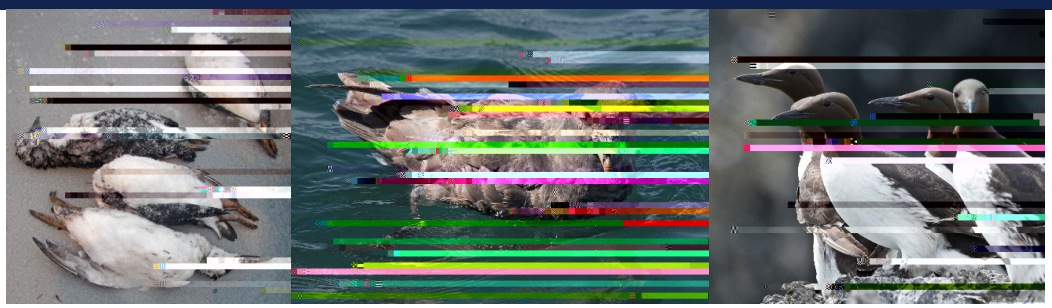
Harmful Algal Bloom Toxins in Alaska Seabirds

USGS Alaska Region
Alaska Science Center
USGS National Wildlife Health Center and
USFWS Alaska Region
Migratory Bird Management



September 2018

Seabird die-o s

Unusually large numbers of dead seabirds have been found on shorelines and lakes throughout Alaska durin 2015-2018. More than 45,000 dead Common Murres (Uria aalge) were counted in the Gulf of Alaska in 2015- 2016, and many dead birds have been reported from the Bering and Chukchi seas in 2017-2018. Seabird die occur irregularly, but recent die-o s were unusual due to the large number and variety of species a ected, the long die-o duration, and the large spatial extent. Coastal residents and scientists have been monitoring the s and scope of these die-o s, as well as investigating potential causes.

Why did the birds die?

Necropsy information from more than 200 birds examined by the U.S. Geological Survey (USGS) National Wildlife Health Center (NWHC) and the USGS Alaska Science Center (ASC) found that birds starved to death. This nding was presumably related to changes in prey availability associated with persistently warm ocean temperatures. Preliminary tests by the National Ocean and Atmospheric Association (NOAA) also detected saxitoxin, a harmful algal bloom (HAB) neurotoxin, in some birds, prompting further study. To evaluate whether HAB toxins may have contributed to seabird deat the ASC, in collaboration with NOAA and other partners, tested birds from multiple locations during 2015-201 for saxitoxin and domoic acid. Samples included tissues from die-o carcasses harvested during necropsies, a well as tissues from apparently healthy (hereafter “healthy”) birds captured live via noose pole or collected at colonies (Figure 1).

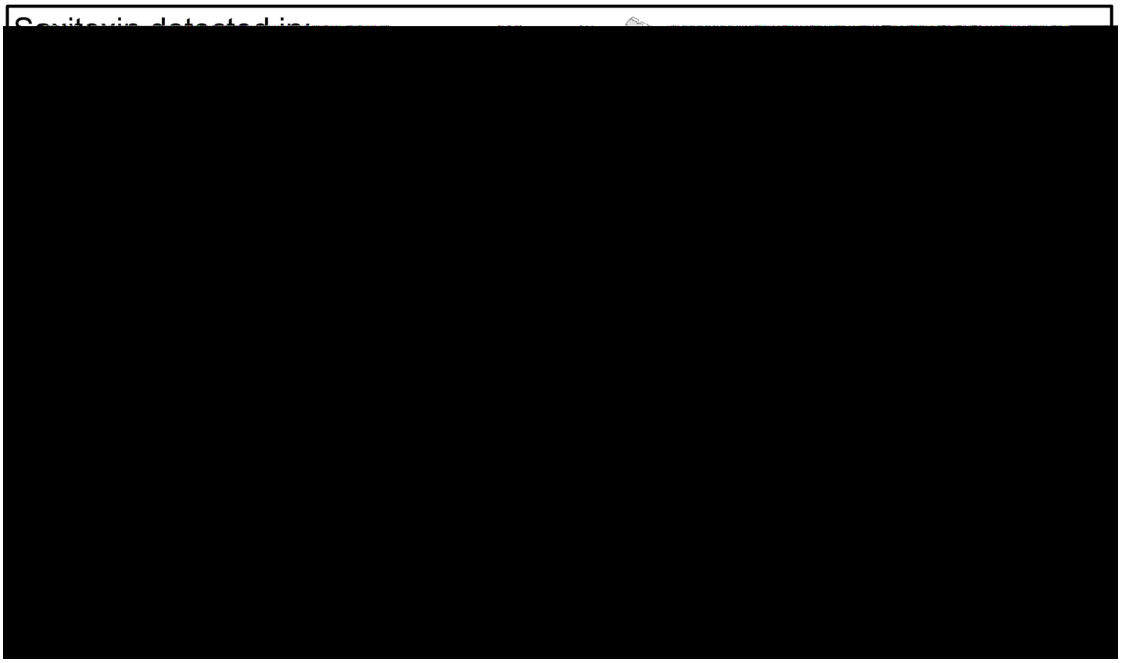


Figure 1. The distribution of sampled seabirds with detectable levels of saxitoxin in Alaska from 2015-2017. Detectable levels of saxitoxin (>1-2 µg/100g) were found in both die-o (31 of 69) and “healthy” (22 of 63) birds.

What are harmful algal blooms?

Harmful algal blooms are large growths of algae that produce potentially harmful toxins. These toxins are produced by certain phytoplankton species, and can cause severe illness or death in animals if ingested in high enough concentrations. The primary HAB neurotoxins in Alaska are saxitoxin and domoic acid. Little is known about what levels of these toxins could cause illness or death in seabirds.

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HAB toxins in Alaska seabirds

Saxitoxin was common in both die-o (45%) and “healthy” (35%) birds across di erent seabird species, locatio seasons, and years. Concentrations also varied by tissue type. Trace levels of domoic acid were found in only of the 86 seabirds tested.

The occurrence of saxitoxin di ered by species. We found detectable levels of saxitoxin in about one-third of: “healthy” Black-legged Kittiwakes (Rissa tridactyla), “healthy” murres, and die-o murres. In contrast, saxitoxin was detected in almost 90% of die-o Northern Fulmars (Fulmarus glacialis). Quanti able levels of saxitoxin were highest in fulmars, followed by die-o murres (Figure 2). All saxitoxin levels were below advisory limits for human consumption of shell sh (80 g/100 g); however, these limits do not apply to seabirds, and thus we cannot advise on human harvest or consumption at this time. The NWHC and ASC are currently investigating the impacts of low-level exposure of HAB toxins on birds.

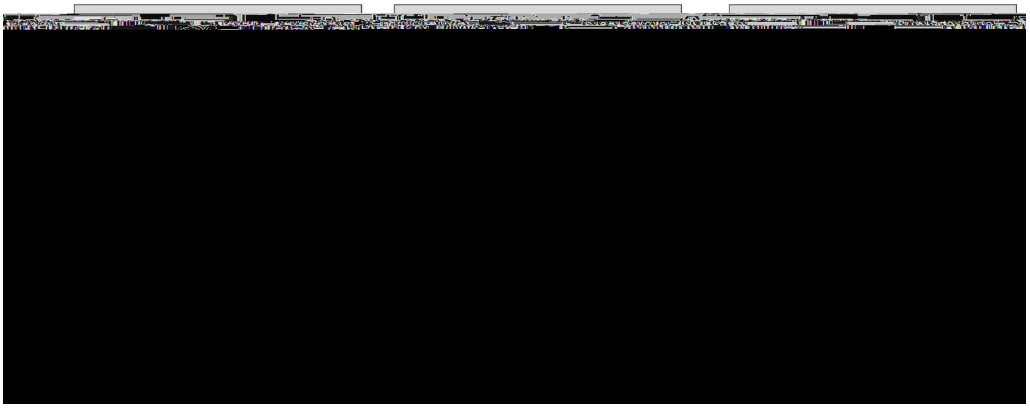
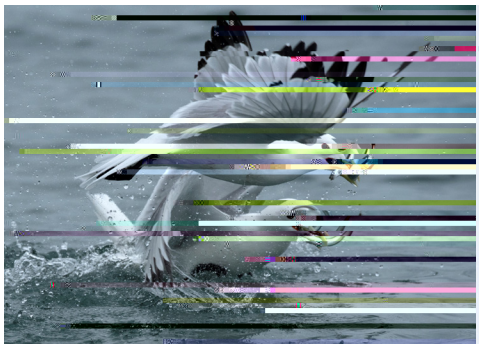
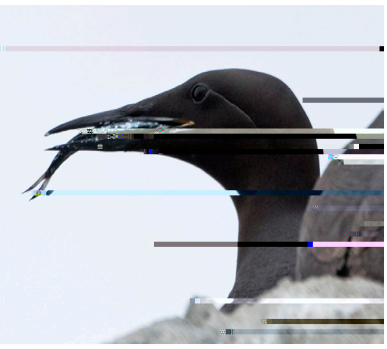


Figure 2. Die-o and apparently healthy birds from 2015–2017 with quanti able levels of saxitoxin (STX). In each boxplot the horizontal line is the median, the box represents the rst and third quartiles, the whiskers extend to the highest and lowest values within 1.5x the inter-quartile range, and points denote outliers.





HAB toxins in forage sh & invertebrates

The ASC also tested forage sh and invertebrates, the typical prey of seabirds, for HAB toxins. We found that they also contained detectable levels of saxitoxin (31% of 85 samples) and domoic acid (12% of 34 samples). Studies to better understand how HAB toxins move through the marine ecosystem are currently underway.

Conclusions

- Unusual seabird die-o s have occurred throughout Alaska since 2015.
- The direct cause of death was attributed to starvation.
- Saxitoxin was found in both die-o and apparently healthy seabirds.
- There is no evidence that seabirds died from acute toxicity, but little is known about the e ects of low-level saxitoxin exposure on seabirds.

What should you do if you nd dead or dying seabirds or have questions?

- Report observations of sick/dead birds to the U.S. Fish & Wildlife Service (1-866-527-3358; AK_MBM@fws
- Participate in monitoring e orts on your local beaches with the Coastal Observation and Seabird Survey Team (COASST; www.coasst.org).
- Contact Caroline Van Hemert (907-786-7167; cvanhemert@usgs.gov) or Sarah Schoen (907-786-7467; sschoen@usgs.gov) with questions.