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Managing Bird Populations at an Incompatible Land Use near an Airport: Dike 10B Confined Disposal Facility

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Abstract: Many airports throughout the world have been built on or adjacent to bodies of water. Due to their location, they are often negatively impacted by wildlife attracted to surrounding areas such as harbors, arenas, beaches, and parks. These same lakes and rivers often serve as shipping channels that support the city to which the airport services. Such is the case at Burke Lakefront Airport (BKL) in Cleveland, Ohio. In 1998, the U.S. Army Corps of Engineers (USACE) constructed Dike 10B, a 64-acre confined disposal facility (CDF) adjacent to BKL to manage contaminated dredge materials removed from the shipping channels of the Cuyahoga River. The facility has become a protected body of water with nutrient-rich sediment and sometimes lush vegetation. Numerous waterfowl and shorebirds are drawn to the facility to loaf and feed. In April 2006, U.S. Department of Agriculture, Wildlife Services entered into a one year Interagency Agreement with the USACE to manage the wildlife in Dike 10B. Through interagency communication, altered project methodology, and an integrated wildlife damage management approach, bird populations using the CDF were reduced, thus promoting safer airspace for aviation operations at BKL.

INTRODUCTION

Where rivers and lakes meet, there is a naturally high level of sediment deposition. As a result, rivers used as shipping channels must be routinely dredged to maintain safe, navigable depths. Most cities along the shores of the Great Lakes are allowed to freely dump dredge sediments into designated offshore areas. However, when benthic materials are too toxic for free dumping, cities must find alternative means to deal with the materials. Confined Disposal Facilities (CDF) are designed to manage such toxic dredge materials. CDFs are essentially holding facilities, where contaminated slurry is pumped in, allowed to settle, and the water is

decanted, allowing the sediment to dry. Through air, sunlight, and other natural exposure, the toxins are slowly stripped away, leaving uncontaminated new land as the result.

To reduce costs, these CDFs are often positioned in close proximity to the dredging sites. The city of Cleveland, Ohio, on the south shore of Lake Erie, has benefited from several of these CDFs over the last few decades. In fact, the greater part of Cleveland's shoreline has been reshaped using these facilities. Dike 10B is the current active CDF for depositing dredge materials from the Cuyahoga River shipping channel.

BACKGROUND

Formerly used as a landfill, Burke Lakefront Airport (BKL) is approximately one mile east of the center of Cleveland. Lake Erie borders the airport to the North, East, and West and the Cleveland Memorial Shoreway serves as the southernmost boundary. BKL initiated operations in August 1947, using a 3,600-foot dirt runway. In 1957, additional landfill was used to create a second 5,200-foot paved runway. Over the years, BKL has grown to become the major reliever airport for Cleveland Hopkins International Airport, hosting primarily general aviation, air taxi, and military operations. The 484-acre airport, owned and operated by the City of Cleveland's Department of Port Control, presently records about 85,000 aircraft operations per year using runways 06L/24R (6,198 feet) and 06R/24L (5,200 feet).

In spring 1998, the United States Army Corps of Engineers (USACE) began construction on Dike 10B, a 64-acre CDF that would be used to accommodate Cuyahoga River dredge materials through 2018. This CDF, situated adjacent to BKL along its north perimeter, is roughly 200 feet from the main runway. Dike 10B is currently approaching capacity and expected to be full in 2007, 11 years ahead of the initially predicted date.

Due to its location next to Lake Erie, BKL has historically been negatively impacted by wildlife hazards to aviation. Gulls and waterfowl have used the airport property for feeding,

loafing, and even nesting. Nationally, gull and waterfowl strikes combined have cost the civil aviation industry a conservative estimate of over \$103,000,000 over the last 16 years (Cleary et al. 2006). The presence of the birds has led to a long history of strikes at BKL, with some resulting in major damage. One serious incident occurred at BKL in 1981 when a U.S. Air Force T-38 ingested a ring-billed gull on take-off (Richardson 1994). The pilot landed on the rocks of the shoreline when his parachute did not open, causing fatal injuries. The aircraft was destroyed.

The construction and filling of Dike 10B has resulted in a protected body of water with nutrient-rich sediment and lush vegetation, resembling a shallow marsh. Geese and gulls were previously attracted to ponding water on the airfield, since it provided a feeding and loafing area that was protected from rough conditions on the lake. The habitat created by Dike 10B now provides a larger protected body of water with a much more substantial food source. Due to the large size of Dike 10B, a greater number and diversity of bird species are now attracted to the airport.

In 2003, Wildlife Services (WS) and the Cleveland Department of Port Control entered into a Cooperative Service Agreement for WS to conduct operational control activities to reduce wildlife hazards to aircraft using BKL and the critical airspace surrounding this airport. A Wildlife Biologist was assigned at BKL to oversee the existing Wildlife Hazard Management Plan (WHMP), already being implemented by Airport Operations personnel. To further enhance the wildlife hazard management program, WS and the USACE entered into a one-year Interagency Agreement (IA) Demonstration Project (DP) on 1 April 2006 to conduct operational activities in Dike 10B to minimize wildlife hazards associated with seasonal dredging operations in the CDF. WS projected a workload of 40 hours per week during the Spring dredge phase (05-27-2006 to 07-01-2006) and Fall dredge phase (11-17-2006 to 12-10-2006), and approximately 10 hours per week for the remainder of the DP.

Prior to the IA between WS and USACE, wildlife management in Dike 10B consisted mainly of pyrotechnic harassment from the North Perimeter Road at BKL. Bird hazards, such as gulls and waterfowl, were harassed primarily from the airport property, and pushed further north of the main runway.

METHODS

The DP lasted from 1 April 2006 through 31 March 2007. To assess the efficacy of management efforts, WS used wildlife survey data collected for the 12 months immediately before the DP (1 April 2005 – 31 March 2006, hereafter referred to as Baseline Period [BP]) compared to survey data for the 12 month DP.

As a proactive approach, WS worked closely with the local USACE office and contractors to modify dredge project plans. Through cooperation and understanding, a plan was developed that would concentrate nutrient-rich dredge discharge into a more localized pit (approximately 6 acres) away from the runway and then decant via a narrow trench along the northern perimeter of Dike 10B. The layout of this plan would allow WS personnel to concentrate all control efforts into a smaller area, while moving the major wildlife attraction an additional 500 feet from the main runway. It is in these key areas that dead gull effigies and Mylar ribbon were placed.

WS employed a number of methods and techniques to manage avian and mammalian wildlife populations at Dike 10B during the DP (Cleary and Dolbeer 2005, Chapter 9). During the DP, the primary harassment technique was various pyrotechnics (810 total pyrotechnics launched) such as; screamer-sirens, bird-bangers, shell crackers, and CAPA devices (which travel 1000 feet before detonating with a loud explosion). WS also used dead-gull effigies hung by legs from 6-foot poles (Seamans 2004), Mylar ribbon (Belant and Ickes 1997), water-filled paintballs, lasers, propane exploders, and firearms. Traditional bird management tools like

Mylar tape and pyrotechnics work if implemented with consistent persistence in an integrated fashion (Chipman et al. 2004). In all, 22 dead-gull effigies and several hundred feet of Mylar ribbon were strategically placed around the pit and along the trench for the Spring '06 dredge phase, and 19 effigies and Mylar ribbon were placed in these same key areas for the Fall '06 dredge phase.

Despite all the non-lethal management efforts in Dike 10B, lethal reinforcement was sometimes necessary. All lethal actions were implemented simultaneously with pyrotechnic harassment when birds were extremely persistent and failed to disperse. The firearms used during the DP consisted of 12 gauge shotguns, .22 caliber rimfire rifles, and .22 caliber air rifles.

WS continued to conduct wildlife surveys twice per month at BKL and in Dike 10B during the DP. The bi-monthly survey figures were averaged to provide a more representative number over the entire month rather than from a single observation. In addition to overall numbers of birds, these surveys also recorded activities in which the birds were engaged. The choices for these activities included: Fly Over, Fly Feed, Ground Feed, Loaf/Roost, on the Water, and Nesting. Species recorded were grouped into seven major categories that represent the bird groups of greatest concern in Dike 10B and at BKL. These categories included: Gulls and Terns, collectively referred to as Gulls (Laridae), Waterfowl (Anatidae), Blackbirds (Icteridae), Shorebirds (Charadriidae and Scolopacidae), Doves (Columbidae), Swallows (Hirundinidae), and Herons (Ardeidae).

RESULTS

All management efforts at BKL for years prior to the DP were not specifically recorded as to deployment location on airport or at Dike10B. For this reason, the types and amount of management techniques used at Dike 10B during the DP could not be quantitatively compared

with previous years. However, the effort expended at Dike 10B during the DP was considerably greater than during the BP.

The variety of harassment methods reduced the likelihood of wildlife adapting to any individual method, ultimately increasing the efficacy of harassment techniques. Though wildlife management in Dike 10B was conducted throughout the DP, the majority of management efforts were concentrated during the Spring and Fall dredge phases of '06. A further breakdown of these efforts is presented in Table 1 of this report. The man hours reflected in Table 1 represent the actual time spent implementing each activity and do not account for man hours invested in monitoring potential wildlife hazards and wildlife surveys.

Table 1. List of wildlife harassment and control techniques used during the Demonstration Project (DP) at Dike 10B, Burke Lakefront Airport, April 2006- March 2007.

Technique Used	Days Employed	Man Hours	Comments
Pyrotechnics	78	27.25	810 Total Pyrotechnics Fired
Shooting	34	12.25	571 Birds Removed
Dead-Gull Effigies	314	3	19 - 22 effigies placed during the Spring and Fall '06 dredge periods
Lasers	3	1	
Paint-ball Guns	2	0.5	
Propane Exploders	1	8	Would have been used more, but experienced technical difficulties
Mylar Tape	314	3	Applied several hundred feet in Spring and Fall prior to dredge

WS dispersed 29,537 birds from Dike 10B using pyrotechnics, firearms, lasers, propane exploders, and paintball guns during the DP (Figure 1). Gulls, waterfowl, and blackbirds were the most numerous groups of birds dispersed.

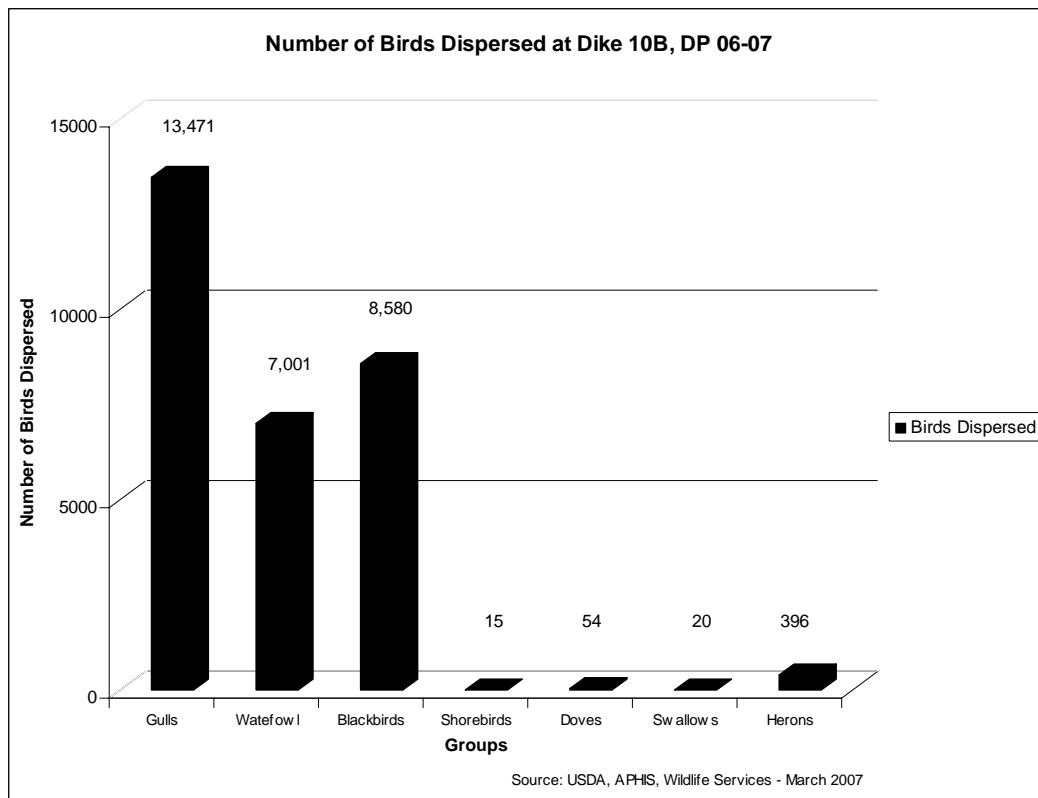


Figure 1. Birds dispersed by group during the Demonstration Project (DP) at Dike 10B, Burke Lakefront Airport, from April 2006- March 2007.

During the DP some birds habituated to the harassment methods and lethal removal was necessary. WS removed 571 birds during the DP to reinforce the efficacy of non-lethal harassment techniques (Figure 2). Red-winged blackbirds and European starlings accounted for the greatest number of birds lethally removed during the DP, with a total of 490 birds taken by shotgun and air rifle.

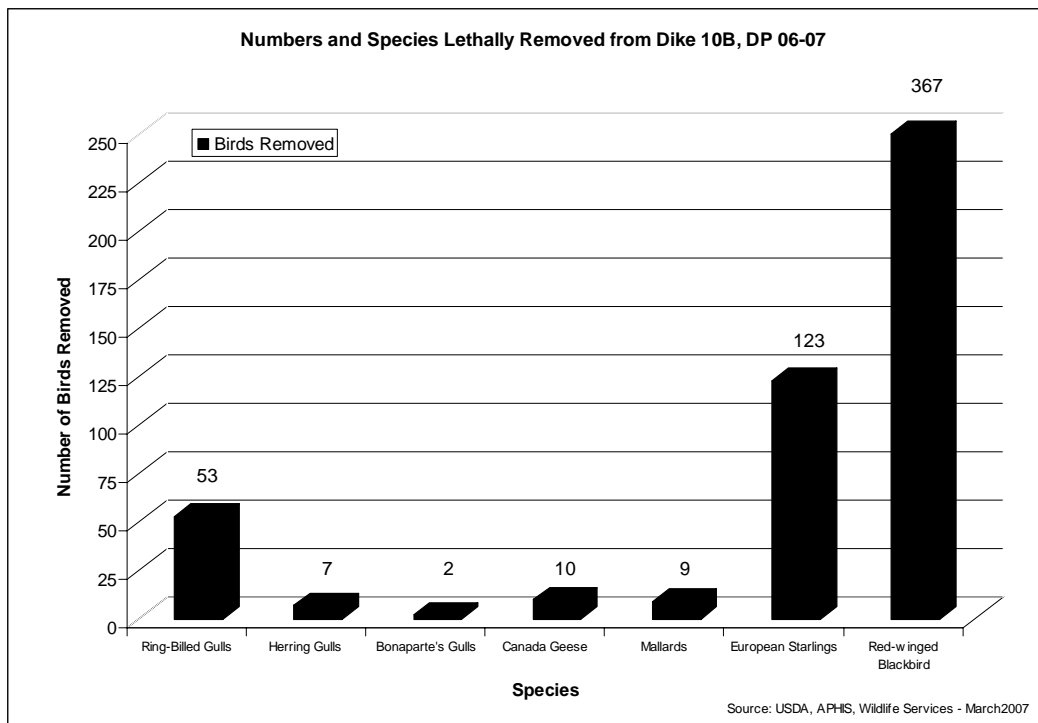


Figure 2. Birds lethally removed by species groups during the Demonstration Project (DP) at Dike 10B, Burke Lakefront Airport, April 2006- March 2007.

The total number of birds observed in Dike 10B decreased from 2,652 during the BP to 1,544 during the DP (Figure 3). This overall reduction was primarily a result of an overall 52% reduction in gull numbers (Figure 3). Gull numbers were especially reduced during the winter months of the DP compared to the BP (Figure 4). The number of gulls landing in Dike 10B decreased by 86% from the BP to the DP (Figure 5).

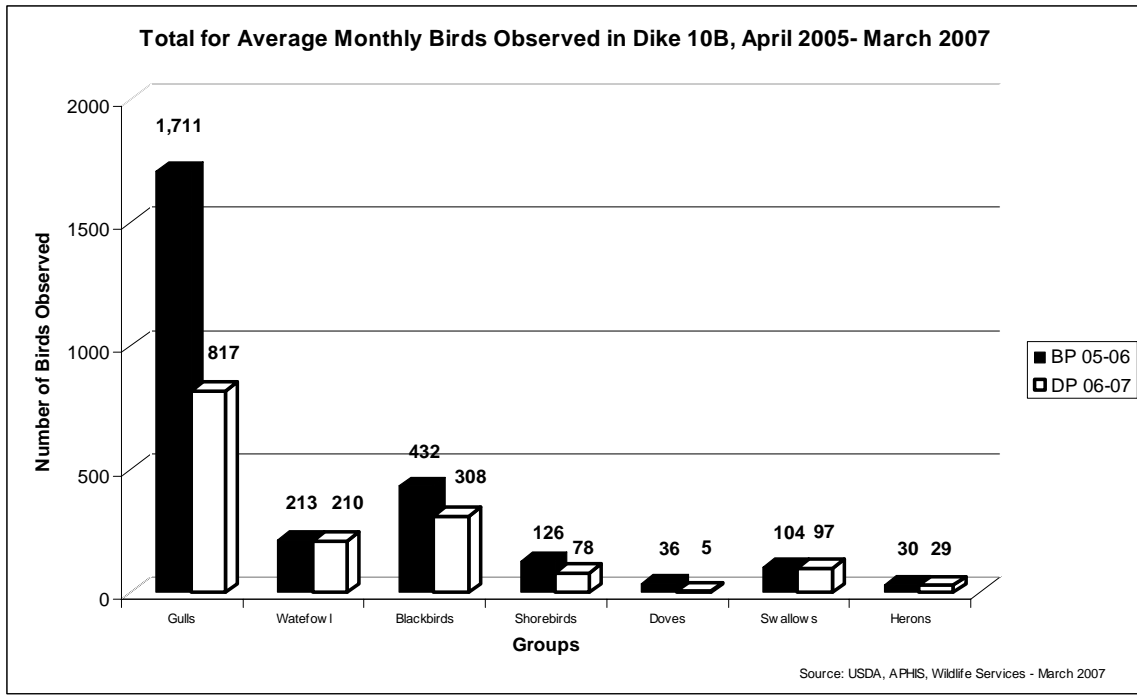


Figure 3. Bird survey results by species groups in Dike 10B from April 2005- March 2006 (Baseline Period [BP]) and from April 2006 - March 2007 (Demonstration Project [DP]), at Dike 10B, Burke Lakefront Airport.

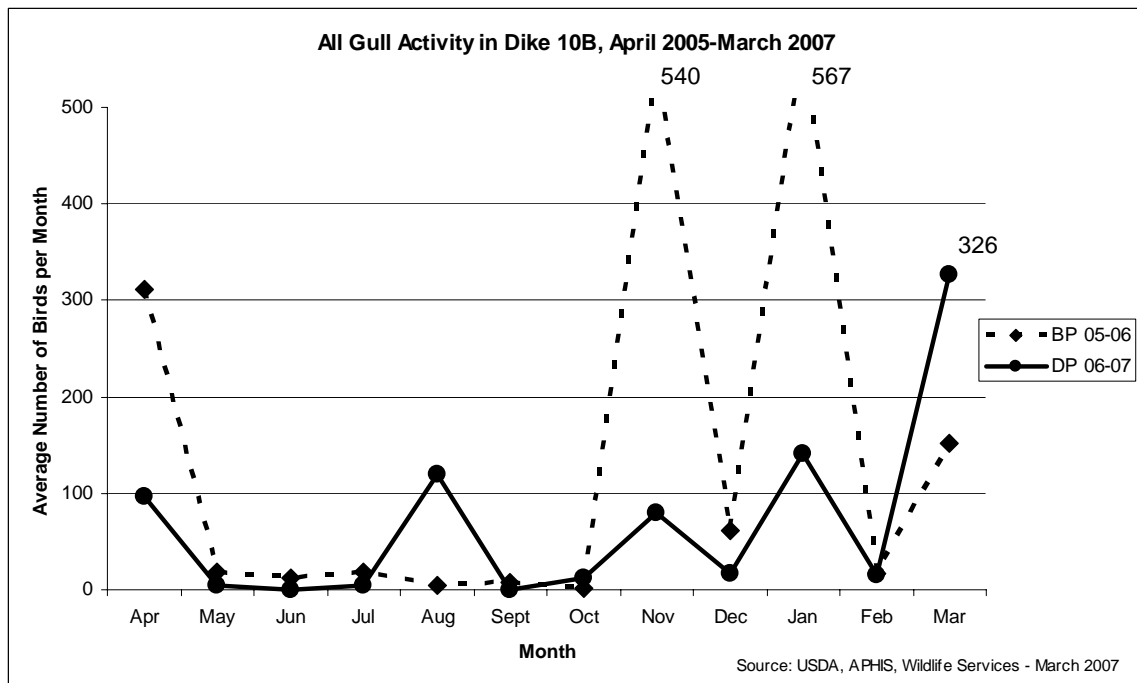


Figure 4. Gull survey results in Dike 10B from April 2005- March 2006 (Baseline Period [BP]) and from April 2006 - March 2007 (Demonstration Project [DP]), at Dike 10B, Burke Lakefront Airport.

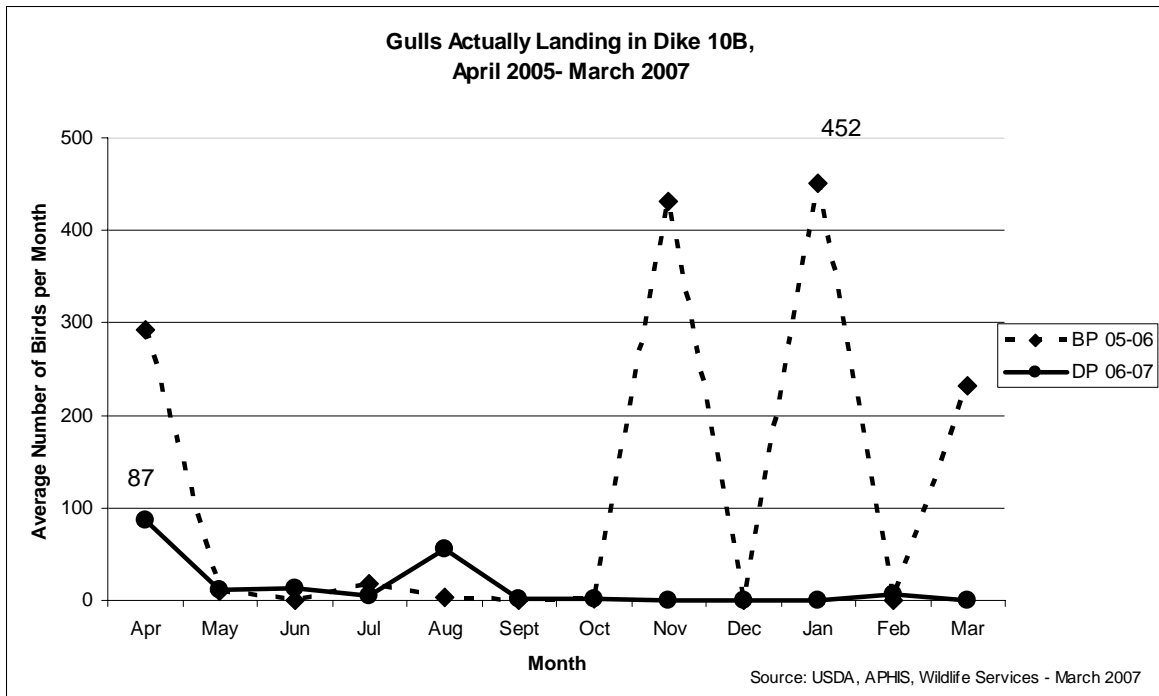


Figure 5. Gulls landing in Dike 10B from April 2005- March 2006 (Baseline Period [BP]) and from April 2006 - March 2007 (Demonstration Project [DP]), at Dike 10B, Burke Lakefront Airport.

DISCUSSION

Wildlife survey results for the 12 month DP, when compared to the same dates of the previous 12 months, yielded many interesting and positive results. For example, our observations and survey results suggested that modified dredge deposition methods were effective in helping to reduce shorebird populations and altering gull use in Dike 10B.

Most notable was the reduction of gulls actively landing in the CDF. With dead-gull effigies and Mylar ribbon strategically placed, increased pyrotechnic harassment, and occasional lethal reinforcement, very few gulls landed in and used Dike 10B during the DP compared to the BP. Due to its unique location, gulls will always be observed flying over and fly-feeding along the shores of BKL. However, our ability to keep these same gulls from touching down and using Dike 10B demonstrated the effectiveness of an integrated wildlife damage management program. Bird surveys conducted at areas of attraction within 2 miles of BKL showed an increase of 154%

in gulls observed from 2004 through 2006 (USDA, Wildlife Services 2007) . This strongly suggests that although gulls were in the immediate area, the majority learned during the DP that Dike 10B was no longer the sheltered oasis it once was. The results of these findings suggest that wildlife management efforts in Dike 10B are proving to be effective in managing ring-billed gulls (*Larus delawarensis*), herring gulls (*Larus argentatus*), great black-backed gulls (*Larus marinus*), Bonaparte's gulls (*Larus philadelphia*), and Caspian terns (*Sterna caspia*). Coincidentally, gull strikes with aircraft at BKL declined by 70% during the 12-month DP (6 gull/tern strikes reported) when compared to the 20 gull/tern strikes reported during the 12-month BP (USDA, Wildlife Services 2007). Future cooperation with the USACE, regarding an integrated wildlife damage management program at Dike 10B, will likely continue this positive trend. Gulls will always be a concern, and intensive harassment and habitat modification will be constantly needed to minimize their presence in Dike 10B.

Mourning dove populations also showed a significant decrease of 86% over this two year period. However, mourning dove populations at both of Cleveland's airports for this same time frame show a significant decrease as well (USDA, Wildlife Services 2007). Therefore, this trend may not necessarily be the result of wildlife management efforts.

While waterfowl, swallow, and heron populations remained fairly constant, blackbirds decreased by 29%. This reduction may be the result of increased harassment and lethal reinforcement under the new IA between WS and USACE. Though waterfowl populations remained constant, this group of birds responded extremely well to harassment efforts.

The total for all shorebird species observed declined by 38% during the DP. This decrease is likely the result of altered dredge methodology, which eliminated the sheeting effect by channeling the majority of runoff through a narrow trench along the northern boundary of Dike 10B. Further analysis of the data shows a 17% increase in killdeer (*Charadrius vociferus*)

numbers. This species, although classified as a shorebird, has a terrestrial lifestyle, and thus was relatively unaffected by the change in dredge methods.

Many species of birds become habituated to harassment methods over time and therefore become difficult to disperse. When this occurs, lethal removal is necessary. Lethal removal also serves to reinforce harassment methods and address the immediate hazard presented by the birds to human safety. While the 571 birds removed in this project may seem exorbitant, they only accounted for 2% of the total number of birds dispersed through non-lethal means. As the lethal removal occurred only after individual birds habituated to harassment, this low percentage of lethal control demonstrates the need for such management efforts as part of an integrated wildlife damage management program.

In addition to the many physical efforts employed during the DP, the collaboration and cooperation of WS, USACE, the Federal Aviation Administration (FAA), and BKL has served an immeasurable role in the success of this project. The open communication and active involvement of all parties has resulted in safer skies for aircraft and wildlife.

Until this DP, many viewed Dike 10B as an incompatible land use at BKL. Though WS recommends all future CDFs be located further from airfields as recommended in FAA AC 150/5200-33A, we now believe that successful wildlife hazard management is a realistic possibility in this CDF until dredge disposal is complete and the area is turned into useable land.

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