

**Gateway National Recreation Area
Jamaica Bay Unit**

Inventory & Monitoring Report

1998



Ragged-fringed Orchid (photo by Don Riepe)

Prepared by John Zuzworsky
Refuge Operations Specialist
Jamaica Bay Wildlife Refuge District

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Introduction

This is the second annual Inventory and Monitoring report for Gateway National Recreation Area's Jamaica Bay Unit. The Jamaica Bay Unit includes: the Breezy Point District including Fort Tilden, the Jamaica Bay District (Floyd Bennett Field) and the Wildlife Refuge District (Jamaica Bay Wildlife Refuge).

The objective of this report is to provide staff, volunteers, interns and researchers in all divisions of the park accurate and current natural resource information and to serve as an inclusive bound document for future reference. It is hoped that this document will be referred to by staff of all divisions of the park to help maintain a current awareness of natural resources occurrences.

The data presented in this report are broken down into three sections: inventories, monitoring data, and study updates and conclusions.

Inventories. This section contains species lists that are arranged by taxa and updated annually as new species are discovered. If no new species are discovered for a particular taxa for the year, the previous years data are reprinted with the notation, "no new species for 1998." This section provides valuable data on the present and historical occurrences of species within the unit.

Monitoring. This section contains reports on natural resource activities that are repeated at a predetermined frequency, and with some degree of standardization. See the individual report for the particular methods employed there-in. The data in this section could be valuable in assessing long-term trends.

Study updates and conclusions. This section contains abstracts and project summaries for research that took place within the unit in 1998. It provides a reference for staff to learn about natural resource activities in the unit.

Credits for the data presented are given in the individual section. Contributions were made by park staff and volunteers within the individual districts as well as from the Division of Natural Resources. The contributions that made this report possible are greatly appreciated. All staff and volunteers are encouraged to contribute information for inclusion in future reports. For details or data collection and contribution please contact the Resource Management Division of Jamaica Bay Wildlife Refuge at (718) 318- 4349.

Compilation of 1998 Butterfly Sightings at the Jamaica Bay Unit

Following is a summation of the Butterfly sightings of the Jamaica Bay Unit. These data were collected opportunistically by staff and volunteers, they do not represent a systematic or standardized search method. The information is reported separately by district showing the first date sighted, the last date sighted, and the date on which the maximum number were sighted. On dates where the maximum occurred on more than one occasion the last date of the maximum will be shown. The species names are in taxonomic order showing all species ever recorded at each District. A (N) will appear following the early date if it is a new record for the district. An (S) will appear next to a species which is represented by only a single record. A (R) appears next to species that are rare.

Wildlife Refuge District

SPECIES	EARLY DATE	LATE DATE	MAXIMA	
Pipevine Swallowtail (<i>Battus philenor</i>)		10/14/98	10/14/98 (1)	
Black Swallowtail (<i>Papilio polyxenes</i>)	5/20/98	17-Aug	5/23/98 (2)	
Eastern Tiger Swallowtail (<i>Papilio glaucus</i>)	5/20/98	8/3/98	6/27/98 (12)	
Spicebush Swallowtail (<i>Papilio triolus</i>)				
Checkered White (<i>Pontia protodice</i>)				
Cabbage White (<i>Pieris rapae</i>)	3/28/98	9/30/98	8/3/98 (25)	
Clouded Sulfer (<i>Colias philodice</i>)	9/30/97	4/21/98	4/21/98 (1)	
Orange Sulpher (<i>Colias eurytheme</i>)	5/20/98	11/21/98	8/3/98 (39)	
Cloudless Sulpher (<i>Phoebis sennae</i>)	5/30/98	12/7/98	10/11/98 (15)	
Little Yellow (<i>Eurema lisa</i>)				
Harvester (<i>Feniseca tarquinius</i>)				
American Copper (<i>Lycaena phlaeas</i>)	4/21/98	8/3/98 (3)	8/3/98 (3)	
Coral Hairstreak (<i>Satyrium titus</i>)				
Banded Hairstreak (<i>Satyrium calanus</i>)				
Striped Hairstreak (<i>Satyrium liparops</i>)				
Red-banded Hairstreak (<i>Calycopis cecrops</i>)				
White M. Hairstreak (<i>Parrhasius m-album</i>)				
Gray Hairstreak (<i>Strymon melinus</i>)				
Eastern Tailed Blue (<i>Everes comyntas</i>)		9/30/98	9/30/98 (1)	
Summer Azure	6/27/98	8/3/98	8/3/98 (10)	

Species	WRD	JBD	BPD
Spring Azure (<i>Celastrina ladon</i>)		4/21/98	4/21/98 (1)
American Snout (<i>Libytheana carinenta</i>)			
Variegated Fritillary (<i>Euptoieta claudia</i>)			
Great Spangled Fritillary (<i>Speyeria cybele</i>)			
Pearl Crescent (<i>Phyciodes tharos</i>)	7/13/98	9/28/98	9/28/98 (2)
Question Mark (<i>Polygonia interrogationis</i>)	6/27/98	9/28/98	10/14/98 (1)
Eastern Comma (<i>apolygonia comma</i>)		8/3/98	8/3/98 (1)
Mourning Cloak (<i>Nymphalis antiopa</i>)	3/8/98	12/3/98	6/27/98 (2)
Compton Tortoiseshell (<i>Nymphalis vau-album</i>)	(R)		
Small tortoiseshell (<i>Nymphalis urticae</i>)	(R)		
American Lady (<i>Vanessa virginiensis</i>)	4/21/98	12/6/98	5/30/98 (8)
Painted Lady (<i>Vanessa cardui</i>)			
White Admiral (<i>Limenitis arthemis arthemis</i>)	(S)		
Red Admiral (<i>Vanessa atalanta</i>)	4/28/98	10/14/98	6/27/98 (3)
Common Buckeye (<i>Junonia coenia</i>)	9/28/98	12/6/98	9/28/98 (11)
Red-spotted Purple (<i>Limnitis arthemis astyanax</i>)	5/26/98	5/30/98	5/30/98 (3)
Viceroy (<i>Limnitis archippus</i>)		8/17/98	8/17/98 (1)
Tawney Emperor (<i>Asterocampa clyton</i>)			
Little Wood Satyr (<i>Megisto cymela</i>)			
Common Wood Nymph (<i>Cercyonis pegala</i>)			
Silver Spotted Skipper (<i>Epargyreus clarus</i>)	7/13/98	8/3/98	8/3/98 (1)
Monarch (<i>Danaus plexippus</i>)	4/21/98	9/30/98	9/28/98 (6)
Long-tailed Skipper (<i>Urbanus proteus</i>)			
Northern Cloudwing (<i>Thorybes pylades</i>)			
Juvenal's Duskywing (<i>Erynnis juvenalis</i>)			
Horace's Duskywing (<i>Erynnis horatius</i>)			
Wild Indigo Duskywing (<i>Erynnis baptisiae</i>)	8/3/98	8/3/98	8/3/98 (1)
Common Checkered Skipper (<i>Pyrgus communis</i>)			
Common Sootywing (<i>Pholisora catullus</i>)	5/23/98	5/30/98 (4)	5/30/98 (4)
Swarthy Skipper (<i>Nestra iherminier</i>)	6/27/98	8/17/98	8/17/98 (5)
Clouded Skipper (<i>Lerema accius</i>)			
Least Skipper (<i>Ancyloxypha numitor</i>)	8/3/98	8/17/98	8/17/98 (1)
European Skipper (<i>Thymelicus lineola</i>)			
Fairy Skipper (<i>Hylephila phyleus</i>)			
Cobweb Skipper (<i>Hesperia metea</i>)			
Peck's Skipper (<i>Polites peckius</i>)		9/27/98	9/27/98 (1)
Tawny-edged Skipper (<i>Polites themistocles</i>)			
Crossline Skipper (<i>Polites origenes</i>)			
Northern Broken Dash (<i>Wallengrenia egermet</i>)		7/13/98	7/13/98 (1)
Little Glasswing (<i>Pompeius verna</i>)			
Sachem (<i>Atalopedes campestris</i>)			

Species	WRD	JBD	BPD	
Delaware Skipper (<i>Atrytone logan</i>)				
Zabulon Skipper (<i>Poanes zabulon</i>)		5/20/98	5/20/98 (1)	
Broad-winged Skipper (<i>Poanes viator</i>)		8/3/98	8/3/98 (22)	
Dun Skipper (<i>Atrytonopsis hianna</i>)				
Salt Marsh Skipper (<i>Panoquina panoquin</i>)				

Jamaica Bay District

SPECIES	EARLY DATE	LATE DATE	MAXIMA
Black Swallowtail (<i>Papilio polyxenes</i>)			
Eastern Tiger Swallowtail (<i>Papilio glaucus</i>)	5/6/98	6/8/98	6/8/98 (3)
Cabbage White (<i>Pieris rapae</i>)	4/28/98	6/8/98	6/8/98 (5)
Clouded Sulfer (<i>Colias philodice</i>)		6/8/98	6/8/98 (5)
Orange Sulpher (<i>Colias eurytheme</i>)		6/8/98	6/8/98 (1)
American Copper (<i>Lycaena phlaeas</i>)	4/28/98	5/6/98 (43)	
Coral Hairstreak (<i>Satyrus titus</i>)			
Red-banded Hairstreak (<i>Calycopis cecrops</i>)		5/6/98 (1)	
Gray Hairstreak (<i>Strymon melinus</i>)		4/28/98 (1)	
Eastern Tailed Blue (<i>Evers comyntas</i>)		5/6/98	5/6/98 (1)
Aphrodite Fritillary (<i>Speyeria aphrodite</i>)	S		
Pearl Crescent (<i>Phyciodes tharos</i>)	5/6/98	8/31/98 (1)	
Mourning Cloak (<i>Nymphalis antiopa</i>)		6/1/98	6/1/98 (1)
American Lady (<i>Vanessa virginiensis</i>)		5/6/98 (3)	
Monarch (<i>Danaus plexippus</i>)	6/1/98	6/8/98	6/8/98(3)
Common Sootywing (<i>Pholisora catullus</i>)		6/1/98	6/1/98 (1)
Swathy Skipper (<i>Nastrea iherminier</i>)		6/8/98	6/8/98 (1)
Least Skipper (<i>Ancyloxypha numitor</i>)			
European Skipper (<i>Thymelicus lineola</i>)		6/8/98	6/8/98 (12)
Delaware Skipper (<i>Atrytone logan</i>)			
Broad-winged Skipper (<i>Poanes viator</i>)			
Ocola Skipper (<i>Panquina ocola</i>)	(S)		

Breezy Point District

SPECIES	EARLY DATE	LATE DATE	MAXIMA
Black Swallowtail (<i>Papilio polyxenes</i>)	5/29/98	20-Jul	7/20/98 (4)
Eastern Tiger Swallowtail (<i>Papilio glaucus</i>)	5/15/98	7/5/98	7/5/98 (1)
Spicebush Swallowtail (<i>Papilio troilus</i>)		7/20/98	7/20/98 (1)
Cabbage White (<i>Pieris rapae</i>)	5/15/98	10/17/98	7/20/98 (17)
Clouded Sulphur (<i>Colias philodice</i>)	7/20/98	7/20/98	7/20/98 (1)
Orange Sulphur (<i>Colias eurytheme</i>)	5/14/98	10/15/98	7/20/98 (9)
Cloudless Sulphur (<i>Phoebis sennae</i>)	8/28/98	11/19/98	9/12/98 (3)
American Copper (<i>Lycapena phlaeas</i>)		7/20/98	7/20/98 (1)
Gray Hairstreak (<i>Strymon melinus</i>)			
Eastern Tailed Blue (<i>Everes comyntas</i>)			
Marine Blue (<i>Leptotes marina</i>)		(S) 1993	
Variegated Fritillary (<i>Euphydryas clydia</i>)	7/20/98	12/6/98	12/6/98 (1)
Pearl Crescent (<i>Phycodes tharos</i>)			
Question Mark (<i>Polygonia interrogationis</i>)			
Mourning Cloak (<i>Nymphalis antiopa</i>)		7/26/98	7/26/98 (1)
American Lady (<i>Vanessa virginiensis</i>)	4/3/98	9/20/98	9/20/98 (4)
Painted Lady (<i>Vanessa cardui</i>)		9/20/98	9/20/98 (1)
Red Admiral (<i>Vanessa atalanta</i>)	5/17/98	8/30/98	8/30/98 (1)
Common Buckeye (<i>Junonia coenia</i>)	9/20/98	12/6/98	9/20/98 (4)
Viceroy (<i>Limnitis archippus</i>)		7/20/98	7/20/98 (1)
Little Wood Satyr (<i>Megisto cymela</i>)		7/5/98	7/5/98 (1)
Monarch (<i>Danaus plexippus</i>)	5/15/98	10/25/98	10/1/98(1000+)
Common Sootywing (<i>Pholisora catullus</i>)		7/20/98	7/20/98 (2)
Swarthy Skipper (<i>Nastira iherminier</i>)		7/20/98	7/20/98 (1)
Delaware Skipper (<i>Atrytone logan</i>)		7/20/98	7/20/98 (1)
Broad-winged Skipper (<i>Poanes viator</i>)	7/20/98	8/20/98	7/20/98 (8)

Jamaica Bay Annual 4th of July Butterfly Count

Date of survey: July 5, 1998

Species	Refuge	FB Field	Breezy Pt.	Total
Tiger Swallowtail	7	4	6	17
Black Swallowtail	-	11	2	13
Spicebush Swallowtail	1	-	-	1
Checkered White	-	-	2	2
Cabbage White	11	4	15	30
Orange Sulphur	9	6	8	23
American Copper	4	35	4	43
Coral Hairstreak	-	3	-	3
Gray Hairstreak	-	1	1	2
Eastern Tailed Blue	4	2	3	9
Variegated Fritillary	-	-	1	1
Pearl Crescent	5	-	-	5
Question Mark	1	-	1	2
Mourning Cloak	2	-	-	2
American Lady	2	-	1	3
Red Admiral	3	-	1	4
Little Wood Satyr	-	-	2	2
Monarch	1	2	4	7
American Snout	4	-	-	4
Silver-spotted Skipper	6	-	2	8
Common Sootywing	-	1	1	2
Swarthy Skipper	-	3	1	4
Least Skipper	1	-	-	1
European Skipper	-	-	1	1
Northern Broken Dash	5	8	1	14
Delaware Skipper	-	1	2	3
Broad-winged Skipper	1	-	-	1

Total Species = 27

Total Numbers = 205

Participants: Nancy Corona, Steve Finn, Kathy Kraus, Don Riepe,
John Zuzworsky



United States Department of the Interior

NATIONAL PARK SERVICE
Gateway National Recreation Area
Jamaica Bay Wildlife Refuge
Floyd Bennett Field, Bldg. 69
Brooklyn, N.Y. 11234

BREEZY POINT DISTRICT, N.Y.
JAMAICA BAY DISTRICT, N.Y.
STATEN ISLAND UNIT, N.Y.
SANDY HOOK UNIT, N.J.
WILDLIFE REFUGE DISTRICT, N.Y.

IN REPLY REFER TO:

LATE SUMMER BUTTERFLY COUNT Jamaica Bay (Brooklyn/Queens, NYC) Sept. 7, 1998

	JBWR	FBF	Ft. Tilden	BP	NEP	Total
Black Swallowtail		1				1
Tiger Swallowtail		1				1
Cabbage White	74	15	27	28	3	147
Clouded Sulphur	7		4	5	3	19
Orange Sulphur	10	2	9	7	1	29
Cloudless Sulphur	6	5	4	7	2	24
American Copper	16	2	4			22
Gray Hairstreak	1	1	1	1		4
Eastern Tailed Blue	2	1				3
Pearl Crescent	19	3	1			23
Question Mark	2		1			3
Mourning Cloak	1					1
American Lady	2	4	1			7
Painted Lady		2				2
Red Admiral	1		1			2
Common Buckeye	3		1	1	1	6
Tawny Emperor	1					1
Monarch	6	12	3	10	5	41
Wild Indigo D-wing	2					2
Silver-spotted Sk.	1					1
Common Sootywing	3					3
Checkered Skipper		2				2
Least Skipper	3					3
Sachem	1	2	2			5
Swarthy Skipper	18	2	16	4		40

Total Species = 25

Total Individuals = 441

Participants: Blanchard, Skip and Jane; Fiore, Tom; Finn, Steve;
Kelly, Rich; Kraus, Kathy; Lampel, Lenny; Meistner, Christine;
Riepe, Don; Taft, David; Walter, Steve; Zuzworsky, John

Moths of the Jamaica Bay Unit 1998

The moth species listed below represent records from the Jamaica Bay Unit, and are separated by district. A (98) will appear in the column of any species observed in 1998. A (*) appears in the column of each district next to the species name, when that species has been recorded in a previous year. A (N) in the column indicates that this is a new species for the district and will be followed by the date of the sighting and the number of individuals observed. WRD refers to the Wildlife Refuge District (Jamaica Bay Wildlife Refuge), JBD refers to the Jamaica Bay District (Floyd Bennett Field), and BPD refers to the Breezy Point District (Fort Tilden).

No active inventory attempts (night lighting or trapping) were conducted in 1998. The baseline inventory was conducted by Wildlife Refuge staff and volunteers and by members of the New York Butterfly Club. The 1998 contributions were made by Nancy Corona Park Ranger Interpretation BPD and John Zuzworsky Refuge Operations Specialist WRD.

SPECIES	WRD	JBD	BPD
Ello Sphinx (<i>Erinnyis ello</i>)	*		
Achemon Sphinx (<i>Eumorpha achemon</i>)	*		
Pandorus Sphinx (<i>Eumorpha pandorus</i>)	*		
White-Lined Sphinx (<i>Hyles lineata</i>)	*		
Abbots Sphinx (<i>Sphecodina abbottii</i>)	*		
Hog Sphinx (<i>Darapsa myron</i>)	*		
Lettered Sphinx (<i>Deidamia inscripta</i>)	*		
Nessus Sphinx (<i>Amphion floridensis</i>)	*		
Tersa Sphinx (<i>Xylophanes tersa</i>)	*		
Hummingbird Clearwing (<i>Hemaris thysbe</i>)	* (98)		(N) 6/21/98 (1)
Bumblebee or Snowberry Clearwing (<i>Hemaris diffinis</i>)	* (98)		(N) 8/8/98 (1)
Pink-Spotted Sphinx (<i>Agrius cingulatus</i>)	*		
Five-Spotted Hawk Moth (<i>Manduca quinquemaculata</i>)	*		
Carolina Sphinx (<i>Manduca sexta</i>)	*		
Elm Sphinx (<i>Ceratomia amyntor</i>)	*		
Waved Sphinx (<i>Ceratomia undulosa</i>)	*		
Pawpaw Sphinx (<i>Dolba hyloeus</i>)	*		
Plebian Sphinx (<i>Paratraea plebeja</i>)	*		
Catalpa Sphinx (<i>Ceratomia catalpae</i>)	*		
Small-Eyed Sphinx (<i>Paonias myops</i>)	*		

Species	WRD	JBD	BPD
Blinded Sphinx (<i>Paonias excaecatus</i>)	*		
Twin-Spotted Sphinx (<i>Smerinthus jamaicensis</i>)	*		
Walnut Sphinx (<i>Laethoe juglandis</i>)	*		
Polyphemus Moth (<i>Anthraea polyphemus</i>)	*		
Luna Moth (<i>Actias luna</i>)	*		
Alilanthus Silkmoth (<i>Samia cynthia</i>)	*		
Promethes Moth (<i>Callosamia promethea</i>)	*		
Cecropia Moth (<i>Hyalophora cecropia</i>)	*		5/29/98 (1)
Io Moth (<i>Automeris io</i>)	*		
Pink-Striped Oakworm Moth (<i>Anisota virginensis</i>)	*		
Rosy Maple Moth (<i>Dryocampa rubicunda</i>)	*		
Eastern Tent Caterpillar (<i>Malacosoma americanum</i>)	*		
Forest Tent Caterpillar Moth (<i>Malacosoma dissita</i>)	*		
Yellow-Collared Scape Moth (<i>Cisseps fulvicollis</i>)	*		
Virginia Ctenucha (<i>Ctenucha virginica</i>)	*		
Banded Tussock Moth (<i>Halysidota tessellans</i>)	*		
Milkweed Tussock Moth (<i>Euchaetes egle</i>)	*		
Pink-Legged Tiger Moth (<i>Spirosoma latipennis</i>)	*		
Virginian Tiger Moth (<i>Spirosoma virginica</i>)	*		
Primrose Moth (<i>Schinia florida</i>)	*		
Isabella Tiger Moth (<i>Pyrrharctia isabella</i>)	*	*	(N)7/25/98 (1)
Locust Underwing (<i>Euparthenos nubilis</i>)	*		
Graphic Moth (<i>Drasteria graphica</i>)	*		
Girfriend Underwing (<i>Catocala amica</i>)	*		
Wonderful Underwing (<i>Catocala mira</i>)	*		
Little Nymph (<i>Catocala micronympha</i>)	*		
Ulironia Underwing (<i>Catocala ulironia</i>)	*		
Woody Underwing (<i>Catocala grynea</i>)	*		
Praeclara Underwing (<i>Catocala praeclara</i>)	*		
Judith's Underwing (<i>Catocala judith</i>)	*		
Mourning Underwing (<i>Catocala hebilis</i>)	*		
The Little Wife (<i>Catocala muliercula</i>)	*		
Bay or Badia Underwing (<i>Catocala badia</i>)	*		
Sleepy or Pink Underwing (<i>Catocala concubens</i>)	*		
Herodias Underwing (<i>Catocala herodias</i>)	*		
Illa Underwing (<i>Catocala illa</i>)	*		
Locust Underwing (<i>Euparthenos nubilis</i>)	*		
The Penitent (<i>Catocala platrix</i>)	*		
The Sweetheart (<i>Catocala amatrix</i>)	*		
Mother Underwing (<i>Catocala parta</i>)	*	*	
Darling Underwing (<i>Catocala cara</i>)	*		
Lunate Zale (<i>Zale lunata</i>)	*		
Colorful Zale (<i>Zale minerea</i>)	*		
Green-dusted Zale (<i>Zale aeruginosa</i>)	*		
Horrid Zale (<i>Zale horrida</i>)	*		
Forage Looper Moth (<i>Caenurgina erecta</i>)	*		
Double-lined Doryodes (<i>Doryodes bistralis</i>)	*		
Black-dotted Brown (<i>Cissusa spadix</i>)	*		
Red-lined Panopoda (<i>Panopoda rufimargo</i>)	*		

Species	WRD	JBD	BPD
The Herald (<i>Scoliopteryx libatrix</i>)	*		
American Idia (<i>Idia americalis</i>)	*		
Common Idia (<i>Idia aemula</i>)	*		
Smoky Idia (<i>Idia scobialis</i>)	*		
Glossy Black Idia (<i>Idia lubricalis</i>)	*		
Variable Zanclognatha (<i>Zanclognatha laevigata</i>)	*		
Chocolate Renia (<i>Renia nemoralis</i>)	*		
Greater Black Letter Dart (<i>Xestia dolosa</i>)	*		
Brown-Collared Dart (<i>Protolampra brunneicollis</i>)	*		
Grand Arches (<i>Lacanobia grandis</i>)	*		
Tufted Bird-Dropping Moth (<i>Cerma cerintha</i>)	*		
Eyed Paectes (<i>Paectes oculatrix</i>)	*		
American Dagger Moth (<i>Acronictina americana</i>)	*		
Beautiful Wood-Nymph (<i>Eudryas grata</i>)	*		
Chocolate Prominent (<i>Peridea ferruginea</i>)	*		
White-Marked Tussock Moth (<i>Orgyia leucostigma</i>)	*		
Tufted Thyatirid (<i>Pseudothyatira cymatophoroides</i>)	*		
Rose Hooktip (<i>Oreta rosea</i>)	*		
Arched Hooktip (<i>Drepana arcuata</i>)	*		
Wavy-lined Emerald (<i>Synchlora aerata</i>)	*		
Chickweed Geometer (<i>Haematopis grataria</i>)	*		
Large Lace-Border (<i>Scopula limboundata</i>)	*		
Ferguson's Scallop Shell (<i>Hydria prunivorata</i>)	*		
Lesser Grapevine Looper Moth (<i>Eulithis diversilineata</i>)	*		
The Gem (<i>Orthonama obstipata</i>)	*		
Lesser Maple Spanworm Moth (<i>Itame pustularia</i>)	*		
Pale Beauty (<i>Campaea perlata</i>)	*		
Dimorphic Gray (<i>Tornos scolopacinarius</i>)	*		
Blurry Chocolate Angle (<i>Semiothisa transitaria</i>)	*		
The Saw-wing (<i>Euchlaena obtusaria</i>)	*		
Obtuse Euchlaena (<i>Euchlaena obtusaria</i>)	*		
Melanophia sp.	*		
Common Gray (<i>Anavitrinella pampinaria</i>)	*		
Small Purplish Gray (<i>Anacamptodes humaria</i>)	*		
Ruddy Metarranthis (<i>Metarranthis duaria</i>)	*		
Oak Besma (<i>Besma quercivoraria</i>)	*		
Juniper Geometer (<i>Patalene olyzonaria</i>)	*		
Pepper-and-Salt Geometer (<i>Biston betularia</i>)	*		
Horned Spanworm Moth (<i>Nematocampa limbata</i>)	*		
Variable Antepione (<i>Antepione thisoaria</i>)	*		
Yellow Slant-line (<i>Tetracis crocallata</i>)	*		
White Slant-line	*		
Large Maple Spanworm (<i>Prochoerodes transversata</i>)	*		
Urola nivalis	*		
Crambus agitatellus	*		
Vagabond Crambus (<i>Agriphila vulgivagella</i>)	*		
Tetralopha Asperatella	*		
Grape Leafroller (<i>Desmia funeralis</i>)	*		
Spotted Beet Webworm Moth (<i>Hymenia perspectalis</i>)	*		

Species	WRD	JBD	BPD
Melonworm Moth (<i>Diaphania hyalinata</i>)	*		
Nomophila nearctica	*		
Blepharomastix ranalis	*		
Pyrausta signatalis	*		
Herculia olinalis	*		
Carpenterworm Moth (<i>Prionoxystus robiniae</i>)	*		
Leopard Moth (<i>Zeuzera Pyrina</i>)	*		
Yucca Moth (<i>Tegeticula yuccasella</i>)	*		
Three-lined Leafroller (<i>Pandemis limitata</i>)	*		
Bidens Borer Moth (<i>Epiblema otiosana</i>)	*		
Maple Callus Borer Moth (<i>Synanthedon acemi</i>)	*		
Squash Vine Borer Moth (<i>Melittia cucurbitae</i>)	*		
Ailanthus Webworm (<i>Atteva punctella</i>)	*		
American Ermine Moth (<i>Yponomeuta multipunctella</i>)	*		
Mompha eloisella	*		
Evergreen Bagworm Moth (<i>Thyridopteryx ephemeraeformis</i>)			

Dragonflies and Damselflies of Jamaica Bay Unit - 1998

Species	WRD	JBD	BPD
Damselflies (Zygoptera)			
Civil Bluet (Enallagma Civilli)	C / 98	C	C / 98
Bog Blue (Enallagma aspersum)	C		
Citrine Forktail (Ischnura hastata)	C / 98	C	
Fragile Forktail (Ischnura posita)	C / 98	C	
Rambers Forktail (Ischnura ramberii)	C	C	(N) 98
Slender Spreadwing (Lestes rectangularus)	C		
Common Spreadeing (Lestes Disjunctus)	C	C	
Dragonflies (Anisoptera)			
Green Darner (Anax junius)	C / 98	C	C / 98*
Hero Darner (Epiaeschna heros)	C / 98	C	C / 98
Salt Marsh Skimmer (Erythrodiplax berenice)	C / 98		C / 98
White Tail (Libellula lydia)	(N) 98	C	C / 98
Ten Spot (Libellula pulchulla)	C / 98	C	
Painted Skimmer (Libullula semifasciata)	C / 98	(S) 97	
Great Blue Skimmer (Libellula vibrans)	C	C	
Blue Pirate (Pachydiplax longipennis)	C / 98	C	(N) 98
Spot Winged Glider (Pantala hymenaea)	C / 98	C	
Wandering Glider (Pantala flavecens)	C / 98	C	
Common Amberwings (Perithemis tenera)	97 / 98		(N) 98
Variegated Meadowfly (Sympetrum curiptum)	S		
Cherry Faced Meadowfly (Sympetrum internum)#	C	C	
Yelow-legged Meadowfly (sympetrum vincium)	C / 98		
Red Mantled Glider (Tamea carolina)	C / 97	C	C
Black Mantled Glider (Tamea lacerata)	C	C	C / 98

There is some debate whether this is a newly described species known as Jane's Meadowfly (Sympetrum janeae)

KEY to Chart

WRD = Wildlife Refuge District

JBD = Jamaica Bay District

BPD = Breezy Point District

(N) = New Species for unit or district

C = Commonly occurs in the Unit

98 = Species was recorded in 1998 or year indicated

S = only a single record exists for that species

1998 data collected by John Zuzworsky- Refuge Operations Specialist WRD, and Steve Finn VIP. Contributions were made by Steve Walter of the NewYork Butterfly Club to the initial inventory.

*** An individual was recorded at the BPD on 12/6/98 which is a state record.**

Other Invertebrate Inventories and Incidental Data **1998**

Baseline data was collected on two families in the Order Hymenoptera.

Ants, Family Formicidae:

Subfamily Myrmicinae

Crematogaster clara (Wildlife Refuge District)

Myrmica punctiventris (Jamaica Bay District)

Tetramorium caespitum (Wildlife Refuge and Jamaica Bay Districts)

Subfamily Dulichoderinae

Tapinoma sessile (Wildlife Refuge District and Jamaica Bay Districts)

Subfamily Formicinae

Formica sp (Wildlife Refuge District)

Acanthomyops interjectus (Wildlife Refuge District)

Lasius alienus (Wildlife Refuge)

The above specimens were collected from beneath coverboards while searching for snakes.

Bees: Superfamily Apoidea

Family Halictidae (Species pending identification)

Family Apidae (Species pending identification)

Data collected by: Lenny Lampel - Seasonal Park Ranger WRD, Kathy Krause - park Ranger WRD, and John Zuzworsky - Refuge Operations Specialist WRD.

Incidental Notes:

On September 17 Thirteen Giant Sulphurs were observed at Cape Cod National Seashore in a two-hour period. (This species normally occurs south of New York)

On September 28 an extremely small Cabbage White was observed. @ The size of an American copper.

Incidental notes by John Zuzworsky Refuge Operations Specialist WRD.

Aquatic Fauna

Updated Inventory of Finfish of Jamaica Bay

Baseline Inventory of Marine Invertebrates

Finfish of Wildlife Refuge Ponds

Species		Pond		
Common Name	Latin Name	East	West	Big John's
Atlantic Silverside	(Menidia medina)	#	#	
Inland Silverside	(Menidia beryllina)*		#	
White Perch	(Morone americanus)	#	#	
Striped Bass	(Morone saxatilis)	#		
Bay Anchovy	(Anchoa mitchilli)		#	
Alewife	(Alosa pseudoharengus)	#		
Common Mummichog	(Fundulus heteroclitis)	#	#	
Striped Killifish	(Fundulus majalis)	#	#	
American Eel	(Anguilla rostrata)	#		
Mosquito Fish	(Gambusia affinis)**			#
Goldfish	(Carrassius auratus)**			#

= Present in that pond

* Pending further identification

** Reported but not confirmed

The above is a reprint of the original inventory completed in 1997. No new inventory work was attempted in 1998. See Jamaica Bay I & M 1997 for a detailed account of inventory methods.

Jamaica Bay Wildlife Refuge Ponds Finfish Inventory By Dave Taft – Supervisory Park Ranger Int WRD.

Marine Invertebrates
Breezy Point / Jamaica Bay Unit
1998

Arthropoda

Merostomata

Horseshoe Crab	(<i>Limulus polyphemus</i>)
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Malacostrata

- Decapoda

Common Spider Crab	(<i>Libinia amarginata</i>)
Blue Crab	(<i>Callinectes sapidus</i>)
Green Crab	(<i>Carcinus maena</i>)
Calico Crab	(<i>Ovalipes ocellatus</i>)
Rock Crab	(<i>Cancer irroratus</i>)
Marsh Fiddler Crab	(<i>Uca pugnax</i>)
Ghost Crab	(<i>Ocypode quadrata</i>)
Flat-Clawed Hermit Crab	(<i>Pagurus pollicaris</i>)
Japanese Shore Crab	(<i>Hemigrapsus sanguinea</i>)
Sand Shrimp	(<i>Crangon septemspinosa</i>)

Mollusca

Bivalvia

Surf Clam	(<i>Spisula solidissima</i>)
Atlantic Razor Clam	(<i>Ensis directus</i>)
Quahog	(<i>Mercenaria mercenaria</i>)
Ribbed Mussel	(<i>Modiolus demissus</i>)
Soft-shell Clam	(<i>Mya arenaria</i>)
Atlantic Jingle Shell	(<i>Anomia simplex</i>)

Gastropoda

Northern Moon Snail	(Lunatia heros)
Lobed Moon Snail	(Polinices duplicatus)
Knobbed Whelk	(Busycon carica)
Channeled Whelk	(Busycon canaliculatum)
American Oyster Drill	(Urosalpinx cinerea)
Eastern Mud Whelk	(Nassarius obsolet)
Atlantic Slipper Snail	(Crepidula fornicata)
Flat Slipper Snail	(Crepidula plana)

The above inventory is a baseline list of Marine Invertebrates found alive and positively identified to the species level.

Marine invertebrate inventory data was collected in 1997 by Steve Finn VIP . No new data was added in 1998.

Finfish of Jamaica Bay – Update 1998

Species		Species	
Common name	Scientific name	Common Name	Scientific Name
Sand Tiger	<i>Odontaspis taurus</i>	Yellow jack	<i>Caranx bartholmaei</i>
Smooth Dogfish	<i>Mustelis canis</i>	Crevalle jack	<i>Caranx hippos</i>
Spiny Dog Fish	<i>Squalus acanthias</i>	Bigeye scad	<i>Selar crumenophthalmus</i>
Little Skate	<i>Raja erinacea</i>	Lookdown	<i>Selene vomer</i>
Clearnose Skate	<i>Raja Egianteria</i>	Scup	<i>Stenotomus chrysops</i>
		Atl. Croaker	<i>Micropogonias undulatus</i>
Cownose Ray	<i>Rhinoptera bonasus</i>	Northern kingfish	<i>Menticirrhus saxatilis</i>
Atlantic Sturgeon	<i>Acipenser oxyrhynchus</i>	Spot	<i>Leiostomus xanthurus</i>
American eel	<i>Anguilla rostrata</i>	weakfish	<i>Cynoscion regalis</i>
Conger eel	<i>Conger oceanicus</i>	Spotfin butterflyfish	<i>Chaetodon ocellatus</i>
Blueback herring	<i>Alosa aestivalis</i>	Tautog	<i>Tautoga onitis</i>
Alewife	<i>Alosa pseudoharengus</i>	Cunner	<i>Tautogolabrus adspersus</i>
American shad	<i>Alosa sapidissima</i>	Striped mullet	<i>Mugil cephalus</i>
Atlantic menhaden	<i>Brevoortia tyrannus</i>	White Mullet	<i>Mugil curema</i>
Atlantic herring	<i>Clupea harengus</i>	Northern sennett	<i>Sphyræna borealis</i>
Bay Anchovy	<i>Anchoa mitchilli</i>	Northern stargazer	<i>Astriscopus guttatus</i>
Inshore lizard fish	<i>Synodus foetens</i>	Rock gunnel	<i>Pholis gunnellus</i>
Oyster toadfish	<i>Opsanus tau</i>	Ocean pout	<i>Macrozoarces americanus</i>
Atlantic cod	<i>Gadus morhua</i>	Am. sandlance	<i>Ammodytes hexapterus</i>
Atlantic tomcod	<i>Microgadus tomcod</i>	Naked goby	<i>Gobiosoma bosci</i>
Silver hake	<i>Merluccius bilinearis</i>	Seaboard goby	<i>Gobisoma ginsbergi</i>
Red hake	<i>Urophycis chuss</i>	Butterfish	<i>Peprilus triacanthus</i>
Spotted hake	<i>Urophycis regia</i>	Northern searobin	<i>Prionotus carolinus</i>
White hake	<i>Urophycis tenuis</i>	Striped searobin	<i>Prionotus evolans</i>
Halphbeak	<i>Hyporhamphus unifasciatus</i>	Grubby	<i>Myoxocephalus aeneus</i>
Atlantic needlefish	<i>Strongylura marina</i>	Longhorn sculpin	<i>M. octodecimspinosus</i>
Mummichog	<i>Fundulus heteroclitus</i>	Summer flounder	<i>Paralichthys dentatys</i>
Banded killifish	<i>Fundulus diaphanus</i>	Four spot flounder	<i>Paralichthys oblongus</i>
Striped killifish	<i>Fundulus mujalis</i>	Gulf stream flounder	<i>Citharichtys arctifrons</i>
Bluespotted cornetfish	<i>Fistularia tabacaria</i>	Smallmouth flounder	<i>Etropus microstomus</i>
Fourspine stickleback	<i>Apeltes quadracus</i>	Windowpaine	<i>Scophthalmus aquosus</i>
Threespine	<i>Gasterosteus aculeatus</i>	Winter flounder	<i>Pseudopleuronectes am.</i>
Lined seahorse	<i>Hippocampus erectus</i>	Hogchocker	<i>Trinectes maculatus</i>
Northern pipefish	<i>Singnathus fuscus</i>	Orange filefish	<i>Aluterus schoepfi</i>
White perch	<i>Morone americana</i>	Planehead filefish	<i>Monacanthus hispidus</i>
Striped bass	<i>Morone saxatilis</i>	Smooth trunkfish	<i>Lactophrys Triqueter</i>
Black sea bass	<i>Centropristis striata</i>	Northern puffer	<i>Sphoeroides maculatus</i>

Species		Species	
Common name	<i>Scientific name</i>	Common Name	Scientific Name
Big eye	Priacanthus arenatus	Striped burrfish	Chilomycterus schoepfi
Short big eye	Priacanthus alta		
Bluefish	Pomatomus saltatrix		
Cobia	Rachycentron canadum		

No new species were recorded in 1998. The marine finfish inventory is conducted by the Division of Natural Resources. A fishkill occurred in Jamaica Bay on 9/15/98 involving 1000's of Atlantic Menhaden (*brevortia tyrannus*).

Flora 1998

This section documents new plant records for the Jamaica Bay Unit that are either not listed in the "Flora Of Gateway National Recreation Area" (revised 1997), or where instances of additional district occurrences have been observed. It includes information on new visual sightings and herbarium voucher collections for 1998, as well as the status of visual sightings listed in the 1997 Inventory and Monitoring Report.

Records of new vegetation plantings for 1998, data on the Seabeach Amaranth population at the Breezy Point District, and an update of the Metropolitan Flora Project - Woody Plant Survey, are also included.

New Plant Sightings 1998 - WRD

Ragged Fringed Orchis (*Plantathera lacera*) Native. Not on Gateway list. Collected 7/5/98, Barn Owl box at east side Plethadon Woods. 44 individuals were located; 24 at collection site, 16 in North Garden, 4 in the East Garden. Several seed pods were observed on North Garden plants 9/6/98. Specimen sent to park botanist.

Cheeses (*Malva neglecta*) Non-native. Not listed for WRD on Gateway list. Visual sighting 6/30/98, Visitor Center Lawn. COLLECT IN 1999.

White Avens (*Genum canadense*) Native. Not on Gateway list. Visual sighting 7/19/98, trail to south East Pond shoreline. COLLECT IN 1999.

Status of 1997 I&M Report Plant Sightings - WRD

Canada St. Johnswort (*Hypericum canadense*) Native. Not on Gateway list. Visual sighting 1993. Collected 8/12/98, South Dike Road. Specimen sent to park botanist.

Rough Boneset (*Eupatorium pilosum*) Native. Not on Gateway list. Visual sighting 1992. Collected 8/12/98, South Dike Road. Specimen sent to park botanist.

Northern Willow Herb (*Epilobium glandulosum*) Native. Not on Gateway list. Visual sighting 1992. Collected 9/28/98, Bench #2 West Pond Shoreline. Specimen sent to park botanist.

Ash (*Fraxinus sp.*) Not listed for WRD on Gateway list. Visual sightings in 1992, 2 specimens in South and North Garden respectively. COLLECT IN 1999.

Sweet Gum (*Liquidambar styraciflua*) Native. Not listed for WRD on Gateway list. Visual sighting 1997, East side board walk. COLLECT IN 1999.

Black Gum (*Nyssa sylvatica*) Native. Not listed for WRD on Gateway list. Visual sighting 1995, East Fire Break. COLLECT IN 1999.

Narrow-leaved Vetch (*Vicia angustifolia*) Non-native. Not on Gateway list. Visual sighting 1993, Wildflower Garden. COLLECT IN 1999.

Cleavers (*Galium aparine*) Native. Not listed for WRD on Gateway list. Visual sighting 1993, east side boardwalk trail. COLLECT IN 1999.

Narrow-leaved Willow Herb (*Epilobium leptophyllum*) Native. Not on Gateway list. Visual sighting 1992. COLLECT IN 1999.

New Plantings 1998 - WRD

- As part of an effort to replace dying Japanese Black Pines, an area of approx. 30 sq. feet of at the West Pond Trail/ South Garden junction (predominantly Oriental Bittersweet) was cleared and planted with the following native species:

- * Eastern White Pine (*Pinus strobus*) (4, 4-5ft trees)
- * Bayberry (*Myrica pensylvanica*) (8, 2 gal. pots)
- * Sweet Pepper Bush (*Clethera alnifolia*) (6, 2-3 gal. pots)

- 6 Scarlet Oaks (*Quercus coccinea*) were planted in the *Ailanthus* grove at the south end of South field.

- 3 Wild Indigo (*Baptisia tinctoria*) were transplanted from an overgrown planting off Crossbay Blvd. to West Pond trail.

The visitor center pond clearing was renovated in late 97/early 98 and planted with the following:

2 American Holly (*Ilex opaca*)

2 Witch Hazel (*Hamamelis virginia*)

Metropolitan Flora Project Update

Data from the woody plant survey conducted at WRD from 1995-1997 were compiled and sent to the Brooklyn Botanic Garden in October 1998. The results of the survey are on file.

Seabeach Amaranth - BPD

Seabeach Amaranth (*Amaranthus pumilus*), has been listed as an endangered species since 1993. In 1998 monitoring efforts located 29 plants at BPD.

Flora data compiled by Kathy Krause – Park Ranger Int / WRD

Birds 1998

The following bird sighting highlights were selected from the sightings logs located outside of the visitor center at the Jamaica Bay Wildlife Refuge and Building #1 at Fort Tilden. A separate summary was written for each district. These sightings are entered into the sightings logs by visitors to the park and are generally not verified by park staff.

Jamaica Bay Wildlife Refuge Sighting Log Highlights 1998

In 1998 visitors to the Jamaica Bay Wildlife Refuge recorded seventy-eight pages of wildlife sightings.

January began with sightings of **Red and White Winged Crossbills** which were recorded on several occasions. Red and White Winged Crossbills were recorded this was the first major influx of these birds from the north to our area in six or seven years. In February a **Ruff legged Hawk** was sighted several times. **Turkey Vulture** sightings continue to increase. The five sightings this year are up from the three recorded last year, which was the previous record number. The **Black Vulture** sighting recorded April 4 would be a new bird record for the Jamaica Bay bird list if it were confirmed. A **Blue Grosbeak** was listed for May 17.

The big news this year came in the form of a little bird, the **Broad Billed Sandpiper**. This bird appeared for the first time ever in the lower 48 states. It was first recorded on 8/27/98 and last recorded in the sightings log on 9/14/98. **Two Red Necked Phalaropes** were listed for the East Pond on August 17. **Black Billed and Yellow Billed cuckoos** were recorded regularly from spring through fall; however, strong breeding evidence for these birds is still lacking. A **Connecticut Warbler** remained in full sight in the North Garden for the better part of the day on September 7 and again on September 13. A **Buff Breasted Sandpiper** was recorded on 9/17/98. On October 20 there is a listing for "**many**" **Ross' Geese** and on November 29 three **Rusty Blackbirds** were recorded. A **Northern Goshawk** rounded out the year with several sightings in December.

Highlights from the sightings log at Fort Tilden

On the Fourth of January **Red and White Winged Crossbills** were sighted and listed regularly until the January 22. On January 11, two hundred

Northern Gannets were listed and on January 15 and 18, a **Black-legged Kittiwake** was recorded.

On January 31 A Black- Tailed Gull was reported. If confirmed this would be the first New York state Record for this Bird.

After a long gap in log entries a **Red Headed Woodpecker** is noted on both September 30 and October 4. On the 8 of October 20 **Black Scoters**. A **cave Swallow** was reported on November 28.

**The Breezy Point District Annual Breeding Surveys
(Gulls, Terns, Plovers, Skimmers, and other waterbirds)
1998**

Eleven pairs of piping plovers (*Charadrius melodus*) were monitored from March 24 to September 7 1998 on three sections of beach. The Piping Plovers began laying eggs during the last week in April and continued into first week of June. Hatching dates ranged from June 15 to July 4, 1998. Hatching success was 37%. Six of thirteen nests hatched. Four were lost to predation and three were abandoned. Fledging dates ranged from July 9 through July 28. Fledgling success was 68% (13 out of 19 chicks). All chick mortality occurred within 7 days of hatching. Total productivity was 13 fledgling produced by 11 breeding pairs. The mean number of chicks fledged was 1.18 per pair.

The number of Common Terns (*Sterna hirundo*) rose from 2,670 last year to 3,700 this year. Many of these birds nested in front of the dunes where the plovers also nested. While the colony experienced an apparent chick loss, productivity was estimated at 1 per pair. Aggressive behavior was noted by the terns toward the plovers for the fifth consecutive year. However the aggressive behavior observed was toward the adults and not the chicks.

Two to three pairs of Roseate Terns (*Sterna dougallii*) nested at the Breezy Point tip this year, compared to 4 last year. Black Skimmers (*Rynchops niger*) nesting decreased from 560 individuals last year to 300 this year, while the number of nesting Least Terns (*Sterna albifrons*) increased from 8 last year to 40 in 1998.

Data compiled by Susan Gilmore – Resource Management Specialist BPD

Jamaica Bay Unit Breeding Bird Update 1997-1998

This latest effort to update and revise the Known status of breeding birds in the Jamaica Bay Unit was conducted in 1997-1998 and will continue in 1999. New data will be added to this chart each year thereafter as it is collected to maintain the most current information available. The chart presented below also references the data collected in 1980-1982 as part of the NY Breeding Bird Atlas Project, and historical data collected prior to 1970. These data are included as part of the brochures: Birds of The Jamaica Bay Wildlife Refuge, compiled by Tom H. Davis and Birds of Floyd Bennett Field, compiled by Ron and Jean Bourque.

Breeding confirmations are separated by district: WRD (Wildlife Refuge District), JBD (Jamaica Bay District) and BPD (Breezy Point District). All species listed have been observed in breeding season and the words "confirmed", "probable", or "possible" will appear in the column(s) of the appropriate districts. Confirmed will appear only after birds that have been confirmed breeding by the observation of specific criteria. The words probable and possible are used when breeding status could not be confirmed. All determinations are based on specific criteria consistent with those used in The Atlas of Breeding Birds of New York State.

The year when observation was last made will appear after each entry.

Please note: not all species were searched for in 1997-1998.

The 1997-1998 breeding bird data were collected by Jamaica Bay Unit Staff and volunteers.

Breeding Bird Data for the Jamaica Bay Unit

Species	District		
	WRD	JBD	BPD
Pied-billed Grebe	Confirmed / 82		
Double Crested Cormoant	Confirmed / 97		
Green Heron	Confirmed / 82		
Little Blue Heron	Confirmed / 97		
Cattle Egret	Confirmed / 82		
Great Egret	Confirmed / 97		
Snowy Egret	Confirmed / 97		
Tricolored Heron	Confirmed / 97		
Black-Crown'd Night Heron	Confirmed / 97		
Yellow Crown'dNight Heron	Confirmed / 97		
Least Bittern	Confirmed / 82		
American Bittern	Confirmed / 70		
Glossy Ibis	Confirmed / 82		
Mute Swan	Confirmed / 97		
Canada Goose	Confirmed / 97	Confirmed / 82	Confirmed / 98
Mallard	Confirmed / 97	Confirmed / 82	Confirmed / 98
Black Duck	Confirmed / 97	Confirmed / 82	Confirmed / 98
Gadwall	Confirmed / 82		
Pintail	Confirmed / 70		
Green-Winged Teal	Confirmed / 70		
Blue-winged Teal	Confirmed / 70		
American Wigeon	Confirmed / 70		
Northern Shovler	Confirmed / 82	Confirmed / 82	
Wood Duck		Possible / 97	
Redhead	Confirmed / 82		
Ruddy Duck	Confirmed / 82		
Northern Harrier	Confirmed / 82	Confirmed / 82	
Osprey	Confirmed / 98		
Peregrine Falcon			
American Kestral	Confirmed / 70	Confirmed / 82	
Northern Bobwhite	Confirmed / 82	Confirmed / 82	
Ring Necked Pheasant	Confirmed / 97	Confirmed / 97	
Clapper Rail	Confirmed / 97		
Virginia Rail	Possible / 97		
Common Moorhen	Confirmed / 82	Confirmed / 82	
American Coot	Confirmed / 82		
American Oystercatcher	Confirmed / 97	Confirmed / 82	Confirmed / 98
Killdeer	Confirmed / 97	Confirmed / 97	Confirmed / 97
Piping Plover			Confirmed / 98
Willet	Confirmed / 97	Confirmed / 82	
Spotted Sandpiper	Confirmed / 97	Confirmed / 82	
Upland Sandpiper		Probable / 82	
American Woodcock	Confirmed / 97	Confirmed / 82	
Gr. Black-Backed Gull	Confirmed / 97		Confirmed / 98
Herring Gull	Confirmed / 97		Confirmed / 98

Species	District		
	WRD	JBD	BPD
Laughing Gull	Confirmed / 97		
Gull-Billed Tern	Confirmed / 82		
Forsters Tern	Confirmed / 82		
Common Tern	Confirmed / 82		Confirmed / 98
Roseate Tern			Confirmed / 98
Least Tern	Confirmed / 70		Confirmed / 98
Black Skimmer	Confirmed / 70		Confirmed / 98
Rock Dove	Confirmed / 82	Confirmed / 82	
Mourning Dove	Confirmed / 97	Confirmed / 82	Confirmed / 98
Yellow Billed Cuckoo	Possible / 98	Confirmed / 82	
Black Billed Cuckoo	Confirmed / 70	Confirmed / 82	
Barn Owl	Confirmed / 97	Confirmed / 82	Confirmed / 98
Short Eared Owl	Possible / 82	confirmed / 82	
Chimney Swift		Confirmed / 82	
Yellow Shafted Flicker	Confirmed / 98	Confirmed / 82	
Downey Woodpecker			
Eastern Kingbird		Confirmed / 82	Confirmed / 97
Horned Lark	Confirmed / 70	Confirmed / 82	
Willow Flycatcher	Confirmed / 82	Confirmed / 82	
Tree Swallow	Confirmed / 97	Confirmed / 82	Confirmed / 98
Barn Swallow	Confirmed / 97	Confirmed / 82	Confirmed / 98
Blue Jay	Possible / 97		
American Crow	Confirmed / 97	Confirmed / 82	Confirmed / 97
Fish Crow	Confirmed / 97	Confirmed / 82	Confirmed / 97
House Wren	Confirmed / 97	Confirmed / 82	
Marsh Wren	Confirmed / 82	Confirmed / 82	
Northern Mockingbird	Confirmed / 97		
Grey Catbird	Confirmed / 97		
Brown Thrasher	Confirmed / 97		
American Robin	Confirmed / 97	Confirmed / 82	Confirmed / 97
Cedar Waxwing	Confirmed / 98		
European Starling	Confirmed / 82	Confirmed / 82	
White-eyed Vireo	Probable / 98	Confirmed / 82	
Yellow Warbler	Confirmed / 97	Confirmed / 82	
Common Yellowthroat	Confirmed / 82	Confirmed / 82	
American Redstart	Probable / 98		
Boat-Tailed Grackle	Probable / 98	Probable / 82	
Brown-Headed Cowbird	Probable / 98		
Northern Cardinal	Confirmed / 98	Confirmed / 82	
Indigo Bunting	Possible / 97		
House Finch	Probable / 97	Confirmed / 82	
American Goldfinch	Probable / 97	Confirmed / 82	
Rufus-sided Towhee	Confirmed / 97	Confirmed / 82	
Savannah Sparrow	Confirmed / 70	Confirmed / 97	
Grasshopper Sparrow		Confirmed / 82	
Sea-side sharp-tailed Sp.	Confirmed / 82	Confirmed / 82	
Seaside Sparrow	Confirmed / 82		
Field Sparrow		Confirmed / 82	

Species	District		
	WRD	JBD	BPD
Swamp Sparrow	Probabile / 82	Possible / 82	
Song Sparrow	Confirmed / 97	Confirmed / 82	
House Sparrow	Confirmed / 82	Confirmed / 82	

Section 2

Monitoring Data

Reptiles and Amphibians (Herps) of the Jamaica Bay Unit 1998

Jamaica Bay Wildlife Refuge

1998 was the third year in the five year Herp monitoring cycle initiated in 1996. This years focus was on land snakes. These included: Northern Brown Snake (*Storeria dekayi dekayi*), Eastern Garter snake (*Thamnophis sirtalis sirtalis*), Smooth Green Snake (*Opheodrys aestivus*), Northern Black Racer (*Coluber constrictor constrictor*), Eastern Milk Snake (*Lampropeltis triangulum triangulum*).

Twelve searches were made between May 30 and September 4. Six on the East Side and six on the West Side. An average of twenty-five cover boards were searched each time. A total of nine snakes were found, eight Garter Snakes* and one Brown Snake. The results of these searches were far less productive than expected. One possible Explanation for that is the exceptionally dry weather we experienced during the peak search time. Notes were taken on the presence of invertebrates and mammals under the cove boards as well. Those data are stored in the raw data files.

*This included two dead snakes found on top of a cover board.

Above data collected by: Lenny Lampel Seasonal Park Ranger WRD and John Zuzworsky Refuge Operations Specialist WRD.

Incidental sightings for WRD

Reptiles:

Painted Turtles were observed often, basking on logs in Big John's Pond. Notably, on May 14, nine Painted Turtles were recorded and six Painted Turtles and a Snapping Turtle on June 18.

Diamond Back Terrapins were recorded from June 16 – July 9. Four were killed and one injured by cars on Crossbay Blvd. On 6/16 Five Terrapins were observed digging nests. On June 21 seven live terrapins were brought to the visitor center from crossbay blvd. in addition to three that were killed on the blvd. On July 7 one terrapin was found dead on cross Bay Blvd and three were recorded live on the West Pond Trail.

Box Turtles

Four Box Turtles were found in the field this year as well as two brought in be visitors who had "Found" them in their neighborhood Both had National Pak tags on them.

Snapping Turtles

Two Snapping Turtles were observed digging nests along the West pond Trail on May 31. Two others were seen on Crossbay Blvd. On June 16.

Amphibians

An adult Wood Frog was noted in the vicinity of Big Johns Pond on March 29. Big John's Pond Dried in Mid August and remained dry for the remainder of the year. The first rain came in major storm system, which put eight inches of water in the pond in two days on Jan 3 and 4. In august Green Herons and Great Egrets were seen and photographed eating Spotted Salamanders among other things from the pond.

A tree frog with a clubbed front leg was collected from the East Side of the wildlife refuge on October 25. In 1999 dip netting will be conducted to search for any other evidence of deformities in frogs and tadpoles

Above data collected by Wildlife Refuge District Staff and Volunteers.

Incidental Herp Sightings for BPD

Grey Tree frogs were heard calling on May16 and June 18, near Battery Harris East and Breezy Point Access Road respectively.

Spring Peepers were heard near the fresh water pond and Back Fort area on April 15.

Young **Fowlers Toads** were seen by the Fresh Water Pond at Fort Tilden on July 24 and an adult **Fowlers Toad** was observed near Battery Harris East on July 31. (Fowler Toad sightings are not a positive identification)

Above data collected by Nancy Corona Interpretive Specialist BPD

Jamaica Bay District

In addition to the coverboards already in place in the North 40, fifty additional coverboards were placed in a wet shrubby field at the north end of section E of the Grasslands. In June through August these boards were searched on seven occasions. Nothing was found on three searches. One Brown Snake was found on two searches two Brown Snakes were found on one search and a Brown snake and a Garter Snake were found on one search.

Eighty-one cover boards were distributed in the GRAMPS (Grassland Restoration and Management Area) and their associated shrub and woodlands. The boards were distributed by pacing numbers selected from a random digits charts along a X and Y-axis delineated by the runways adjacent to the GRAMP site. The cover boards were distributed in April and early May. All activities in the GRAMP site were halted from mid May through August 1 to allow grassland sparrows to nest undisturbed. In August 55 of the 81 boards placed were located (61%). Most of the boards that were not located were those distributed in the dense shrublands that surround the grasslands. In four searches of the boards in August no snakes were found.* Notes were taken on the occurrence of Invertebrates and mammals found under the boards. Those data are stored in the raw data files.

*The lack of productivity may be the result of the extreme dryness that occurred throughout the search period. A continuation of snake monitoring efforts will continue in 1999.

No snakes were found in two searches of the coverboards in the North Forty. @ 20 boards were searched each time.

Above data collected by John Zuzworsky Refuge Operations Specialist WRD, Lenny Lampel Seasonal Park Ranger WRD, and Christopher Smith VIP.

Pond Avian Botulism Control Patrol Results 1998

Routine Patrols are conducted on the East and West Ponds of the Jamaica Bay Wildlife Refuge to locate and remove dead bird carcasses as part of an avian botulism control plan. Tallies of the results are presented below.

In 1998 routine patrols were conducted as usual, however collection data was not systematically recorded. From incidental data available the following general comments can be made: The total number of dead bird carcasses removed from the ponds were closer to the number in 1997 than in 1996, and Mute Swan deaths on the ponds were higher than ever. A least ten were removed this year as opposed to one or two normally.

Summary of Dead Bird Patrol results 1996

Pond	Total Duck	Total Gull	Total Geese	Total other	Unidentified	Total Birds	*
East Pond	2	4	1	2		9	
West Pond	1	1				2	
*							
*							

Summary of Dead Bird Patrol Results 1997

Pond	Total Duck	Total Gull	Total Geese	Total other	Unidentified	Total Birds	*
East Pond	10	28	15	7	8	58	
West Pond	0	2	4	0	5	11	
*							
*							

Other refers to birds other than those listed, **Unidentified** refers to bird that were not able to be identified

Jamaica Bay District Pond Information

Due to the lack of rainfall from July 1998 through January 1999 both Big John's Pond (WRD) and the Return a Gift Pond completely dried by August 1, 1998 and remained dry till until January 3, 1999 when a major rainstorm deposited @ six inches of water into Big John's Pond. This is a historically long dry period for both ponds.

The flap valves that regulate water flow from the west pond at the wildlife Refuge to Jamaica Bay and prevent back flow of salt water into the west pond were repaired. A deteriorated section of conduit pipe that connects the flap valves was also replaced.

JBWR Cavity / Platform Nesting Bird Project 1998

Tree Swallow / House Wren Nesting Boxes

Ninety-Eight boxes were available for nesting in 1998.* Seventy-four boxes were used in total fifty-seven by Tree Swallows and seventeen by House Wrens. Thirty-four of the Fifty-Seven Tree Swallow boxes Were Successful and eight of the seventeen House Wren Boxes were successful.

98 Nesting boxes were available for use this year

74 boxes were used	74/98	74%
57 were used by Tree Swallows	57/74	77%
34 Tree Swallow nests were successful	34/57	60%
17 boxes were used by House Wrens	17/74	23%
8 House Wren Boxes were successful	8/17	47%

***All brush was cleared from around the boxes and all boxes had predator guard installed on them. Please note however the flange type predator guards are greatly inferior to conical guards which are now installed on some boxes in the post 1998 nesting season. The flange type guards become dislodged and thereby ineffective because of wind sheer, especially in open areas. I hereby recommend A conversion to the conical style predator guards when that becomes feasible.**

Cavity nesting bird Data collected by Chris Olijnyk Refuge Operations Specialist WRD

Barn Owl and Osprey Banding

Osprey:

The Jamaica Bay Unit has Seven Osprey nesting platforms, all of which are located within the Wildlife Refuge District. In 1998 two

pairs of Osprey produced six young, four in one nest and two in the other. An unsuccessful nesting attempt may have been made by a third pair. All six hatchlings were banded.

Barn Owls:

The Jamaica Bay Unit has Twenty -four Barn Owl Nesting Boxes. They are distributed between all three districts. In 1998 these boxes produced twelve nests which hatched eighteen young. All young were banded as well as three adults.

Osprey and Barn Owl Nesting Data collected by: Don Riepe, Refuge Operations Specialist WRD and Chris Nadareski, NYCDEP

Resident Waterfowl Monitoring 1998

In an attempt to get a handle on the population numbers of resident (birds that breed and remain throughout the year) waterfowl a periodic survey was implemented in 1998. The species involved include: Mallards (*Anas platyrhynchos*), Black Ducks (*Anas rubripes*), Canada geese (*Branta canadensis*), and Mute Swans (*Cygnus olor*). The timing of these counts are will be timed to attempt to separate migrating only, migrating and breeding, and strictly migrating birds.

Date	Species	East Side	West Side	Total Number
June 29, 1998	Mallard	61 +6 chicks	243	304 +6 chicks
	Black Duck	96 +19 chicks	70	166 +19 chicks
	Canada Goose	675	920 +3chicks	1,595 +3chicks
	Mute Swans	163	1 =4 chicks	164 = 4 chicks

July 31, 1998	Mallard	25 +26 chicks	301 +4 chicks	326+30 chicks
	Black Ducks	91 +8 Chicks	98	189 +8 chicks
	Canada Goose	482	532	1014
	Mute Swans	272 +3 signets	5	277 + 3 signets

Oct 20, 1998	Mallard	76	133	209
	Black Duck	345	560	905
	Canada Goose	366	167	533
	Mute Swans	6	3	9

Data collected by: John Zuzworsky Refuge Operations Specialist WRD, and Lenny Lampel Seasonal Park Ranger

Section 3

Study Updates

Dispersal of Juvenile Great Blacked and Herring Gulls from Staten Island A Pilot Study Summary

Richard R. Veit
Department of Biology
The College of Staten Island
2800 Victory Boulevard
Staten Island, NY 10314
Fax 718-982-3852

We visited Hoffman Island (40 35'N, 74 03.5'W) on 23 June 1998 in the company of Don Riepe and colleagues from the National Park Service and Paul Kerlinger, consultant under contract to the New York Audubon Society, for the purpose of banding gull chicks and surveying the nesting waterbird colonies. Our party consisted of myself, Tom Brown and Jarrod Santora, all of The College of Staten Island. Our visit to the island lasted a bit less than two hours; during that time we circumnavigated the perimeter of the island and feel that we gained access to all areas where gulls were nesting. We counted at least 100 nearly-fledged Great Black-backed Gulls, but saw only a few (<25) Herring Gull chicks, and suspect that Herring Gulls experienced low fledging success in 1998. We captured gull chicks by hand, and banded all individuals which appeared healthy and large enough to accept a band. We banded 47 Great Black-backed and 3 Herring Gull chicks (all under Federal Bird-Banding license 22795). As of February 1999, we have received no sightings or recoveries of these marked individuals.

This was a pilot study to explore the feasibility of studying interannual variability in distances dispersed by juvenile gulls. At Staten Island, it will be of particular interest to note changes in distances dispersed before and after the closure of the Fresh Kills landfill, slated for the end of 2001. To achieve this objective it will be necessary to band several hundred chicks each year, in order to obtain sightings or recaptures of a sufficient sample. Resighting frequencies of this sort should be on the order of 1-10%, and could be higher than this if we use highly visible colored plastic bands. The popularity of gull-watching up and down the east coast substantially increases the probability that our banded birds will be resighted and reported. By visiting all of the gull colonies surrounding Staten Island, and possibly including the large Canarsie Pol Colonies surrounding Staten Island, and possibly including the large Canarsie Pol colony in Jamaica Bay as well, we ought to be able to band a large enough sample of chicks each year to ensure resightings.

We thank George Frame and Don Riepe for arranging boat transport to Hoffman Island.

**MAPS Station (Monitoring Avian Productivity and Survivorship
Program Station) at Fort Tilden, Gateway National Recreation Area, in
Summer 1998
A Study summary**

Richard R. Veit and Thomas Brown
Biology Department
The College of Staten Island
2800 Victory Boulevard
Staten Island, NY 10314
Fax 718-982-3852

During late May-mid August 1998 we operated a MAPS station at Fort Tilden, near the automotive repair garage by the easternmost NIKE missile bunker. This was our second year of operation. We maintained eight 12-meter mist nets, which we opened on 6 dates between 18 June and 15 August. Each sampling period began 30 minutes before sunrise and lasted for 6 hours thereafter. In 1998, we banded 54 new birds of 13 species, and recaptured 18 birds that we banded at Fort Tilden in 1997. Of the birds captured new in 1998, a Black-billed Cuckoo and a White-eyed Vireo were new to the site for us (we did not capture them in 1997). The three most abundant species at Fort Tilden in 1998 were Gray Catbird, Eastern Towhee and Common Yellowthroat. Overall, productivity of young passerines at Fort Tilden was lower in 1998 than in 1997.

The objective of the nationwide MAPS program is to estimate reproduction and survival of passerine birds. As maps of abundance of passerines are already available from Christmas Bird Counts and Breeding Bird Surveys, the point of this additional program is to link birds more closely with their habitats by mapping the variation in reproductive success across a broad diversity of habitats. MAPS is a long-term program, designed also to measure variation in reproduction through time. Thus it is our hope to continue our work at Fort Tilden indefinitely, during the breeding season.

We thank Jose Rosario for expediting our use of the Fort Tilden site.

Changes in the Nesting Populations of Colonial Waterbirds in Jamaica Bay, New York, 1974-1998

Kevin M. Brown*, Julia L. Tims*, R. Michael Erwin**, and Milo E. Richmond*

*Department of Natural Resources, Cornell University, New York Cooperative Fish and Wildlife Research Unit, Ithaca, NY 14853, USA.

**USGS Patuxent Wildlife Research Center, 12100 Beech Forest Road, Laurel, MD 20708; and Department of Environmental Sciences, Clark Hall, Univ. of Virginia, Charlottesville, VA 22903.

ABSTRACT. Given both the unusual biotic richness of an urban wildlife refuge and the potential of birds to interfere with the safe operations of aircraft, the distribution, abundance and trends in waterbirds are important to airport authorities, wildlife managers and the public. In this study, we identify changes in the population dynamics of colonial waterbirds nesting in the Jamaica Bay Wildlife Refuge, located adjacent to John F. Kennedy airport, from 1974 to 1998. During the past 25 years, the number of Herring Gull (*Larus argentatus*) pairs nesting in Jamaica Bay has decreased from about 3,300 pairs (1974 - 1978) to 2,350 pairs in 1998 (linear relationship, $r = 0.6$, $P = 0.0232$). In contrast, nesting by Great Black-backed Gulls (*L. marinus*) has increased from about 50 to 400 pairs in 1998 (linear relationship, $r = 0.8$, $P = 0.0001$). In 1979, 15 pairs colonized Jo Co Marsh in Jamaica Bay. During the 1980's, Laughing Gull numbers increased exponentially to about 7,600 pairs in 1990 but have remained relatively stable at about 5,200 (± 850) pairs since 1991 when a gull-shooting program was initiated at Kennedy airport by the Port Authority of New York and New Jersey; as part of a Bird Hazard Reduction Program. Common and Forster's Terns (*Sterna hirundo*, *S. forsterii*) nest sympatrically with the Laughing Gull on three salt-marsh islands: Jo Co Marsh, Silver Hole Marsh and East High Meadow. From 1975 to 1985, Common Terns increased from about 400 to 1,467 pairs but have since declined to about 360 pairs in 1997 (second order polynomial regression, $P=0.0077$). The Forster's Tern (1 pair in 1991; 1992 - 1997, mean = 56 ± 16 pairs/year) has nested in Jamaica Bay since 1991, the only known site on Long Island. In 1997, approximately 800 pairs of wading birds nested on Canarsie Pol island. Although this heronry declined during the 1980s, the numbers of Glossy Ibis (*Plegadis falcinellus*, $N = 306$ adults estimated), Great Egret (*Casmerodius albus*, $N = 127$ adults), Snowy Egret (*Egretta thula*, $N = 128$ adults) and Black-crowned Night Heron (*Nycticorax nycticorax*, $N = 238$ adults) in 1997 were similar to, or higher than, those recorded during the mid-1970's. In 1997, we also observed small numbers of Yellow-crowned Night Herons (*N. violacea*, $N = 5$ adults), Little Blue Herons (*E. caerulea*, $N = 7$ adults), and Tricolored Herons (*E. tricolor*, $N = 7$ adults) at the Canarsie heronry. In general, the results of 25 years of census data strongly suggest that the protection of colony sites in Jamaica Bay Wildlife Refuge will be of vital importance to the conservation efforts of most colonial waterbirds that presently breed on Long Island; it remains the only colony site of Laughing Gulls and Forster's Terns in New York state. The Jamaica Bay colonies may serve as a source of immigrants to other Long Island colonies, and in some cases, act as a "sink" (e.g. gull shooting) for birds emigrating from New Jersey and elsewhere.

Gulls and planes at Kennedy Airport: Does the National Park Service need to Manage the Laughing Gull Colony in the Jamaica Bay Wildlife Refuge?

Kevin M. Brown*, R. Michael Erwin**, and Milo E. Richmond*

*Department of Natural Resources, Fernow Hall, Cornell University, New York Cooperative Fish and Wildlife Research Unit, Ithaca, NY 14853, USA.

**USGS Patuxent Wildlife Research Center, Biological Resources Division, 12100 Beech Forest Road, Laurel, MD 20708, USA; and Department of Environmental Sciences, Clark Hall, University of Virginia, Charlottesville, VA 22903.

Abstract. During the 1980s, the exponential growth of a Laughing Gull (*Larus atricilla*) colony (from 15 to 7,500 pairs by 1990) in the Jamaica Bay Wildlife Refuge, and the significant and positively correlated increase in the 'bird-strike' rate at nearby John F. Kennedy International Airport, led to a controversy between the National Park Service and the Port Authority of New York and New Jersey regarding the management of the colony. Although concerned about human safety, the Park Service maintain that the problem of bird-strikes at Kennedy can possibly be reduced by the full implementation of the an on-airport integrated wildlife management program. In 1996, as an independent third party, we began a five year effort to gather biological information from the field and literature that will provide a basis for future wildlife management decisions in Jamaica Bay. Does the Park Service need to manage (i.e. relocate) the Laughing Gull colony? Presently, we are addressing this question by reviewing data pertaining to five criteria: (1) the 'bird-strike' rate (defined as pilot reported strikes and all bird carcasses found within 250 feet of a runway); (2) sources of gulls at Kennedy airport; (3) species-specific risk; (4) the elimination of on-airport and off-airport attractants to gulls (breeding and non-breeding); and (5) the feasibility of relocating the colony to another suitable location on Long Island; except for one pair in 1978, Laughing Gulls have not attempted to nest elsewhere on Long Island. While the 'bird-strike' rate at Kennedy was correlated to the number of Laughing Gull pairs nesting in Jamaica Bay, the numbers of pilot-reported strikes (i.e. known collisions) were not. Furthermore, none of the 745 nesting adults that were marked with Rhodamine B dye at the colony have been reported as 'bird-strikes'. At this time, we support the view of the Park Service that the colony does not need to be managed at least until all alternative options (e.g. the elimination of all on-airport attractants to gulls) have been implemented and demonstrated to be ineffective. We have also been investigating the feasibility of establishing a new colony on Long Island that could attract non-breeding Laughing Gulls away from the Jamaica Bay/Kennedy airport complex.

**Breeding Biology of Laughing Gulls Nesting on Salt-marsh Islands
in the Jamaica Bay Wildlife Refuge, New York City**

Kevin M. Brown¹, R. Michael Erwin², and Milo E. Richmond¹

¹Department of Natural Resources, Cornell University, New York Cooperative Fish and Wildlife
Research Unit, Ithaca, New York 14853, U.S.A.

²USGS, Patuxent Wildlife Research Center, 12100 Beech Forest Road, Laurel, MD 20708, USA;
and Department of Environmental Sciences, Clark Hall, University of Virginia, Charlottesville,
Virginia 22903, U.S.A.

ABSTRACT. From 1996 to 1998, we studied the breeding biology of marsh-nesting Laughing Gulls in Jamaica Bay in an effort to provide baseline data pertaining to the experimental establishment of a new Laughing Gull colony elsewhere on Long Island, New York. Our objectives were to: (1) record nesting chronologies; (2) quantify productivity (clutch-size, hatching and fledging success per nest); (3) identify causes of nest, egg and chick losses; and (4) quantify nest-site characteristics. In all three years, in study plots ($N = 2 - 4$ per year) located in Jo Co Marsh, egg-laying began on 19 - 20 May and continued through mid-June; the modal clutch-size was three eggs (51 - 60% of clutches each year). Pairs that initiated clutches on or before 7 June (i.e. early nesters) laid more eggs than later-nesting pairs (e.g. 1998: early, mean $\pm$ 1SD = 2.6 ± 0.6 eggs/nest; late, 1.8 ± 0.6 eggs/nest; $P < 0.0001$). The most frequent cause of nest/egg loss was flooding (up to 40% of nests/plot) during periods of exceptionally high spring and storm tides in late May and early June. Each year, first chicks were found in study nests on 13 - 14 June. Hatching success per nest was variable among study plots and years. In general, early-nesting pairs realized higher hatching success (e.g. 1998: 1.8 ± 1.2 eggs hatched/nest), despite losses to flooding, than late-nesting pairs (0.6 ± 0.9 eggs hatched/nest). In all years, chick survival to fledging (taken as age 15 days post-hatching) was high ranging from 60 to 82 percent of those that hatched. In 1997 only, we recorded nest-site characteristics at Laughing Gull nests ($N = 60$) and also at randomly chosen points ($N = 100$). Nest placement was non-random ($P < 0.01$). Most (78%) nests were built on short-form Spartina alterniflora while few gulls nested on S. patens (5%). Laughing Gulls also nested on rack (dead vegetation) more than it was randomly available ($P < 0.05$). In comparison to random availability, Laughing Gull nests were located on lower ground and in taller grass; grass height and ground elevation were negatively correlated ($P < 0.01$). In addition, nests were closer to other nests ($P < 0.01$) and tidal ponds ($P = 0.08$) but further away from creeks ($P = 0.08$) than random points. At mid-incubation, the top of the nest cup was (on average) 35cm above the ground and 15cm above mean high water. Presently, we are designing a protocol that could be used to establish a new colony of Laughing Gulls on Long Island. The protocol would utilize decoys placed on rack-covered rafts and courtship vocalizations, broadcast from speakers, to attract prospecting gulls to the chosen site (possibly in the Hempstead marshes).

The Effectiveness of Pyrotechnics and Egg Destruction to Reduce Nesting by Herring and Great Black-backed Gulls: Results from a Seven Year Effort

CHRIS G. OLIJNYK¹ AND KEVIN M. BROWN²

¹National Park Service, Gateway National Recreation Area, Jamaica Bay Wildlife Refuge, Building 69, Floyd Bennett Field, Brooklyn, New York 11234, U.S.A.

²New York Cooperative Fish and Wildlife Research Unit, Department of Natural Resources, Fernow Hall, Cornell University, Ithaca, New York 14853, U.S.A.

ABSTRACT. In 1992, as part of an integrated Piping Plover (Charadrius melodus) recovery plan, the National Park Service initiated a long-term gull control program to reduce nesting by Herring and Great Black-backed Gulls (Larus argentatus and L. marinus) at Breezy Point, western Long Island, New York; an estimated 600 pairs occupied an area of about 50 acres. Gull management included discharging pyrotechnics to harass gulls and keep them off the nesting areas prior to the onset of breeding, and the physical destruction of all gull nests and eggs in the colony; this program was non-lethal to adult gulls.

From 1993 to 1996, we found no evidence that discharging pyrotechnics at the colony site prior to egg-laying reduced the daily numbers of loafing gulls. Gulls appeared to habituate to the pyrotechnics and our activities as the day (morning to evening) and season progressed. The physical destruction of nests and eggs was an effective method to eliminate the production of fledglings and eventually, starting three years after gull management began, reduced the number of nesting attempts by both Herring and Great Black-backed Gulls from 742 total clutches in 1994 to 282 in 1998 (a 60 percent reduction). Puncturing eggs (i.e. addling), as opposed to crushing them, did not reduce the frequency of renesting. In 1993, the year that most (80%) eggs were punctured, the proportion of new clutches found in old nests (11.1%) was similar to that recorded in 1994 and 1995 when eggs were crushed (11.0 and 9.4%, respectively). The fewer renesting attempts (6.5%) in 1998, however, suggests that the gulls may be less persistent than in earlier years. Despite the seven years of gull control at Breezy Point, approximately 40 percent of the colony remains indicating that nest destruction will need to continue for several more years if the colony is to be eliminated, although less effort may be required in subsequent years.

Diet Composition and Resource Partitioning in a Community of Larus Gulls in the Jamaica Bay/Kennedy Airport Complex, New York City

Kevin M. Brown¹, Julia L. Tims¹, R. Michael Erwin², and Milo E. Richmond¹

¹Department of Natural Resources, Cornell University, New York Cooperative Fish and Wildlife Research Unit, Ithaca, New York 14853, U.S.A.

²USGS, Patuxent Wildlife Research Center, 12100 Beech Forest Road, Laurel, MD 20708, USA; and Department of Environmental Sciences, Clark Hall, University of Virginia, Charlottesville, Virginia 22903, U.S.A.

ABSTRACT. Species sharing the same habitat often partition food resources by utilizing different kinds or sizes of foods, feeding at different times or in different places. In 1997 and 1998, we quantified the diet composition of nestling and adult Laughing, Herring and Great Black-backed Gulls (Larus atricilla; L. argentatus; L. marinus, respectively) nesting in Jamaica Bay, New York City. Our objectives were to: (1) identify food items in the diet samples from nestlings (ages 1 - 35 days); and (2) compare the diet of nestlings to the stomach contents from adult gulls that were collected at nearby Kennedy airport as part of a bird control program. In all three species, we found that foods from marine sources occurred more frequently and were more abundant in nestling diets than those from terrestrial sources, but more so in the Great Black-backed Gull (87% marine by mass) than in both the Herring (60%) and the Laughing Gull (58%). Boli collected from Laughing Gull nestlings contained mostly forage fishes (28% of mass; e.g. Atlantic Silversides, Menidia menidia), human refuse (23%), insects (20%; e.g. Scarabaeidae beetles), shrimp and amphipods (18%), and Horseshoe Crab (Limulus polyphemus) eggs (8%). Similarly, the most abundant foods in crop samples from adult Laughing Gulls were insects (26% of mass; e.g. beetles and cockroaches), human refuse (24%); crab eggs (20%), fishes (15%), and shrimp and amphipods (11%). In contrast, Great Black-backed Gull chick regurgitations were comprised of mostly offal from local sport fishes (70% of mass; e.g. Summer Fluke, Paralichthys dentatus), crab eggs (10% of mass) and human refuse (10% of mass). Boli from Herring Gull nestlings contained less offal (39% of mass) than Great Black-backed Gull boli but more human refuse (26%), oligochaetes (13%) and body parts from large 'crabs' (11%; e.g. Horseshoe Crab; Spider Crab, Libinia emarginata). Crop samples (N = 9) from shot Herring Gulls contained mostly human refuse (56%) and oligochaetes (33%). In summary, our results indicated that nesting Herring and Great Black-backed Gulls utilized the same foods but in different proportions. Since the larger-bodied Great Black-backed Gull often excluded the smaller Herring Gull from scavenging fish carcasses, the later species often consumed other food resources including crabs, clams, oligochaetes and human refuse. The smaller-bodied Laughing Gull coexists with Herring and Great Black-backed Gulls by utilizing relatively small prey items and a broader range of foods including forage fishes, shrimp and insects.

Quantifying Depredation of Diamondback Terrapin Nests around Jamaica Bay

Study summary

In 1998, all estuarine beaches in the Gateway National Recreation Area were surveyed for nesting activity of the northern diamondback terrapin (*Malaclemys terrapin terrapin*), a New York state species of special concern. Special focus was given to the Jamaica Bay unit. The Jamaica Bay unit was considered to be an excellent location to study terrapins for several reasons. First, the complete year round protection from commercial and recreational harvest and collection prevents removal of individuals. A second reason is that the study area is large, with continuous, calm, wetlands that provide superb habitat for terrapins. The presence of sparsely vegetated, sandy shorelines also provide terrapins with ideal nesting beaches. Finally, a reportedly low predation rate and large terrapin population would allow an opportunity to study a robust population thriving in urban New York City.

Originally one of the primary research objectives of 1998 was to pinpoint the beaches that were being used by female turtles during nesting. A reliable and common way for locating these beaches is to search for the conspicuous remains of nests that had been destroyed by raccoons. The strategy was to do a basic and generalized sweep of all the beaches in the refuge. This was meant to give a simple idea of which beaches were being used by the terrapins. If several nests could be located while briskly scouring a given beach, it would be considered active. This method was considered accurate, easy, and cost and time efficient. The surveys began in late spring. As they progressed, it became obvious that there were much more depredated nests than anyone had anticipated. Some areas as small as five by ten meters contained 50 depredated nests. The focus of the research objective quickly changed from a basic, generalized sweep to a thorough and detailed count of all depredated nests in the refuge. Although this was a serious undertaking and time consuming, it seemed important due to the circumstances. The results were astonishing and unexpected.

1,303 destroyed nests were found at the Jamaica Bay refuge (otherwise known as Rulers Bar Hassock), and an additional 16 depredated nests were found on one of the small ancillary islands (the Raunt) in the Bay. These numbers were higher than any previous published study of diamondback terrapin nesting sites. Several nests were also marked while the terrapins were actually laying eggs, and 100% were destroyed by raccoons within 24 hours.

With the discovery of 1,303 depredated nests at the refuge three main questions emerged. First, if there were 1,303 nests found in the refuge (plus an additional 16 on the Raunt), what is the size of the entire diamondback terrapin population of Jamaica Bay? The population might be extremely large, quite possibly the largest in New York state. Population estimates are necessary for multiple aspects of this study. They will indicate the current size of the population and can also be used in future comparisons necessary to document trends and changes in population size. This might help to determine if there is a long-term population decline due to the raccoons. The second question is more complicated. After speaking with park biologists, it was learned that raccoons did not historically inhabit Rulers Bar Hassock. It was not until the mid-1980's that the first raccoons were documented there. Thus, concerns have now arisen as to what effects this fairly new and destructive predator will have on Jamaica Bay's terrapin population, and what should be done by park officials in response to this new problem. The amount of nest depredation is tremendous, and it is a pressure that most likely has not been encountered by the terrapins until recently. The third big question is why only 16 nests were depredated on the Raunt while 1,303 were eaten on Rulers Bar Hassock? Is it because there are no raccoons or because only very few terrapins nest there? It is important to determine how many females nest on the Raunt. If a large number of females do nest there, it may provide a raccoon-free oasis for the nesting turtles.

During the 1999 field season, data will hopefully be gathered that can help answer these and many other important questions. It is obvious that before any action can be taken by park officials, further investigation into the raccoon problem must be done. The success of 1999 depends on the acquisition of the financial and human resources that are necessary for a complete and thorough investigation.