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The Chicago Ring-Billed Gull Damage Management Project

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ABSTRACT: The population of ring-billed gulls in the upper Midwest has increased exponentially in recent decades leading to a variety of conflicts including property damage, negative economic impacts, threats to human safety, and potential threats to human health. Some studies have suggested a link between gull fecal droppings and elevated *Escherichia coli* levels, which result in swim advisories and bans on public beaches. The objectives of the Chicago ring-billed gull damage management project were to reduce the local production of ring-billed gulls, to evaluate the effects limiting gull production has on gull use of beaches, and to reduce the severity of conflicts with gulls including the issuance of swim advisories and swim bans. Between 2007 and 2009, we applied corn oil to 52 - 80% of nests in 2 large gull colonies in Chicago and successfully reduced hatching success and subsequent fledging of 18,000 - 42,000 gulls per year without causing colony abandonment. Fewer hatch year gulls were observed in 2009 on Chicago's beaches compared to 2007. The reduction in the number of gulls using Chicago beaches has contributed to a reduction in conflicts with gulls, including a decrease in the frequency of swim advisories/bans on Chicago's beaches in comparison to 2006.

KEY WORDS: bacterial contamination, Chicago, egg oiling, *Escherichia coli*, human health, Illinois, integrated pest management, *Larus delawarensis*, ring-billed gull, swim ban, visual counts

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INTRODUCTION

The high population of ring-billed gulls (*Larus delawarensis*) in the Chicago, IL region causes the following problems for people and the environment: 1) nuisance in public open spaces; 2) property damage; 3) adverse aesthetic impacts; 4) foul odors near nesting sites; and 5) potential health and safety risks caused by accumulation of fecal material on buildings, near outdoor dining areas, and at recreational sites. Specifically, gulls reduce recreational enjoyment of beaches by contributing bacteria that may result in swim advisories and bans on public beaches. In Chicago, a large gull nest colony exists on Dime Pier in Lake Michigan and on a dike in Lake Calumet. Marinas exist near each colony, and it is thought that gulls from these colonies are partially responsible for excessive amounts of bird droppings on boats and docks in the marinas. Gulls which nest on Dime Pier frequently inhabit Navy Pier, a nearby popular tourist attraction, and create negative interactions with large numbers of people. In addition, land managers from nearby private, city, and federal properties report that gulls create nuisances at their facilities.

Recent research has documented a cause and effect between gull use of habitats and increased bacterial contamination. Whitman and Nevers (2003) noted that the number of birds on a beach may relate to the bacterial contamination of recreational waters. Edge and Hill (2007) showed that bird droppings served as primary sources of *Escherichia coli* contamination. Levesque et al. (2000) documented that the bacterial content of ring-billed gull droppings can contribute to microbiological

contamination of recreational waters, and Nugent et al. (2008) described how ring-billed and other gulls contributed to increased fecal coliform levels in a municipal drinking water source. Data collected on or near Chicago beaches indicated that gulls were the source of *E. coli* in $\geq 50\%$ of the samples (Whitman et al. 2004). Gull numbers at beaches appeared to be significantly correlated with water and foreshore sand concentrations of *E. coli* taken 24 hours later (Whitman et al. 2004). Whitman et al. (2004) also reported DNA fingerprinting of *Salmonella* isolates from sand and water at 63rd Street Beach in Chicago were a reasonably good match to gull feces isolates, but other birds could also have been *Salmonella* vectors.

Immediately to the north of Chicago, the Lake County Illinois Health Department has confirmed that gulls at North Point Beach and Illinois Beach State Park were the primary source of the *E. coli* as illustrated by a DNA ribotyping study (M. Adam, Lake County, personal comm., July 29, 2009). Further public health concerns were noted at beaches heavily used by gulls when additional studies conducted by the Lake County, IL Health Department in 2008 identified the pathogens *Salmonella* spp. and *Proteus mirabilis* in fresh gull feces at both of these beaches as well as other Lake County beaches (M. Adam, Lake County, personal comm., July 29, 2009). It has also been demonstrated that in Racine, Wisconsin, gull feces is capable of carrying human pathogens (Kinzelman et al. 2008) and that gulls are a significant non-point source of fecal contamination on beaches (Kinzelman et al. 2004).

Swim bans due to high levels of *E. coli* result in a devaluation of Chicago's beaches and a loss of revenue. A University of Chicago study estimated that swim bans can result in a 45% decline in attendance on beaches, \$17.3 million in lost economic value, and an additional \$2.1 million lost expenditure value in a single year (Shaikh 2006).

OBJECTIVES

The objectives of the Chicago Ring-Billed Gull Damage Management Project were to reduce the production of ring-billed gulls in Chicago, to evaluate the effect oiling gull eggs has on gull use of Chicago's beaches, and to reduce the severity of conflicts with gulls including the issuance of swim advisories/bans. We hypothesized that oiling the majority of ring-billed gull eggs would reduce the number of hatch year (HY) ring-billed gulls produced in Chicago and that this decrease would ultimately reduce the severity of conflicts with gulls, including issuance of swim advisories/bans.

METHODS

Colony Assessment and Egg Oiling

The number of gull nests in each colony was estimated based on the largest number of nests observed during a single oiling treatment (which may have spanned over several days to treat the entire colony) in 2007, 2008, and 2009. The oiling treatment consisted of 2 or more WS staff walking transects through the colony with backpack sprayers to apply food-grade corn oil to all the eggs in each selected nest. Once a majority of the colony was oiled, staff flagged and counted the remaining untreated nests to obtain an actual total count. In 2007, we marked 742 gulls with patagial tags to determine local movement of gulls from the 2 colonies.

Gull Observation Surveys

Gulls were observed at Chicago beaches, harbors, and points of historic gull concentration along Lake Michigan during the 2007 - 2009 swim seasons. The nest colonies at Dime Pier and Lake Calumet were observed periodically to assess HY development and colony fledged date.

In 2007 and 2008, gulls were harassed with canines at 3 beaches in the study area. In 2009, canine harassment did not take place on Chicago beaches. To minimize potential effects canine dispersal of gulls may have had on observational data, all information presented in this report related to gull observational surveys and beach water quality excludes data from beaches where canines were used to disperse gulls.

Systematic counts of HY and after hatch year (AHY) gulls were conducted multiple times per week during the middle of swim season on 10 beaches. For each beach, the mean number of gulls observed during the six 1-week blocks of observations were compared among summers across 2007, 2008, and 2009.

Swim Advisories/Bans on Chicago's Beaches

The Chicago Park District examines near-shore water quality at swimming beaches in the City. If the average of 2 water quality samples from a beach indicate levels of *E. coli* >235 colony-forming units (cfu)/100 ml of beach

water tested, a swim advisory is issued for the beach the following day. If the average of 2 water quality samples indicate levels of *E. coli* $\geq 1,000$ cfu/100 ml of beach water tested, swimming is banned on the beach the following day. The proportion of the combined number of swim advisories and swim bans issued on each beach was compared between the year prior to managing gull production (2006) and 2007, 2008, and 2009.

RESULTS

Egg Oiling

Approximately 52% of the nests were oiled in 2007 and approximately 80% of the nests were oiled in each colony in 2008 and 2009. Slightly fewer gull nests were observed in total among both colonies in 2009 than in 2008.

Observations of Gull Use of Chicago Habitats

In 2007, we observed patagial tagged gulls from both colonies at all Chicago beaches we observed throughout the summer. During the first few weeks after fledging in 2008 and 2009, slight increases in HY gull use of beaches were observed. After this period, HY gull use of beaches remained stable and eventually declined late in the swim season.

The mean number of HY gulls on each of the 10 beaches observed in 2009 declined in comparison to 2007. During the initial summer of observations in 2007, when approximately half of the nests were oiled, HY gulls represented about 40% of the total gulls observed on beaches during the mid-swim season. In contrast, during the same period of 2009, HY gulls represented about 10% of the total gulls observed on beaches.

Beach use by AHY gulls did not experience the dramatic decrease observed with HY gulls. However, a slight reduction in AHY gull use of beaches was detected in 2009. The mean number of total gulls observed using beaches during 2009 declined from that in 2007.

Frequency of Swim Advisories/Bans on Chicago's Beaches

In comparing the issuance of swim advisories/bans starting the year before gull work was initiated (2006), the proportion of water quality tests resulting in an advisory/ban declined during each of the subsequent 3 years during which the production of HY gulls within Chicago was managed. The most notable improvement was experienced when comparing advisories/bans between 2006 and 2009, when nearly all beaches examined exhibited a decrease in the proportion of swim advisories/bans.

DISCUSSION

This project reduced the annual production of HY ring-billed gulls in Chicago. We did not attempt to alter the historical, regional trend of increasing ring-billed gull numbers. Rather, we attempted to reduce the number of gulls using Chicago's beaches during the swim season and their corresponding local conflicts with humans.

It appears that nest management efforts have resulted in a slight decrease in the combined number of gull nests in the 2 colonies. Unfortunately, the exact change in nest numbers/colony size over the past 3 years is unknown,

since no pretreatment estimate of the number of gull nests is available for the years preceding initiation of the project (2006 and earlier). In addition, fewer nests in these 2 large colonies should not lead to the conclusion that fewer gulls are nesting in Chicago, as gulls could be selecting nesting locations outside of the 2 colonies yet still within Chicago. Additionally, we did expect that it would take multiple years of limiting the production of gulls before a decrease in the local gull population would be observed due to mortality/attrition of these long-lived (10-15 years) birds that habitually return to their nest colonies (Southern 1977, Southern and Southern 1985, Ehrlich et al. 1988, Kinkel 1989).

Analyses of gull use of beaches was conducted by comparing the number of gulls observed on beaches in 2009 to the number observed in 2007, the year egg oiling was initiated by treating approximately half of the nests. While no estimate of gull use of Chicago beaches is available in years prior to initiation of our gull management efforts in 2007, it is highly likely that gull use of beaches in 2006 and prior years was greater than it was in 2007 (our baseline year for comparison). Unfortunately, it is impossible to estimate how much our efforts to limit gull production in Chicago ultimately decreased gull use of beaches in 2007, 2008, and 2009. During the past 2 years (2008 and 2009), we have found that oiling most of the nests reduced the number of HY gulls observed on beaches and ultimately reduced the proportion of HY gulls utilizing the beaches down to less than 10% in 2009.

Observations of gulls patagial tagged in Chicago nest colonies confirmed that these same birds are utilizing beaches within the City. Total gull use of beaches early in the swim season prior to fledging of HY gulls has remained unchanged during the 3 years of observations. It should be noted that only AHY gulls are using beaches prior to fledging. Nevertheless, by limiting gull production at the colonies, we have reduced the local HY population and subsequent conflicts with gulls and the frequency of swim advisories/bans have decreased during the mid and late swim season.

When comparing the base year (2006) swim advisory/ban frequency to 2009, a statically detectible reduction in the proportion of tests exceeding health standards were observed at approximately one-fourth of the beaches. It should be recognized that the relationship between water quality and gull numbers, gull excrement, temperature, wind/wave/rainfall patterns, and other environmental variables is complex. Historically, the frequency of swim advisories/bans begins to increase during July, which is possibly a result of the synergetic effect of HY gull use of beaches and other variables. It appears that simply reducing the production of HY gulls can considerably decrease gull use of beaches during the swim season. Additionally, gull use of beaches is one of the few potential factors which contribute to fecal coliform in swim water that we can control. Therefore, effective gull management programs, as demonstrated by our work in Chicago, can help in reducing swim advisories/bans due to fecal deposits by gulls.

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