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EEE BRANCH REVIEW

DATE: IN 9/18/75 OUT 12/17/75 IN _____ OUT _____ IN _____ OUT _____

FISH & WILDLIFE ENVIRONMENTAL CHEMISTRY EFFICACY

FILE OR REG. NO. 6704-TT

PETITION OR EXP. PERMIT NO. _____

DATE DIV. RECEIVED _____

DATE OF SUBMISSION _____

DATE SUBMISSION ACCEPTED _____

TYPE PRODUCT(S): I, D, H, F, N, (R), S Gull Control

PRODUCT MGR. NO. 11

PRODUCT NAME(S) DRC-1339 Gull toxicant

COMPANY NAME USDI Fish and Wildlife Service

SUBMISSION PURPOSE Registration

CHEMICAL & FORMULATION Starlicide (DRC-1339) 98% Concentrate

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100.0 Pesticidal Use

DRC-1339 for use as a gull toxicant for 98% concentrate in prepared bread baits to control only herring gulls (Larus argentatus) and great black-backed gulls (Larus marinus). Its use is restricted to the coastal areas of the northeastern United States (Delaware, New York, New Jersey, Connecticut, Rhode Island, Massachusetts, New Hampshire, and Maine), in breeding areas or colonies within predation radius of important nesting colonies of terns, puffins, and Laughing gulls from March 1 through June 30 each year.

100.1 Application methods/directions and rates

Bait Preparation

Blend 6.0 gms 1339 Gull Toxicant 98% Concentrate into 454 gms (1.0 lb) melted, stick oleomargarine. Spread 15 gms of the blended mixture (1 tablespoon) on a slice of standard sandwich bread, and cover with another slice. Immediately cut each sandwich into 9 equally-sized cubes. Prepared baits should be placed in a plastic bag for transportation or distribution and should be used within 12 hours.

Bait Application

Each site destined to be treated will be prebaited with untreated bread cubes to ensure rapid bait acceptance. Treatments will be made on land only in or near nesting colonies of the target species. Treated bread cubes will be broadcast or placed only in the same areas where bread cubes were accepted during prebaiting. Initial applications will be broadcast; however, no broadcast application will be made after April 20. Applications after April 20 will be made at or in gull nests. The number of bait applications will be determined by the degree of control provided by previous applications; however, no more than 10 bait applications should be made in or near individual colonies. The number of baits exposed at an individual site will not exceed 5 times the total number of gulls to be controlled at that location, and baits will be retrieved within 12 hours after application if not consumed.

101.0 Chemical and physical properties

101.1 Chemical name

3-chloro-p-toluidine hydrochloride.

101.2 Common name

DRC-1339, Starlicide

101.3 Structural formula, etc.

Not available.

102.0 Behavior in the Environment

Not available.

103.0 Toxicological properties

Unless otherwise specified, source is: E. W. Schafer, Denver Wildlife Research Center, U. S. Fish and Wildlife Center.

103.1 Acute toxicity

103.1.1 Mammal

Common name	Mode	LD_{50} (mg/kg)
Cat, domestic	iv	162
Cattle, F	Oral	> 10(HCl)
Coyote	"	>100(HCl)
Dog, domestic	"	>100(HCl)
" "	"	71(HCl)
Mouse, Deer	"	1800(HCl)
Mouse, Laboratory	"	2000(HCl)
" "	"	960(HCl)
" "	"	>500(HCl)
" "	ip	349(HCl)
Rabbit	Oral	710(HCl)
"	Dermal	>1250(HCl)
"	"	2680(HCl)
Rat, Laboratory	Oral	1170(HCl)
" " F	"	1167(HCl)
" " M	"	1766(HCl)
" "	"	655(HCl)
" "	"	1770(HCl)
" " (20-25 days)	ip	313(HCl)
" " (40-45 days)	ip	250(HCl)
" " (75-100 days)	ip	222(HCl)
" "	ip	325(HCl)
Sheep	Oral	>200
"	"	400
Squirrel, Grey	"	280(HCl)
Swine	"	> 50(HCl)

103.1.2 Bird

*(HCl) refers to the hydrochloride salt. Other names in parenthesis refer to the appropriate salt.
** Numbers with the prefix BD refer to microfiched data sheet number, Section of Bird Damage Control, DWRC. Numbers without prefix refer to reprint file number, Section of Bird Damage Control, DWRC. Hyphenated numbers refer to unpublished manuscript numbers, Section of Bird Damage Control, DWRC.

Common name	Mode	LD_{50} (mg/kg)*
Blackbird, Red-winged	Oral	2.4 (HCl)
" "	"	<3.16 (HCl)
" "	"	1.0
" "	"	<8
" "	Dermal (foot)	56
" "	" (breast)	8
" "	"	4.64
Blackbird, Tri-colored	Oral	2.74 (HCl)
" "	"	2.4
" "	Dermal (foot)	24
" "	" (breast)	4.2
Budgerigar (Australian Parakeet)	Oral	232 (HCl)
"	Dermal (breast)	>32
Chachalaca	Oral	42 (HCl)
Chicken (domestic)(1 Day)	Oral	8.7 (HCl)
" "	"	> 3.1 (HCl)
" (3 wk)	"	> 7.6 (HCl)
" "	"	< 13.6 (HCl)
" (1-4 wk)	"	11.1 (HCl)
" "	"	<6 (HCl)
" "	"	<6 (HCl)
" "	"	6 (HCl)
" "	"	14 (picrate)
" "	"	10 (trichloro-acetate)
" "	"	3-6 (HCl)
" " "	"	6
" " (11-12 wk)	"	11.4-12.69 (HCl)
" " (adult)	"	13.1-28.4 (HCl)
" "	"	7.9 (HCl)
" "	ip	4.24 (HCl)
" "	Dermal (back)	31.6 (HCl)

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Common name	Mode	LD_{50} (mg/kg)
Cowbird, Red-eyed	Oral	5.6 (HCl)
	"	1.8 (HCl)
Crow, Common	"	1.33 (HCl)
Dove, Ground	"	4.2 (HCl)
Dove, Mourning	"	7.5 (HCl)
	"	3.2 (HCl)
Dove, White-fronted	"	> 5.6 (HCl)
Dove, White-winged	"	4.2 (HCl)
Eagle, Golden	"	> 100 (HCl)
" "	iv	> 100 (HCl)
Finch, Cassians	Oral	> 100 (HCl)
Finch, House	"	> 225 (HCl)
Gull, Herring	"	2.9 (HCl)
" "	"	3.2
	Dermal (breast)	18
Grackle, Boattailed	Oral	1.0 (HCl)
" "	"	1.0 (HCl)
Grackle, Common	"	1.0 (HCl)
Hawk, Coopers	"	562 (HCl)
Hawk, Marsh	"	178 (HCl)
" "	"	100 (HCl)
Hawk, Redtailed	"	< 320 (HCl)
Hawk, Sparrow	"	320 (HCl)
" "	"	> 320 (HCl)
" "	"	421
Jay, Blue	"	> 10 (HCl)
" "	"	10 (HCl)
Magpie, Black-billed	"	10 (HCl)
Mallard	"	17.8 (HCl)
Pigeon, Common	"	18.0 (HCl)
" "	"	17.7 (HCl)
" "	"	13.3
Pintail	"	> 32 (HCl)
Pheasant, Ring-necked	"	10 (HCl)
Quail, Bobwhite	"	4.2 (HCl)
" Coturnix	"	2.47 (HCl)
" "	"	2.24 (HCl)
" " comb sex	"	2.37 (HCl)
" " "	"	< 10 (HCl)
" " "	"	1.00
Quail, Valley	"	< 10 (HCl)
Quelea, Red-billed	"	31.6 (HCl)
" "	Dermal (breast)	42.1

Common name	Mode	LD_{50} (mg/kg)
Raven	Oral	13.5 (HCl)
"	iv	5.6 (HCl)
Robin	Oral	3.2 (HCl)
"	"	< 3.2 (HCl)
Sparrow, House	"	375 (HCl)
" "	"	> 320 (HCl)
Sparrow, White-crowned	"	320 (HCl)
Starling	"	1.33 (HCl)
"	"	3.0 (HCl)
"	"	3.2 (HCl)
"	"	3.76 (HCl)
"	"	4.0 (HCl)
"	"	4.2 (HCl)
"	"	0.78
"	"	1.78
"	"	4.21
"	"	8
"	iv	3.47 (HCl)
"	Dermal (breast)	33 (HCl)
"	" "	31 (HCl)
"	" "	14
"	" (foot)	80 (HCl)
"	" "	25
"	" "	32
"	" (whole body)	94 (HCl)
"	" "	63
Teal, Blue-winged	Oral	31.6 (HCl)
Thrasher, Brown	"	> 3.2 (HCl)
Thrasher, Curved-billed	"	3.2 (HCl)
Turkey (Domestic) (1 day)	"	6.8 (HCl)
" " (3 wk)	"	9.2 (HCl)
" " (adult)	"	10.3 (HCl)
" " "	"	5.6

103.1.3 Fish

SPECIES	Temp&hardness		3 hr	6 hr	24 hr	48 hr	96 hr
					LC_{50} (ppm)		
Bluegill	12°C	Soft	-	-	38(HCl)	37(HCl)	32(HCl)
"	"	"	-	48.5	37.3	-	21.0
Catfish, Channel	12°	Soft	-	-	44 (HCl)	41(HCl)	38 (CHl)
" "	"	"	55.0	43.7	30.0	-	24.0
Goldfish	12°	Soft	-	-	41(HCl)	39(HCl)	34(HCl)
"	20°	"	-	-	25-50(HCl)	-	-
"Shiners"	20°	"	-	-	25-50(HCl)	-	-

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103.1.3 Con't

Trout, Rainbow	7°	Soft	59.7	56.2	15.2	-	5.3
" "	12°	"	64.0	44.3	13.1	-	8.3
Trout, Rainbow	17°	Soft	22.2	14.1	10.0	-	7.0
" "	12°	Very soft	-	43.1	16.3	-	8.9
" "	12°	Hard	-	77.0	12.9	-	9.2
" "	12°	Very hard	-	89.0	13.1	-	8.3

103.1.4 Aquatic invertebrate: none available

103.1.5 Other animals:

Common name	Mode	LD_{50} (mg/kg)
Turtle	ip	1040
Frog	ip	225

103.2 Subacute toxicity:

Common name	Mode	Duration	LC_{50} (ppm)
Chicken (domestic)	Oral (feed)	5 days	40(HCl)
" " (1-4wks)	"	"	< 60
" " "	"	"	< 60 (sulfate)
Starling	Oral(1 hr intervals)	12 hrs	< 1.25 mg/kg/dose (HCl)
"	Oral(2 hr intervals)	24 hrs	< 1.25 mg/kg/dose (HCl)
"	Oral (4-24 hr intervals)	2-12 days	> 1.25 mg/kg/dose (HCl)
"	Oral (feed)	30 days	4.7 (HCl)
"	"	90 days	< 1.0 (HCl)
Quail, Coturnix	"	28 days	17.8 (HCl)
Pigeon, Common	"	30 days	< 100 (HCl)
Quail, Bobwhite	Oral (2% baits)	22 days	< 286 (HCl)
Pheasant, Ringnecked	Oral (2% baits)	120 days	28.6 (HCl)
	Mammals		
Mouse Laboratory	Oral (24 hr intervals)	10 days	> 500mg/kg/dose (HCl)
Rat, Laboratory	ip (24 hr intervals)	7 days	≅ 125 mg/kg/dose (HCl)
Rat, Laboratory	ip (24 hr intervals)	9 days	< 125 mg/kg/dose (HCl)

103.3 Chronic Toxicity

Reproduction

Species	Minimum effective treatment level (ppm)	Duration (days)	Effect
Pigeon	25	43-50	Partial infectility in adults-transient in male. No effect 2nd generation.
Coturnix quail	10	28	Decreased live chick production (reduced egg production plus increased production of thin-shelled eggs. 2nd generation not effected.

Secondary hazards

Species	No. field killed birds eaten/day	Duration (days)	Effect
Mammals			
Cat	0.85	27	None
Swine	5	20	None
Birds			
Coopers hawk	1.41	135	None
Marsh hawk	2.13	104	None
Sparrow hawk	1.60 (2 hawks)	35	None
" "	1.46	41	None

Other:

Irritation

Conc	Application site	Effect
1%	Skin	None
10%	Skin	Minor on abraded skin only
1%	Eye	None

Phytotoxicity

Plant species	Phytotoxic level	Culture
Wheat seed	100 ppm	Soil
Wheat	2.15-4.65 ppm	Nutrient culture

103.4 Field toxicity

1) Gull control program: Matinicus Rock and Green Island (Petit Manan) 1971 Season

Results

Approximately 7,000 baits were distributed to 1,400 gulls. A total of 426 carcasses were recovered and buried. Approximately 20 percent of the carcasses were black-backed gulls. No mortality was found in any other species with the possible exception of a crow found on Petit Manan that might have been due to toxicant. Some regurgitated bait was found on each island, generally few deposits and small amounts. The observations following baiting--the numbers of nesting and loafing gulls and their effects on the other species--were to have been made by Audubon investigators. Informal verbal and written reports indicated a great reduction in large gulls and a very promising increase in the desired species.

2) Gull control program: Boothbay, Maine

Results

Approximately 3,300 lethal baits were ingested at six feedings by gulls between January 28 and February 13.
Because of number of gulls, baits exposed, and feeding behavior, probably not over 600 gulls ingested toxic material. Of these, the majority probably ingested multiple lethal doses.
Shoreline searches of immediate harbor area and Boothbay-Boothbay Harbor-Southport shoreline revealed a total of 27 gull carcasses, six of which were retrieved.

Jan. 29	- shore search	2 carcasses
Jan. 30	- shore search	17 carcasses
Jan. 31	- Harbor and shore search	8 carcasses

A few additional gull carcasses were reported at later dates, but ice made complete retrieval impossible and accurate counts could not be made. A two-foot snowfall on February 3 and subsequent heavier snows complicated assessment of mortality. However, the resident gull population in the Boothbay area was not noticeably effected.
The population at the dump increased during the treatment period from an estimated 125 on January 27 to an estimated 600 on February 7 and 13.

3) Summary: field control tests

Research by the U.S. Fish and Wildlife Service and the Massachusetts Audubon Society in 1969, 1970, 1971, and 1973, shows that DRC-1339 sandwich-cube, bread baits can achieve the goals of large gull control in an effective, safe, and humane manner when used by trained persons. When about 7,000 baits were distributed to 1,400 large gulls on Matinicus Rock and Petit Manan in 1971, it resulted in a successful breeding season for the resident terns and Laughing Gulls, and in an increase in numbers of loafing Puffins (Fratercula arctica). Tests on Ram and Tern Islands, 1969-73, obtained 70-80% reduction in large gulls.

Exposure of DRC-1339 baits on islands has been highly selective. Aside from target species, only an occasional crow (Corvus brachyhynchos) has taken the bait. Most gulls expire quietly in 48-72 hours following bait ingestion. Lack of distress symptoms eliminates spooking birds from bait sites. The toxicant is short-lived and primarily specific to birds. Its breakdown in gull tissues before and after death provides a large additional safety factor.

For greatest effectiveness, DRC-1339 baits are exposed in two phases. First, bait are exposed when the large gulls first gather on the nesting island. This reduces their numbers before the terns or other smaller species arrive, thereby reducing competition for space with the less aggressive species. Second, baits are placed at the nests of the large gulls after the nesting season begins. This removes nesting gulls and reduces predation on eggs and young of smaller species. Repeated baitings are required to meet the ingress of new gulls, the surplus birds in the locally expanding population.

DRC-1339 baits on nesting islands are not intended to cause a regionwide population reduction to solve the human health and safety problems, but rather to achieve local spot removal from key seabird colonies. It is judged necessary to reduce numbers of large gulls at these sites by at least two-thirds and to eliminate any remaining gulls that specialize in eating tern chicks.

104.0 Hazard Evaluation

104.1 Discussion

Populations of black-backed and herring gulls, Larus marinus and Larus argentatus, continue to increase along the Maine coast and their expansive colonization of islands occupied by terns, laughing gulls, Leach's petrels and puffins is threatening the continued existence of these more timid species.

of the Maine population of the more desirable seabirds.

The islands of Matinicus Rock and Petit Manan Green Island were considered extremely important for the maintenance and survival of the Maine Department of Inland Fisheries and Game, and Maine Audubon Society have agreed upon a cooperative control effort to reduce the number of large gulls on and near these two sites. The U.S. Fish and Wildlife Service has been requested to co-operate in this venture, and act as the major laison agent between other federal agencies.

Gull Control Methods--Limitations

A number of gull control methods have been tried with either no effect or only partial or delayed success. Gross sprayed over 900,000 gull eggs with oil-formalin emulsion in the 1940's. This stopped the Herring Gull population growth for 12 years, and Laughing Gulls resettled on those islands until the program was discontinued and large gulls again overran them in the 1960's. Such a birth control program, however successful, cannot stop the present increase for 5 years, nor effect a significant decrease for 20 years, because gulls are long-lived. Chemosterilization and egg breaking are other methods that do not take significant effect for 5 to 10 years for the same reason. Repeated disturbances (egg breaking, rallying, shooting) drive off the locally more disirable species as well as the target species. Rapid action baits such as Avitrol 200 and Alpha-chloralose scare gulls off the bait sites but not off of the islands. These or other methods have, apparently other drawbacks such as taking too much time, affecting gulls only temporarily, or being too difficult to administer.

DRC-1339 as a Control Method

A blend of DRC-1339 and oleomargarine is used as a filler for sandwiches. The "oleo" spread is prepared by blending three grams of DRC-1339 (97% concentrate) into a pound of melted oleomargarine. The LD_{50} of DRC-1339 for captive herring gulls was determined to be approximately 3.7 mg/kg. is of body weight. Approximately one tablespoon of oleomargarine spread on each slice of standard sandwich bread and a cover slice placed on top to make a sandwich. Each sandwich is then sliced into nine cubes. Individual bait cubes average about 10.3 mg. of DRC-1339. Baits should be prepared and distributed within 24 hours.

DRC-1339 treated bread cubes appear to be highly selective, and apparently present no secondary hazard to mammals and a minimal hazard to other birds. The only bird other than gulls observed feeding on the bait has been an occasional crow.

Most gulls expire quietly in a humane manner in 48 - 72 hours following bait ingestion. The ultimate cause of death is kidney failure. Affected birds do not show distress symptoms; they merely become less active until death occurs. This slow action eliminates the Spook" factor and the rest of the flock is not scared away as is frequently the case with many other toxicants.

Results of Field Tests on Ram and Tern Islands 1969-1973

A comparison of pre and immediate post census data indicates up to a 70-80% reduction in gull numbers. On both Tern and Ram islands, however, reinvasion by a surplus of non-breeding adults occurs so rapidly that both populations are back to pre-control levels within two weeks. The rate of reinvasion depends on the population density in the area. For example, Tern Island is very close to an extremely large gull colony on Monomy and is also close to prime feeding sources; the Chatham Dump and the town fish pier. Ram Island is also close to very large nesting colonies on Penekese and the Elizabeth Islands. Follow-up treatments of gull nests with three to four bread cubes proves to be very effective. This does not mean that control effects are futile. Work done by the Mass. Audubon Society indicates that initial pre-nesting and gull reduction and subsequent and persistant removal of nesting gulls has relieved pressure on the nesting tern and enhanced their survival. The objective is reducing a gull population before the nesting season is biologically sound, since gulls set up territories before the terns arrive and compete for space with the less aggressive terns.

The second control phase of placing treated bread cubes in gull nests is highly selective. By removing the nesting gulls predation on tern chicks is greatly reduced. Results of the gull control program on selected islands along the Maine coast were comparable to those in Massachusetts. The islands of Matinious Rock and Petit Manan were considered extremely important for the main-laughing gulls, leach's petrels and puffins. In 1971 approximately 7,000 baits were distributed to 1,400 gulls and 426 carcasses were recovered and buried. Approximately 20 percent of the carcasses were black-backed gulls. Each time bait was distributed, a large segmentof the resident gull population was reducing the local population of territorial adults. As in the occurred as soon as a vacuum was created. However, the number of gulls that invaded the islands after each baiting operation diminished. The total number of gulls that succumbed to the bait is unknown since many died away from the islands or drifted considerable distances with the exchange of the tide. No mortality was found in any other species with one exception of a crow found on Petit Manan that might have been due to a toxicant.

Secondary poisoning hazard:

Pre and post census gull counts are made on all islands where control work is undertaken. Dead gulls are counted prior to burial but, since we have no way of measuring the percent of the total kill that is recovered, we have to rely on estimates. A comparison of pre and post treatment gull counts and the number of dead birds actually picked up indicates that only 20-25 percent of the dead gulls were found.

Since so few birds are actually recovered, the possibility of secondary poisoning needs to be considered. The following information is provided by the Massachusetts Audubon Society, Lincoln, Mass. in a memorandum entitled: The Need for control of Gulls on two Maine Islands (available in the Environmental Safety review staff's files)

"Dead gulls are collected and buried after each operation, but a few may be missed, and the possibility of secondary poisoning needs to be considered. DRC-1339 is a short-lived chemical which is specific to birds and relatively non-toxic to other groups. A dog, for example, would have to eat at least eight times its weight of dead gulls in three days to be killed by it. (Nevertheless, if the coastguard at Matinicus Rock still have a dog in 1971 they should be warned not to let it eat dead gulls.)

Secondary poisoning is more likely to affect bird scavengers. The most likely scavengers are crows and other large gulls, whose loss would not be a disadvantage. Ravens are very sensitive to DRC-1339 (Larsen & Dietrich 1970), and might be killed if they ate a freshly dead gull which had consumed several baits. Ravens do not feed at Matinicus Rock or at Petit Manan in the summer months (Drury, Buchheister) and are rarely seen at this season on other islands in the vicinity, but have been seen within 10-20 miles of both islands in May (Drury) and may well nest within these distances. The hazard to the Raven population is small, but the Raven is a scarce species and it is important that dead gulls should be searched for thoroughly.

The most serious concern would be for the Bald Eagle, a scavenger which is itself an endangered species: there are six breeding pairs of Bald Eagles within 20 miles of Petit Manan. However, tests at the Denver Research Laboratory have shown that raptors are most resistant to DRC-1339 than other birds (DeCino et al. 1966). In one set of tests, a captive Golden Eagle was given 100 mg of DRC-1339, both orally and intra-venously, without ill effects.

This is approximately the dose given initially to 10 large gulls, and there is a large additional safety factor provided by the breakdown of the chemical within the gull's tissues before and after death. We consider the hazard negligible, and the National Audubon Society's study group on the Bald Eagle agrees."

Based upon the above statement provided by the audubon society — and upon the limited laboratory tests available, the Environment Safety Review staff has no concern for the potential ~~of~~ for secondary poisoning hazards at this time.

Summary:

The following information is provided by the Fish and Wildlife Service in their report titled:

Justification for the registration of DRC-1339 to reduce Herring Gulls and Great Black-backed Gulls on nesting islands off the New England coast.

I. Population Trends of Large Gulls

Breeding populations of the Herring Gull (Larus argentatus) from western Long Island Sound to Grand Manan, New Brunswick, have been increasing since the 1880's. Once rare, they numbered about 60,000 pairs on 200 island colonies in this area in the 1960's. Their increase has been nearly four-fold in the past 25 years and most rapid in the Cape Cod area.

Breeding numbers of the Great Black-backed Gull (Larus marinus) have also increased in the last 40 years, especially on the Maine coast. A continued doubling of Herring Gulls every 12-15 years and Great Black-backed Gulls every 9-10 years has been forecast.

II. Reasons for Increased Numbers of Large Gulls

The enormous increase in large gulls on the northeast coast has resulted from two factors. First, a change in public attitudes and legal protection earlier in this century reduced human predation and all seabird species. More importantly, the environment has been drastically modified in that new, unnaturally abundant sources of food have made it possible for large gulls to breed successfully in new areas and for a higher percentage of juvenile gulls to survive to adulthood. The large gulls, being very adaptable scavengers, obtain this surplus food at municipal dumps, pig farms, and fish waste disposal sites.

III. Human Problems Created by Increased Numbers of Large Gulls

The great increase in numbers of large gulls on the northeast coast has adversely affected human health and safety. Several municipalities have suffered bacterial contamination of their water supplies where gulls fly from sewage outlets to reservoirs. Gulls have been a hazard to jet aircraft, causing millions of dollars in damage at east coast airports. Minimal results have been gained when gulls were treated only as a local problem in such areas.

IV. Population Trends of Other Seabirds

Laughing Gulls (Larus atricilla) have been steadily declining in numbers in the scattered colonies north of New York City in the last 40 years and this species is in critical condition in the northeast. The drop in numbers in the last 5 years is alarming. More than 20,000 pairs nested on Muskeget Island, Massachusetts, in the early 1940's but only 50 pairs nested there in 1970. At this colony, the average rate of decrease is about 17% per annum, corresponding to a halving period of about 3.7 years.

Three tern species - Common Tern (Sterna hirundo), Roseate Tern (Sterna dougallii), and Arctic Tern (Sterna paradisaea), have been declining in numbers in the past 40 years in New England. There are no longer any productive colonies in Massachusetts Bay; Tern Island at Chatham was formerly the largest colony in New England. About 8,000 pairs of terns (6,000 Common, 2,000 Roseate, 100 Arctic) in 8 colonies in the Cape Cod area in 1970 were less than two-thirds of the numbers there in 1950. South of Cape Cod, only one colony of 1,200 pairs was found where great colonies formerly existed. In Maine, 4,500 pairs, mostly in 6 colonies, were less than one-fourth of those there in 1949, and the decrease has accelerated since 1965.

V. Reasons for Decreased Numbers of the Smaller Seabirds

The increase in populations of large gulls is the only widespread factor associated with the decline of terns, Laughing Gulls, and other small seabirds. Human intrusion and vandalism, rats, vegetational changes (sheep grazing), hurricanes, oil spills, and pesticides have affected certain species only locally or temporarily.

Large gulls, as their populations increased, have encroached on the nesting colonies of the smaller species. In addition to the competition for nesting space, the large gulls eat large numbers of tern eggs and tern and Laughing Gull chicks. Establishment of a gull colony in the midst of or on the edge of a colony of nesting terns soon drives them out, and large gulls are now pressing in on the last islands available to terns in Maine.

VI. Objectives of Reducing Populations of Large Gulls

The main goal of reducing the unnaturally high numbers of Herring Gulls and great Black-backed Gulls is to reverse the decline in tern and other seabird populations. Maintaining certain critical islands free of large gulls will maintain diversity in the coastal ecosystems and ensure a variety of wildlife for public enjoyment. When large gulls have been removed from an island which they had overrun, terns have reoccupied it promptly. A second goal of gull population reduction is to encourage terns to move back to places where they can be seen and appreciated by more people.

104.1.1 Adequacy of Toxicity Data: Satisfactory - refer to 104.1.2.

104.1.2 Additional data required: Aquatic invertebrate, ~~96~~ 48-96 hr. acute (LC_{50}) study on shrimp or crabs.

104.1.3 Likelihood of exposure to non-target organisms. Refer to section 104.1. The potential exists for exposure to several desirable non-target species of fish and birds - even the species which are to be protected by the gull control program can potentially be exposed, either by the baits as they are applied or later if they are regurgitated by the gulls. Close supervision is necessary to achieve the desired control, while minimizing the potential for adverse effects. Baits regurgitated or not accepted must be retrieved within 12 hours of application, to reduce this hazard.

104.1.4 Hazard potential to endangered species: Refer to 104.1 and secondary hazard evaluation.

105.0 Conclusions:

The environmental safety review staff finds no objections to the proposed use of DRC-1339 to control Herring gulls (Larus agentatus) and great black-backed gulls (Larus marinus).

It is understood that:

Its use is restricted to fish and wildlife service personnel, or persons under its supervision from co-operating government agencies experienced in bird control work, and under the auspices of the Audubon society. Treatments will be made on land only, in or near nesting areas of the target species, during the period of March 1 through June 30. Applications after April 20, will be made at or in gull nests.

The number of baits exposed at an individual site will not exceed 5 times the total number of gulls to be controlled at that location, and baits regurgitated or not accepted must be retrieved within 12 hours after each application.

The following label modifications are in order -

Under the directions for Bait application, modify the last sentence to read as follows: "The number of baits exposed at any individual site must not exceed 5 times the total number of gulls to be controlled at that location. Baits regurgitated or not accepted must be retrieved within 12 hours after each application and disposed of by burial or other adequate means. A search must be conducted within 48-72 hours after application to remove and dispose of bird carcasses, except for those areas where disturbance of eiders may adversely affect their breeding efforts."

The environmental hazard cautions must read as follows:

"This pesticide is toxic to birds. Do not expose in areas accessible to waterfowl and other non-target birds. Keep out of lakes, ponds, streams, tidal marshes and estuaries. Do not treat when weather conditions favor runoff or drift from target area. Do not contaminate water by cleaning of equipment or disposal of wastes."

The section III regulations stipulate that an acute ~~96~~ 48-96 hour aquatic invertebrate LC_{50} study is required. We suggest that crab (or shrimp) would be most appropriate. Please note that registration may be granted prior to the submission of this data, provided you agree to conduct the study within a reasonable amount of time.

Scott Fredericks

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Environmental Safety
EEEB

12/17/75