxygen consuming) bacteria involved in the decomposition process deplete the limited dissolved oxygen stores in the water, thereby creating the conditions necessary for the production of the toxin. Not only do the invasive mussels contribute to botulism toxin production, they subsequently filter the toxin out of the water as they feed and it becomes concentrated in their bodies. When waterfowl feed on the mussels, or on mussel-eating fish such as invasive round gobies, they become intoxicated and die. The toxin-laden fish also die from botulism, which is particularly unfortunate in the case of our native Lake Sturgeon.

Thus, the atypically warm weather during 2012 likely set the stage for the distressing avian botulism outbreak we witnessed. In addition, some suspect that declining water levels in the Great Lakes could be contributing to the problem. The wildlife fatalities documented by volunteers and the public in Emmet and Charlevoix Counties during 2012 are presented in Table 1.

We would like to thank all of our Beach Rangers for collecting data and contributing to regional efforts to better understand avian botulism outbreaks. Our hope is that these efforts ultimately reduce impacts to birds, fish and other wildlife inhabiting the Lake Michigan coastline.

Table 1. Documented wildlife fatalities.*

Wildlife Type/Species	Fatalities	Wildlife Type/Species	Fatalities
Cormorant	113	Canada Goose	3
Loon	431	Common Goldeneye	1
Horned Grebe	77	Long-tailed Duck	13
Red-necked Grebe	109	Mallard Duck	5
Unspecified / Unknown Grebe	45	Unspecified / Unknown Birds	65
Herring Gull	25	Common Carp	6
Ring-billed Gull	15	Burbot	1
Unspecified / Unknown Gull	13	Lake Sturgeon	1
Common Merganser	22	Walleye	1
Red-breasted Merganser	0	Lake Trout	1
White-winged Scoter	45	Salmon**	Omitted
Surf Scoter	5	Unspecified / Unknown Fish	8
Bufflehead	0	Squirrel (unspecified)	19

*Reported fatalities not necessarily due to botulism.

**Salmon omitted due to the high degree of natural mortality that occurs in their life cycle during the monitoring period.

Becoming a Beach Ranger

An annual Beach Ranger Workshop with ECLA is held each September to train volunteer monitors. If you are interested in becoming a Beach Ranger to help monitor botulism outbreaks, contact Dan Myers at 231-347-1181 or dan@watershedcouncil.org. Volunteer beach rangers generally monitor on a weekly basis from early September through late November. Resources and general information about avian botulism can be found under the "Learn" tab at www.watershedcouncil.org.

Regional Partners

Coordination of avian botulism monitoring is performed regionally by these organizations in the northern Lake Michigan region:

Benzie and Leelanau Counties – Michigan Sea Grant www.miseagrant.umich.edu

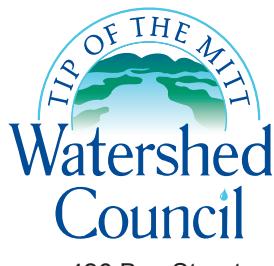
Sleeping Bear Dunes National Lakeshore – National Park Service www.nps.gov/slbe/index.htm

Grand Traverse County – Watershed Center of Grand Traverse Bay www.gtbay.org

Antrim County – Loon Network www.loonnetwork.org

Delta, Mackinac, Menominee, and Schoolcraft Counties – Common Coast Research and Conservation www.commoncoast.org

Northern Wisconsin – Northern Lake Michigan Volunteer AMBLE www.nwhc.usgs.gov/amble



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