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CONTROL OF RING-BILLED GULLS AND HERRING GULLS NESTING AT URBAN AND INDUSTRIAL SITES IN ONTARIO, 1987-1990

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Abstract: Large numbers of ring-billed gulls (Larus *delawarensis) and* much smaller numbers of herring gulls (L. argentatus) have begun to nest at several industrial and urban sites in the Canadian Great Lakes causing a flight safety problem (nesting at end of a runway), disrupting commercial operations (nesting on roads and storage yards), and creating nuisances (noise and smell of the colony and defecations on equipment). Gulls were prevented from nesting by scaring (using tethered birds of prey, moving vehicles, and foot patrols equipped with cracker shells) or by physically excluding them (by installing monofilament lines). At some sites nestbuilding was thwartedby frequently disturbing the nesting substrate through grading, disking, or dragging aboom. Where nesting could not be prevented, reproduction was stopped by collecting eggs repeatedly, or by spraying oil on eggs. Operations at gull colonies were carried out by affected landowners under special permits issued by the Canadian Wildlife Service. Advantages and disadvantages of the different control methods are briefly discussed. Control operations reduced or eliminated local problems but did not reduce the population of adult, urbanized gulls. We predict more problems associated with the expected colonization of other industrial sites by gulls.

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During the period 1976-1990, the nesting population of ring-billed gulls in the Canadian portion of the lower Great Lakes system increased from almost 56,000 pairs to some 283,000 pairs (Blokpoel and Tessier 1991). This population increase was associated with an apparent urbanization of the gulls. More and more gulls began to nest on human-made habitat at large industrial sites in or near urban areas (Blokpoel and Tessier 1986,1991). Gulls nesting at urban industrial sites caused various problems, and during 1984-1990, nesting gulls were controlled at several sites using a variety of techniques. Gulls areprotectedunderthe federal Migratory Birds Convention Act and it is illegal to disturb a gull colony without a special permit issued by the Canadian Wildlife Service (CWS). In cases where a gull colony poses a serious problem, CWS issues permits to the affected landowners, under which they are allowed to disturb gull colonies. These permits usually allow the landowners to scare gulls, but in extreme cases (threats to human health and safety, and economic hardship), collection and destruction of eggs is permitted as well.

The nesting population of herring gulls in the Canadian lower Great Lakes system is 200x smaller than that of the ringbills (Blokpoel and Tessier 1991). Although herring gull numbers have recently increased, there were only 1,300 nests in 1990. Herring gulls caused only a few problems (i.e., nesting on the ground atPolysar, describedbelow; and nesting on roofs at several other sites).

Gull control operations during 1984-86 were described by Blokpoel and Tessier (1987). In this paper, we update that report for those colonies where gulls nested on the ground during 1987-1990. Problems with roof-nesting gulls in Ontario were described elsewhere (Blokpoel and Smith 1988, Blokpoel et a1.1990).

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STUDY AREAS AND COLONY HISTORIES

Bruce Nuclear Power Development (BNPD), Douglas Point.-This fenced Ontario Hydro site, located on Lake Huron (Fig. l), consists of various buildings, woodlots, roadways, and man-made shorelines. Gulls have nested along the waterfront since 1979. In recent years, numbers of ring-billed gulls varied between 6,000 and 7,000 pairs, whereas those of herring gulls varied from 130-220 pairs. Gulls nested on a perimeter road and occasionally triggered a security system (G. Biedermann, BNPD, pers. common.).

Polysar, Sarnia.-The fenced site consists of buildings, storage tanks, various plant facilities, and diked settling ponds. In 1986, a few gulls (probably herring gulls) may have nested on armouring rocks along the St. Clair River, but in 1987 larger numbers were present. To prevent expected problems (noise, smell, defecations, etc.) the company controlled the gulls during 1987-1990 (J. King, Polysar, pers. common.).

DOW Chemical Canada, Sarnia.-The fenced industrial complex is located south of the Polysar site (Fig. 1). In 1987, "hundreds" of gulls (probably ring-billed gulls) nested at a railway loading area and these gulls occasionally attacked and distracted workers when they were loading hazardous chemicals in tanker cars (R. Allen, DOW Chemical Canada, pens. common.). The company began an on-going control program in 1988.

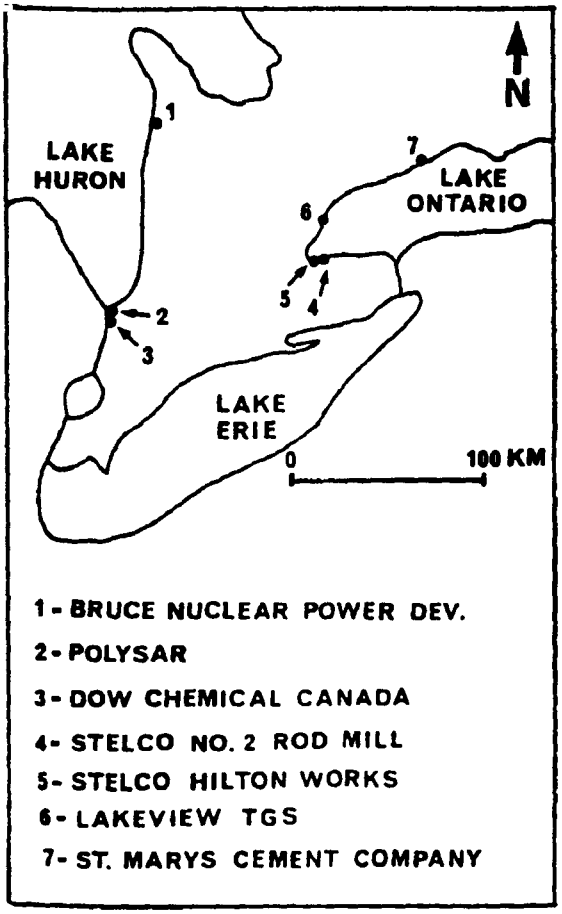

Fig. 1. Urban industrial sites in southern Ontario where ringbilled gull colonies were controlled during 1987-1990.

Stelco, No. 2 Rod Mill, Hamilton.-This site consists of a human-made dike, and an adjacent area of flattened slag. The dike (300 x 10 m) was sodded and planted with trees as required by Ontario's Ministry of the Environment. In 1983, some 100 ring-billed gull pairs nested on the dike. By 1985, their numbers had increased to 4,650 pairs and the gulls were destroying the landscaped area. Stelco began control operations in 1986 (Blokpoel and Tessier 1987) and they were continued during 1987-90 (P. D. Smith, Stelco, pens. common.)

Stelco, *Hilton Works. Hamilton.-This site* consists of piles of materials adjacent to Hamilton Harbour. In 1986, a ringbilled gull colony of 250-300 nests interfered with handling and storing of materials and gull control started that year (Blokpoel and Tessier 1987).

Lakeview TGS, Mississauga.-This thermal generating station of Ontario Hydro consists primarily of a power plant, outdoor coal storage areas, and a cooling channel. Ring-billed gulls began to nest along the channel in 1986. By 1988, nest numbers had increased to 2,700, and the gulls interfered with road traffic and defecated on equipment (H. Waning, Lakeview TGS, pens. common.). Ontario Hydro began control ope in 1988.

Toronto *Island Airport,* Toronto.-Located on an is the Toronto Harbour (Fig. 2), this small but busy ' frequented by gulls. During 1985 and 1986, small nom .ring-billed gulls nested at **the** end of Runway 26, but ' staff destroyed their nests to prevent gull-aircraft collision (Blokpoel and Tessier 1987). During 1987-90, control erations continued.

Fig. 2. Ring-billed gull colony sites near Toronto. Eastern Headland consists of Tommy Thompson Park and the Endykement Area.

Mugg's Island, Toronto.-The north end of this heavily vegetated island in the Toronto Harbour (Fig. 2) holds a large, sandy knoll. In 1984, the 7,700 pairs of ring-bills that nested at and around this knoll caused problems including: (1) threats to air traffic in and out of Toronto Island Airport; (2) many sick, starving, and/or dying fledglings at the nearby Centre Island Park grounds; and (3) defecations on park facilities and marinas. Toronto Metro Parks and Properties began control operations in 1985 when >12,000 nests were present (Blokpoel and Tessier 1987). Operations continued during 1987-90.

Eastern Headland, Toronto.-This human-made land spit projects intoLalceOntarioandconsistsof: (1)TommyThompson Park that is operated by the Metropolitan Toronto and Region Conservation Authority (M7RCA); and (2) the Endykement Area, a series of confined disposal facilities, operated by the Toronto Harbour Commissioners (THC). The number of ringbilled gull nests increased from 20 in 1973 to 75,000-80,000 during 1982 and 1983. By 1983, gulls were nesting all over the

Headland and interfered with construction and traffic. They also impacted on ecologically sensitive areas, and gulls were not part of the Master Plan for the site. After successful tests in 1984, MTRCA hired a contractor to prevent gulls from nesting anywhere on the Headland during 1985 and 1986, except in 3 off-road areas in Tommy Thompson Park. This successful program (Blokpoel and Tessier 1987) was continued during 1987-90.

Outer *Harbour Marina,* Toronto. The marina is located on a human-made peninsula that juts into the Toronto Outer Harbour from the base of the Eastern Headland. Some 1,000 pairs of ring-billed gulls began to nest at the western-most, as yet undeveloped, tip of this peninsula in 1989 (U. Watermann, pens. common.). The THC began bird control in that year to prevent construction delays by the nesting gulls.

GreenwoodRacetrack, Toronto.-In the centre of the ovalshaped racetrack is a small pond surrounded by a lawn and shrubs. Ring-billed gulls began nesting on this lawn in 1989 and control operations began in that year to prevent gulls from interfering with the horse races.

St. *Mary's Cement Company, Bowmanville.-This fenced* site consists of various buildings, docking facilities, and large yards where raw materials are stored. The yards consisted mainly of flat, bare, hard-packed soil but one section had a small pond with some nearby vegetation. This area was particularly attractive to nesting ring-billed gulls. Nest numbers increased from "several hundred" in 1981 to > 17,000 in 1985. The nesting gulls interfered with plant operations and the company began gull control in 1985 (Blokpoel and Tessier 1987). Control continued during 1987-90.

METHODS

Various gull control methods were used at different sites and/or indifferentyears(Table 1). Examples ofthesetechniques are described in more detail below.

Changing habitat.-This method was used only at St. Mary's Cement Company where a pond was filled, surrounding vegetation bulldozed, and the main colony site developed as a storage site for raw materials.

Installing monofilament lines.-Monofilament lines were installed over the dike at No. 2 Rod Mill of Stelco (Blokpoel and Tessier 1987). Lines were installed 30-40 cm above the ground at a spacing of about 120 cm at the DOW Chemical site. Monofilament lines were also used, at a spacing of about 100 cm, over ditches at the St. Mary's Cement site. A small portion of the Lakeview TGS site was also covered by lines 60-90 cm above ground, and spaced about 100 cm apart. We refer to areas where lines are installed as gull exclosures.

Scaring adults.-Intensive scaring operations included dawn-to-dusk harassment using shell crackers, tethered birds of prey, and "mock gull" and distress calls at the Eastern Head land (details in Blokpoel and Tessier 1987). Minor attempts (i.e., occasional harassment by car or foot patrols equipped with shell crackers) occurred at other sites.

Table 1. Methods used to control gull colonies at urban industrial sites in Ontario, 1987-1990

	Method'			
	1987	1988	1989	1990
BNPD			SA	OE
DOW Chemical		DE,SA	DE,IL	IL
Polysar	DE,IL	DE,IL,SA	DE,DS	DE,IL,SA
Stelco RM	DE,IL	DE,IL	DE,GS,IL	DE,GS,IL
Stelco HW	DE	DE	DE	DE
Lakeview TGS		DE,IL,SA	DE,SA	OE
East. Headland	SA	SA	SA	SA
Mugg's Isl.	DE	DE	DE	DE
Gr. Racetrack			DE,SA	DE,SA
Tor. Isl. Airp.	DE,SA	DE,SA	DE,SA	DE,SA
Out. Harb. Mar.			DE	DE,SA
Toronto Zoo			DE	DE
St. Mary's Cem.	CH	CH	CH,DE	CH,DB,DE IL

' CH-changing habitat; SA-scaring adults; IL-installing monofilamentlines; DS-disking substrate; DB-draggingaboom; GS-grading substrate; DE-destroying eggs; OE-oiling eggs.

Destroying eggs.-When issuing a permit to destroy eggs, CWS requires proper collection, transport, and disposal of the eggs. At Mugg's Island, eggs were collected in plastic pails and dumped into specially-dug, on-site pits that were closed immediately afterwards. At other sites collected eggs were transported in heavy-duty plastic bags to landfill sites. Destroying eggs was the only method used at Mugg's Island (Blokpoel and Tessier 1987), but was also an alternative method at other sites.

Grading substrate.-At the No. 2 Rod Mill site, Stelco staff used heavy equipment to grade the flat area 2-3 times a week to prevent nest-building by gulls.

Disking substrate.-At Polysar, company personnel frequently disked a flat area near the river to prevent gulls from building their nests.

Dragging a boom.-At St. Mary's Cement, bulldozers dragged booms over flat areas several times each week to prevent gulls from initiating their nests. This method, as well as grading and disking the nesting substrate, is allowed only if control operations begin as soon as gulls are establishing territories (i.e., well before they have nests with eggs and/or chicks).

Oiling eggs.-At Lakeview TGS and BNPD, a CWS contractor used a backpack sprayer to spray oil on gull eggs to

prevent hatching. These projects were carried out as large-scale experiments that simulated control operations by the affected landowners. The oil was a pure, white mineral oil that was safe to handle, and did not pollute the environment. Eggs were sprayed at least twice (Christens and Blokpoel 1991).

RESULTS

BNPD.-Scaring of adults in 1989 did not appreciably affect the number of nests. Spraying oil on eggs in 1990 resulted in hatching failures of >99.6% and 100% for ringbilled gulls and herring gulls, respectively (Christens and Blokpoel 1991).

DOW Chemical Canada.-Harassment early in 1988 caused the gulls to nest elsewhere on the site. Their eggs were repeatedly collected until the end of the 1988 egg-laying season. During 1989, greater areas were treated with monofilament lines as gulls attempted to nest in new areas. A few eggs were destroyed. In 1990, lines were again installed in all problem areas early in the season and damage was greatly reduced (R. Allan, DOW, pers. common.).

Polysar.-During 1987, a small-scale test with monofilament lines was successful. No gulls nested in the exclosure but some 20 nests were built outside the exclosure. Eggs were destroyed and no chicks hatched. In 1988, lines were installed over a larger area. Again, no gulls nested in the exclosure, but a total of about 50 pairs nested on the sloping shoreline and on the dikes of the setting ponds. Their eggs were destroyed. In 1989 lines were not installed due to construction activities. Disking the main area kept it free from nests. Eggs were destroyed from < 150 herring gull nests on the dikes of the ponds and the sloping shoreline. Lines were installed again over the main area in 1990, but eggs had to be collected from 125 nests on the dikes and shoreline (J. King, Polysar, pers. common.).

StelcoNo. *2 Rod* Mill.-The combination of 3 techniques virtually eliminated gull problems. Fewer than 10 pairs of gulls nested each year during 1987-90 on the dike treated with monofilament lines. Frequent grading of the flat area adjacent to the dike prevented any gulls from nesting there, and nests on sloping surfaces that could not be dealt with by bulldozer were dectrnveti by hand fP. D Smith Stelcn nPrc cnmmun I

Stelco, Hilton Works.-Because no lines could be installed on the piles of raw materials, eggs were collected by hand and destroyed on site each year during 1987-1990, well before hatching could occur. The number of nests were 100-250 in 1987, <100 in 1988, and < 200 in 1989 and 1990 (P. D. Smith, Stelco, pers. common.).

Lakeview TGS.-The gull exclosure installed during 1988 prior to the breeding season, covered < 10°k of the nesting area. Although gulls did not nest inside the exclosure, it had no effect on the total nesting population. Some gulls nesting near the exclosure became entangled in the lines and had to be disentangled. Eggs from nests on or near the road were repeatedly destroyed. In 1989, scaring the gulls had little effect and e were again collected from the road and roadsides. The egg. oiling in 1990 resulted in hatching failures of >99.6% and 10096 for ring-billed gulls and herring gulls, respectively (Christens and Blokpoel 1991).

Toronto Island Airport.-The scaring operations during working hours were not enough to eliminate nesting by ring. billed gulls at the end of Runway 26. Airport staff repeatedly destroyed the eggs of 120, 30, 62, and 49 nests during 1987, 1988,1989, and 1990, respectively (W. Yule, Tor. Isl. Airport, pers. common.).

Mugg's Island.-The frequent egg destructions were succesfull in that < 20 chicks hatched each year during 1987-90, but they did not eliminate the colony. Even after S years of gull control, there were still 1,765 nests early in the 1990 breeding season (Table 2).

Table 2. Numbers of ring-billed gull nests at Mugg's Island, 1985-90.

Year	Date of visit'	Nests with eggs
1985	16 May	12,025
	10 June	7,200
	20 June	120
	3 July	0
1986	6-8 May	10,782
	29 May	9,586
	16 June	4,240
	25 June	0
1987	7-11 May	6,102
	28 May	2,093
	9 June	0
1988	4 May	24
	17 May	367
	6 June	681
	17 June	30
1989	15 May	4,109
	5 June	3,745
	23 June	2
1990	12 May	1,765
	1 June	2,307
	21 June	466
	5 July	0

At each visit all nests were counted before all eggs were collected and destroyed.

Tommy Thompson Park.-As in 1985 and 1986, the 198790 scaring program was 100% effective in preventing gulls from nesting in areas where they were not wanted.

OuterMarina Harbour.-During 1989, all eggs in the new ring-billed gull colony were repeatedly destroyed, and no chicks were produced. In 1990, nesting was virtually elimi

hated by scaring adults during weekdays. Nevertheless, several nests were started during weekends, and a total of 110 eggs were destroyed. No chicks were produced (U. Watermann, pers. common.).

Greenwood Racetrack.-During 1989 several hundred nests were present. A bird-control consultant was called in very late in the breeding season to collect any unhatched gull eggs and to scare adults. That year hundreds of chicks fledged. In 1990, scaring began early in the breeding season. Gulls managed to build < 20 nests during the weekends, and 62 eggs had to be destroyed (LJ. Watermann, pers., common.).

St. Mary's Cement.-The number of ring-billed gull nests declined from 12,133 on 7 May 1986 to < 1,000 on S May 1990. During 1987-90 many construction activities took place in addition to the gull control activities. It is impossible to say how much of the decline was due to what activity.

DISCUSSION

From an ecological point of view, the best way to eliminate nesting gulls would be to change the habitat so that it becomes permanently unsuitable for nesting. In situations where habitat changes are not feasible, gulls can be prevented from landing by persistent scaring. If intensive scaring is not feasible, gull access can be eliminated by installing lines. Where lines are not feasible, gulls can be prevented from completing their nests by frequent disturbances of the nesting substrate (e.g., dragging a boom, grading, or disking). Where it is impossible to prevent gulls from laying eggs, hatching can be prevented by repeated egg destruction or egg oiling.

During 1987-90, the affected landowners used various combinations of control methods to achieve a variety of objectives. The landowners selected gull control alternatives based on the seriousness of existing and future problems, their resources (human, financial, and equipment) and advice provided by CWS. As CWS employees, we were (with one exception) not actively involved in the control operations. However, we attempted to monitor success with phone calls and occasional site visits. This explains, for example, why we do not know for certain what gull species nested at Polysar and DOW Chemical in 1987 and 1988. Despite the lack of scientific rigor in the control operations, we learned much from them. We discuss below advantages and disadvantages of the different methods (Table 3).

Control Methods

Changing habitat.-Because ring-billed gulls nest on almost any substrate, both bare and vegetated, it is virtually impossible to change the habitat to make it permanently unsuitable. At St. Mary's Cement, habitat was made much less attractive by filling in a pond and ditches, and by obliterating vegetation. However, without the construction and control activities gulls would still have nested on the flattened and hardpacked grounds. The only areas truly made unsuitable for nesting are large, steeply-sloped piles of materials covered with plastic. At Stelco Hilton Works, ring-bills nested on piles of raw materials and herring gulls nested on coal piles near Sandusky, Lake Erie (Dolbeer et al. 1990).

Scaring adults.-This method works well, but only if done properly. Intense and persistent harassment using a variety of techniques forced the gulls to give up traditional nesting areas at the Eastern Headland. In the first year, it was most difficult to dislodge the gulls from their old nesting area. However, once many gulls had been displaced (and presumably had begun nesting elsewhere), it became easier each year to keep the area

Table 3. Relative advantages and disadvantages of methods used to control gull colonies on urban industrial sites in Ontario, 1987-90.

	Method'							
	CH	SA	IL	DS	DB	GS	DE	OE
Advantages ,								
Effectiveness in keeping gulls away	H [b]	H	H	L	L	L	L	L
Effectiveness in preventing gulls from nest building	H	H	H	H	H	H	L	L
Effectiveness in preventing hatching	H	H	H	H	H	H	H	H
Degree of permanence	H	L	M	L	L	L	L	L
Degree of humaneness	H	H	M	H	H	H	M	M
Disadvantages								
Costs of equipment	H	H	L	H	H	H	L	M
Costs of materials	H	H	L	L	L	L	L	M
Costs of labor	H	H	H	H	H	H	H	H
Need for specialized skills	H	M	M	M	M	M	L	L
Likelihood of effects on other wildlife	H	M	H	M	M	M	L	L

CH-changing habitat; SA-scaring adults; IL-installing monofilament lines; DS-disking substrate; DB-dragging a boom; GSgrading substrate; DE-destroying eggs; OE-oiling eggs. [b] H-high, M-medium, L-low.

free of nesting gulls. If the scaring program ended, gulls would immediately recolonize the cleared areas. After a colony has been broken up, an unskilled patrol team outfitted with motorbikes, shell crackers, and distress cells may well be able to keep gulls from reoccupying the site in following years.

An established colony is harder to break up than a new one, and any colony is easier to break up if the scaring program is initiated as soon as the gulls arrive. Breaking up a large, established colony through scaring requires dedicated, knowledgeable personnel, and often involves expensive equipment and materials (e.g., at the Eastern Headland trained raptors and a special vehicle to transport them). Therefore, scaring tends to be costly.

Installing lines.-After the good success of earlier tests at Eastern Headland and Mugg's Island (Blokpoel and Tessier 1983 and 1987, respectively), it is not surprising that this method worked well at DOW Chemical and Stelco No. 2 Rod Mill. Drawbacks are that the method is labor-intensive and requires some skill. Also, the monofilament lines become brittle and break, requiring yearly replacement. Another serious problem is the risk of gulls becoming entangled (as was the case at Lakeview TGS). Entanglement can be virtually eliminated by installing the lines before the return of the gulls, keeping the lines taut, and fully covering the entire area where the gulls mightpossibly nest. Nevertheless, even under optimal conditions, areas protected by lines need to be checked at least twice a day for entangled gulls and other birds.

Disturbing the substrate.-Dragging a boom, disking, or grading the substrate at a high frequency thoughout the breeding season prevents nest completion. These methods are fairly labor-intensive and require heavy equipment. However, at many problem sites discussed here, the necessary machinery and skilled operators were readily available on site.

Destroying eggs.-Repeated, systematic egg destruction over several years proved effective in preventing chicks from hatching, but did not eliminate the colony at Mugg's Island. It is likely that after several years many of the original nesting gulls died or moved to other sites. Because Mugg's Island remains attractive it will continue to attract new birds, and without the annual egg collecting operations, the colony would most likely soon grow back to its former size. Repeated egg collections in a large colony require much labor. In the case of Mugg's Island, a large labor pool is available early in the season (to deal with gull eggs) but not late in the season (to deal with injured or starved fledglings).

Oiling eggs.-This methodeffectivelypreventedeggsfrom hatching at 2 sites during large-scale experiments. As with collecting eggs, oiling eggs requires that all nests be located and treated. Although >95% hatching failure was obtained by spraying oil on eggs once, oiling eggs twice resulted in > 99.6% hatching failure. Further operational considerations are cussed elsewhere (Christens and Blokpoel 1991).

Compared with destroying eggs, which can be a m affair at very large colonies, oiling eggs is a much cleaner method for preventing hatching. Both destroying and oiling eggs have drawbacks. Embryos are killed, which may c concern by animal rights groups. Also, gulls incubating ' eggs until well after the normal hatching date may act as d for new birds, whereas the disturbance caused by destroying ' eggs is more likely to discourage gulls.

An Overview of Gull Control in Ontario

Gull problems at urban industrial sites now are dealt with by the affected landowners. Thus, problems are malt with a site-by-site basis, and there is no strategy or plan to con gulls in a comprehensive manner over a large area. The man pitfalls of a large-scale gull control program have been discussed earlier (Thomas 1972, Blokpoel and Tessier 1986), and the need for such a program in Ontario has not been demonstrated (Blokpoel and Tessier 198?).

The control methods now used in Ontario do not involve killing adults or nestlings. A local problem may be solved by displacing the nuisance gulls, but the displaced birds are likely to colonize other unused human-made habitats rather than establish new colonies on natural sites. In the lower Great Lakes there are few suitable natural sites (i.e., islands with little vegetation and no human presence), and those that do exist are often already occupied by herring and ring-billed gulls (Scharf et al. 1978, Blokpoel and Tessier 1991). Continued control of large urban colonies in Ontario will probably cause the following effects in Ontario and nearby portions of the U.S.: (1) further growth of existing, uncontrolled, urban colonies and establishment of new colonies along the shores of the Great Lakes; (2) colonization of inland sites away from the Great Lakes; (3) further increase of roof nesting; (4) further increase in the encroachment by ring-bills on traditional common term (Sterna *hirundo)* colonies; and (5) an increase in the breeding reserve (i.e., the number of adult gulls that do not breed).

Effects (1), (2), and (3) make it likely that in the foreseeable future there will remain a need to control existing colonies at urban industrial sites, forestall colonization of new sites, and prevent recolonization of old cleared sites. The results of the control operations reported here indicated that several methods are available for affected landowners that are effective, humane, and inexpensive (for large companies).

Even if all urban industrial colonies in Ontario were eliminated, the ring-billed and herring gulls would continue to nest successfully in the rural and wild areas of Ontario, and many gulls would still visit the urban areas before and after the breeding season. The present and future control operations at many urban sites are not the beginning of the demise of these

two gull species, nor will they deprive urban naturalists of the birds' presence in city parks.

Finally, a few comments regarding effects (4) and (5). Ring-billed gulls have taken over several common tern colonies (Morris and Hunter 1976, Courtney and Blokpoel 1983). At present, gull control efforts take place at tern colonies near Port Colbome, Lake Erie (Morris et a1.1991), and Hamilton Harbour Lake Ontario (D.V. Weseloh, pens. commun.). Also, atEastern Headland, tern nesting rafts are installed at a time when most gulls are already nesting and terns are just arriving (Dunlop et a1.1991). Regarding effect (5), the breeding reserve of Great Lakes ring-billed gulls has not been studied, but deserves attention.

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