FIFTIETH ANNUAL REPORT

OF THE

STATE MOSQUITO CONTROL COMMISSION

OF THE

STATE OF NEW JERSEY

50 YEARS

1956 - 2006

For the Fiscal Year commencing July 1, 2005 and ending June 30, 2006

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION

JON S. CORZINE
Governor

STATE MOSQUITO CONTROL COMMISSION
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LISA P. JACKSON
Commissioner

To: The Honorable Jon S. Corzine, Governor
and the members of the Senate
and the General Assembly of the
State of New Jersey

In accordance with the provisions of Title 26, Chapter 9:12.6, we are pleased to submit the Fiftieth Annual Report of the State Mosquito Control Commission for the Fiscal Year covering the period from July 1, 2005 through June 30, 2006.

Respectfully,

Dr. Kenneth Bruder, Chairman
John Sarnas
John Surmay
Daniel Konczyk
David Adam
Anthony Petrongolo
Shereen Brynildsen
Mark Mayer

FIFTIETH
ANNUAL REPORT

NEW JERSEY STATE MOSQUITO CONTROL COMMISSION

2006

STATE OF NEW JERSEY
JON S. CORZINE, GOVERNOR

NJ DEPARTMENT OF ENVIRONMENTAL PROTECTION
LISA P. JACKSON, COMMISSIONER

Report prepared by the Office
of Mosquito Control Coordination,
NJ Department of Environmental Protection
Robert Kent, Administrator
Claudia O'Malley, Principal Biologist
Steven Csorgo, Jr., Assistant Biologist
Eileen Shields, Secretary

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MEMBERS OF THE STATE MOSQUITO CONTROL COMMISSION

Dr. Leonard E. Spiegel, Chairman	Monmouth County
Thomas E. Sellers	Camden County
Jacob C. Matthenius	Warren County
John P. Sarnas	Hudson County
John Surmay	Union County
Daniel Konczyk	Cape May County
Dr. Keith Cooper *Ex Officio*	N.J. Agricultural Experiment Station, Rutgers University
Dr. Clifton Lacy, Commissioner *Ex Officio*	N.J. Department of Health & Senior Services
Charles Kuperus, Secretary *Ex Officio*	N.J. Department of Agriculture
Bradley M. Campbell, Commissioner *Ex Officio*	N.J. Department of Environmental Protection
Robert Kent, Secretary	N.J.Department of Environmental Protection

The following individuals served as representatives for the various *ex officio* members during the year:

Shereen Brynildsen	N.J. Department of Health & Senior Services
Anthony Petrongolo	N.J. Department of Environmental Protection
Dr. Robert Eisner	N.J. Department of Agriculture
Dr. Zane Helsel	N.J. Agricultural Experiment Station, Rutgers University

COMMISSION ACTIVITIES AND HIGHLIGHTS DURING FISCAL YEAR 2006

During the fiscal year 2005-2006, the State Mosquito Control Commission continued to monitor and address those issues, activities and legislation of importance to the mosquito control interests in New Jersey. Official meetings of the Commission were held monthly during the year on the following dates and at the following locations:

DATE	LOCATION
July 19, 2005	Monmouth County Mosquito Commission, Tinton Falls, NJ
August 16, 2005	Headlee Research Laboratory New Brunswick, NJ
September 20, 2005	Office of Mosquito Control Coordination, DEP, Trenton, NJ
October 18, 2005	Office of Mosquito Control Coordination, DEP, Trenton, NJ
November 15, 2005	Office of Mosquito Control Coordination, DEP, Trenton, NJ
January 17, 2006	Office of Mosquito Control Coordination, DEP, Trenton, NJ
February 21, 2006	Canceled
March 21, 2006	Monmouth County Mosquito Commission, Tinton Falls, NJ
April 18, 2006	Monmouth County Mosquito Commission, Tinton Falls, NJ
May 16, 2006	Monmouth County Mosquito Commission, Tinton Falls, NJ

In addition to the regularly scheduled meetings, the commissioners participated in numerous committee meetings and conferences with local, state and federal officials regarding mosquito control related matters. All business meetings were announced and held in compliance with the Open Public Meeting Law. P.L. 1975. C231.

Fiftieth Annual Report of the NJ State Mosquito Control Commission

Covering the period of July 1, 2005 to June 30, 2006

The calendar year of 2006 marked the fiftieth anniversary of the NJ State Mosquito Control Commission. The Commission was established as a result of the findings of the 1955 Mosquito Study Commission, which was created by the legislature via a joint resolution. On July 19, 1956 Governor Meyner approved Senate Bill No. 14 which formed the Commission.. During the past 50 years, the Commission has provided support in all aspects of mosquito surveillance, research and control as aid to all mosquito control and research institutions at the municipal, county and state government and university level.

The fiscal year began with the mosquito season of 2005 well underway. Specimens to be tested for West Nile virus collected from both mosquitoes and humans had already been submitted to the Public Health and Environmental Laboratories. All twenty-one county mosquito control agencies had submitted their collected, speciated and sexed specimens, which they prepared for submission to the state. Populations of the Cedar Swamp mosquito, *Culiseta melanura,* had reached above-average levels thereby raising the potential for this mosquito implicated in the cycling of both West Nile virus and Eastern Equine Encephalitis to amplify those diseases. Only during the prior month had these populations been low, thus exampling how fast the mosquito-as-a-vector role in virus transmission can change.

The Commission also supported the development of a toll-free telephone number (1-888-NO-NJ-WNV) intended to provide to callers information allowing them to contact their local, county mosquito control agency. The data, relating to the frequency and location of source calls collected, may be another key to determining areas in the state where problematic, chronic mosquito issues exist.

Among equipment matters, the Commission focused its resources on the maintenance and repair of water management and surveillance apparatus as important elements in the statewide battle against mosquitoes and the diseases they transmit. In particular, the members voted to support the investigation of recently introduced laboratory devices which, if proven to be reliable, will allow local mosquito agencies to laboratory or field test collected mosquito specimens for the presence of virus. Staff from the counties of Hunterdon, Mercer and Monmouth coordinated the investigation Rapid Analyte Management Platform (RAMP) equipment and supplies were purchased in order to allow for a full and comprehensive investigation. The Commission also endorsed the purchase and distribution of seven such devices, supplemented with support equipment (including

autoclaves, centrifuges and vortex devices) by way of the Division of Fish and Wildlife's budgeted West Nile Virus funds.

Other Equipment-Use Program matters involved the transfer of a low-ground pressure hydraulic excavator from Burlington to a wetlands rehabilitation for mosquito control project in Essex County. Another machine, a long-reach, low ground pressure excavator was cooperatively shared and moved between Essex and Morris county twice during the fiscal year. Several other pieces of equipment were transferred among counties in the state. Repairs ensured that all such equipment was in good working order with a minimal amount of funds invested in maintenance.

By August, aerial applications performed by the State Airspray Program were well underway. Flying operations took place in counties in both northern and southern New Jersey. Although funded investigations at the Agricultural Experiment Station at Rutgers continued to show that target mosquito populations were susceptible to both temephos and methoprene, the bacterial insecticide Bacillus thuringiensis H-14 was the formulation of choice as a larvicide. One month later very dry weather conditions severely reduced the need for aerial applications of larvicides. Only Atlantic County, where unmanaged salt marsh habitat still provided flooded mosquito habitat suitable for larval development (as a result of lunar tides), required service.

The Airspray Program continued to provide aircraft applications of larval and adult mosquito control formulations on an as-needed basis well into the month of October. Adult mosquito control flights were restricted to Atlantic and Burlington Counties. A significant amount of larval control compounds were replaced with Commission support in both Ocean and Cape May Counties where those programs made applications on state and federally owned lands. Studies of the toxicology and susceptibility of the salt marsh mosquito *Ochleratatus sollicitans*, the primary target of the State Airspray Program, to select insecticides, proved to be perplexing as reported tolerance ranges of mosquitoes collected from various sites fluctuated. Extended investigations suggested that such ranges might vary between brooded mosquito generations within a single mosquito season.

By the end of the 2005 season, over 33 human specimens had been tested for West Nile virus; twenty-four were negative. Though eighteen different mosquito species tested positive for WNV, there were no equine cases of WNV reported. However a horse succumbed to Eastern Equine Encephalitis from a region near the Monmouth-Ocean County border in July. Mosquito control action interrupted the viral cycle prior to any human involvement with that disease. Four horses died from EEE throughout NJ this past season; none from West Nile. This was the first time on record that a WNV equine fatality did not precede one blamed on EEE.

Of interest was the death of an alpaca from EEE in Burlington County. Also reported to the Commission was a case of human WNV infection resulting from the transplantation of a West Nile virus infected human organ. In total, five humans were confirmed and one probable case suffered the effects of West Nile virus in New Jersey during 2005.

Within this fiscal year, the season of 2006 began in the spring with scheduled aerial larviciding operations in Atlantic, Cumberland, Essex and Morris Counties. In addition to these chemically oriented larval control strategies, almost 45,000 larvivorous fish were stocked throughout the state. The Bio-Control Program continued its investigations, in concert with the NJDA's Beneficial Insects Laboratory, of the efficacy of using copepods as natural, resident, bio-control agents.

The success of the NJ State Mosquito Control Commission depends on the participation of its appointed members who, by statute, serve without compensation. This fiftieth annual report would be incomplete without the acknowledgement of the loss of several of its long-serving members. The longest serving Chairman in the Commission's history, Aaron Rappaport, passed away in August and likewise, it's longest serving Vice Chairman and eventual Chairman, Dr. Leonard Spiegel retired following a long illness. Personnel changes at the NJ Agricultural Experiment Station impacted Commission interests as well as the veteran director of the Vector Surveillance Program, Dr. Wayne Crans also retired. Additionally, the representative for the Secretary of the Department of Agriculture, Dr. Robert Eisner also retired after almost two decades of service to the Commission. Finally, the Commission scheduled its September meeting on the campus of the NJ Agricultural Experiment Station in order to meet the new Executive Director and introduce him to the state mosquito control community.
The Commissions efforts left the state programs prepared for not only the beginning of the next fiscal year, but also for the next fifty years and beyond.

State Equipment-Use Program

The Equipment-Use Program annually assigns different types of surveillance, research or operational control equipment to any of the requesting mosquito control agencies on an as-needed basis. The equipment is used and maintained under the Department of Environmental Protection's Equipment Use Agreement and the State Mosquito Control Commission's 'Guidelines for the Use and Repair of State-Owned Equipment'. The State Commission has in its inventory 126 pieces of equipment available to the mosquito control community through this program (Table 1). During fiscal year 2006, all twenty-one county mosquito control agencies in New Jersey, as well as the New Jersey Agricultural Experiment Station at Rutgers University and the New Jersey Department of Environmental Protection's Division of Fish and Wildlife utilized this equipment.

The changes to the program's equipment purchase and repair policies approved by the Commission in fiscal year 2005 went into effect in fiscal year 2006. These changes include increasing the minimum amount for equipment purchases from $2,500.00 to $5,000.00, and increasing the deductible for equipment repairs from $500.00 to $1,000.00. Additionally, the Commission now requires that any request for the purchase of new equipment be accompanied by documentation that the requesting agency has first approached its own administration, and that the request has been denied. This is in keeping with the underlying philosophy that the State Mosquito Control Commission's state aid programs exist to supplement the county mosquito control programs, not to replace them.

The Commission did not add any new equipment to its inventory in fiscal year 2006. However, the Office of Mosquito Control Coordination received funding from the Division of Fish and Wildlife's Office of Fish and Wildlife Health and Forensics for work relative to West Nile virus. The Commission endorsed using these funds to purchase eight complete RAMP (Rapid Analyte Measurement Platform) test packages, and offered recommendations as to where they should be sited. The total cost for the eight RAMP test packages was $70,880.00. This equipment was assigned to the mosquito control agencies in the following counties: Burlington, Essex, Hudson, Middlesex, Monmouth, Morris, Ocean and Passaic. Each test package consisted of an autoclave, a RAMP West Nile virus reader, a RAMP West Nile virus test kit (100 tests/kit), two vortex mixers, two mini centrifuges, various pipettes and pipette tips, centrifuge racks, biohazard containers, biohazard bags and absorbent bench liners.

Although the Commission did not add any new equipment to its inventory during fiscal year 2006, accessories were purchased to augment equipment already in inventory. $172.80 was expended on a light guide support for SMCC #31, the 2003 Leica microscope assigned to Mercer County Mosquito Control. Flow control and data recording systems were purchased for SMCC #30 and SMCC #86, at a cost of $8,300.00 and $6,200.00, respectively. Both are machines for ultra-low volume insecticide applications, and both are assigned to the Sussex County Office of Mosquito Control.

The Burlington County Division of Mosquito Control surrendered SMCC #55, the 1985 John Deere 490 hydraulic excavator. Following a notice to all county mosquito control agencies

regarding the availability of this equipment, the Essex County Division of Mosquito Control requested its addition to their program, for use within that county's growing water management program. The Commission approved this request, and SMCC #55 was transferred to Essex County on August 22, 2005. Likewise, the Warren County Mosquito Commission surrendered SMCC #16, the 1983 DMC Logan 1200 tracked vehicle. The Essex County Division of Mosquito Control's request for this equipment was also approved by the Commission, and SMCC #16 was transferred to Essex County on March 29, 2006.

In fiscal year 2005, the Atlantic County Office of Mosquito Control surrendered SMCC #35, the 1989 Dodge four-wheel drive pickup truck. Since that time, the truck had been housed at the Division of Fish and Wildlife's Central Region Office, and was used as needed by Division personnel. This vehicle was surrendered by the Commission in fiscal year 2006, following a request by the State for a reduction in the number of state-owned vehicles.

Seven pieces of equipment that had previously been declared derelict and surplus were finally removed from the Commission's inventory and disposed of at auction during the fiscal year. These included a 1960 crawler crane, a 1961 crawler crane and a 1971 amphibious dragline crane, all assigned to the Salem County Mosquito Commission; a 1966 crawler crane, a 1968 amphibious dragline crane and a 1970 amphibious dragline crane, all assigned to the Cape May County Department of Mosquito Control; and a 1964 crawler crane assigned to the Cumberland County Department of Mosquito Control.

During the fiscal year eight pieces of equipment required repairs, at a total cost to the Commission of $36,596.04. This included $1,299.47 for repairs to SMCC #1, the 1995 amphibious hydraulic rotary excavator assigned to the Cape May County Department of Mosquito Control; $14,149.49 for repairs to SMCC #2, the 1987 amphibious hydraulic rotary excavator assigned to the Ocean County Mosquito Commission; $2,800.00 for repairs to SMCC #3, the 1995 amphibious hydraulic rotary excavator assigned to the Atlantic County Office of Mosquito Control; $5,267.08 for repairs to SMCC #7, the 2003 low ground pressure hydraulic excavator assigned to the Salem County Mosquito Commission; $2,378.50 for repairs to SMCC #8, the 1992 long-reach hydraulic excavator assigned to Salem County; $8,031.12 for repairs to SMCC #17, the 1985 wide-track bulldozer assigned to Salem County; $1,485.38 for repairs to SMCC #55, the hydraulic excavator assigned to the Essex County Division of Mosquito Control; and $1,185.00 for repairs to SMCC #125, the 2004 ultra low temperature freezer assigned to Somerset County Mosquito Control. Each item for repair was inspected and approved by a representative of the Commission. Additionally, $45,000.00 was encumbered for repairs to SMCC #10, the amphibious long-reach hydraulic excavator assigned to the Salem County Mosquito Commission. This work had not been performed by the end of the fiscal year.

Table 1. State Mosquito Control Commission

No.	Type of Equipment	Location
1	1992 Amphibious Hydraulic Rotary Excavator	Cape May
2	1987 Amphibious Hydraulic Rotary Excavator	Ocean
3	1995 Amphibious Hydraulic Rotary Excavator	Atlantic
4		Vacant
5	2003 Long-Reach Hydraulic Excavator	Essex/Morris
6	2003 Low Ground Pressure Hydraulic Excavator	Warren
7	2003 Low Ground Pressure Hydraulic Excavator	Salem
8	1992 Long-Reach Hydraulic Excavator	Salem
9		Vacant
10	1995 Amphibious Hydraulic Excavator	Salem
11	1986 Hydraulic Excavator	Div. Fish & Wildlife
12	2003 Low Ground Pressure Hydraulic Excavator	Cumberland
13	2002 Hydraulic Excavator	Atlantic
14	2002 All-Terrain Vehicle	Warren
15	2002 All-Terrain Vehicle Trailer	Warren
16	1983 Tracked Vehicle	Essex
17	1985 Widetrack Bulldozer/Backhoe	Salem
18	1972 17 Foot Boat	Atlantic
19	2002 Outboard Motor	Atlantic
20	2002 Boat Trailer	Atlantic
21	1987 13 Foot Boat	Burlington
22	1987 Boat Trailer	Burlington
23	2002 Outboard Motor	Burlington
24	1988 Stereo Microscope w/optics	Warren
25	1966 6" Water pump	Bergen
26	1966 6" Water pump	Bergen
27	1994 Ultra Low Temperature Freezer	Rutgers
28	1995 U.L.V. Machine	Somerset
29	1995 U.L.V. Machine	Salem
30	1995 U.L.V. Machine	Sussex
31	2003 Stereo Microscope w/optics	Mercer
32	1995 Turbine Sprayer	Cumberland
33	1995 U.L.V. Machine	Gloucester
34	1981 Phase-Contrast Microscope	Rutgers
34	1981 Power Pack	Rutgers
34	1981 Camera	Rutgers
35		Vacant
36	2004 Incubator	Rutgers
37	1987 Stereo Microscope w/optics	Salem
38	1987 Stereo Microscope w/optics	Hudson
39	1992 U.L.V. Machine	Cumberland
40	1988 Microplate Reader	Rutgers
41	1988 Biosafety Cabinet	Rutgers
42	1977 Flatbed Truck	Sussex

43	2002 Pickup Truck w/Cap	Rutgers
44	1986 Excavator Trailer	Salem
45	1976 Compound Microscope	State
46	1977 Compound Microscope	Rutgers
47	1977 Stereo Microscope	Rutgers
48	1977 Stereo Microscope	Rutgers
49	1980 Bulldozer/Backhoe	Warren
50	1980 Rotary Ditcher Attachment	Salem
51	2004 Tabletop Autoclave	Hunterdon
52	1984 Stereo Microscope	Monmouth
53	1985 Hydraulic Excavator	Atlantic
54	2002 4WD Pickup Truck	State
55	1985 Hydraulic Excavator	Essex
56	6" Water Pump	Cape May
57	1989 Stereo Microscope	Atlantic
58	1989 All-Terrain Vehicle	Salem
59	1989 All-Terrain Vehicle Trailer	Salem
60	1990 Stereo Microscope w/optics	Sussex
61	1990 20-Ton Trailer	Warren
62	1996 All-Terrain Vehicle	Monmouth
63	1996 All-Terrain Vehicle Trailer	Monmouth
64	1997 Turbine Sprayer	Gloucester
65	1997 17 Foot Boat	Ocean
66	1997 Outboard Motor	Ocean
67	1998 Boat Trailer	Ocean
68	2000 Stereo Microscope	Hunterdon
69	2000 U.L.V. Machine	Hunterdon
70	2000 U.L.V Machine	Burlington
71	2000 U.L.V. Machine	Essex
72	2000 U.L.V. Machine	Warren
73	2000 U.L.V. Machine	Atlantic
74	2000 U.L.V. Machine	Hunterdon
75	2000 U.L.V Machine	Gloucester
76	2001 Power Sprayer	Hunterdon
77	2000 U.L.V. Machine	Salem
78	2001 Ultra Low Temperature Freezer	Bergen
79	2001 Ultra Low Temperature Freezer	Middlesex
80	2001 Ultra Low Temperature Freezer	Monmouth
81	2001 Ultra Low Temperature Freezer	Morris
82	2001 Ultra Low Temperature Freezer	Salem
83	2001 Ultra Low Temperature Freezer	Warren
84	2001 Ultra Low Temperature Freezer	Camden
85	2001 Ultra Low Temperature Freezer	Sussex
86	2001 U.L.V. Machine	Sussex
87	2001 Insecticide Applicator	Sussex
88	2004 Power Sprayer	Essex

89	2001 4WD Pickup Truck w/Cap	State
90	2002 17 Foot Boat	Essex
91	2002 Outboard Motor	Essex
92	2002 Boat Trailer	Essex
93	2002 All-Terrain Vehicle	Camden
94	2002 All-Terrain Vehicle Trailer	Camden
95	2002 All-Terrain Vehicle	Essex
96	2002 All-Terrain Vehicle	Hunterdon
97	2002 All-Terrain Vehicle Trailer	Hunterdon
98	2002 4WD Pickup truck	State
99	2002 All-Terrain Vehicle	Sussex
100	2002 All-Terrain Vehicle Trailer	Sussex
101	2002 Acoustic Storm Drain System	State
102	2002 Ultra Low Temperature Freezer	Rutgers
103	2002 All-Terrain Vehicle	Bergen
104	2002 All-Terrain Vehicle Trailer	Bergen
105	2002 U.L.V. Machine	Salem
106	2002 Ultra Low Temperature Freezer	Burlington
107	2002 Ultra Low Temperature Freezer	Mercer
108	2002 U.L.V. Machine	Cumberland
109	2002 U.L.V. Machine	Essex
110	2002 All-Terrain Vehicle	Union
111	2002 All-Terrain Vehicle Trailer	Union
112	2003 Microplate Reader	Rutgers
113	2003 Microplate Washer	Rutgers
114	2003 All-Terrain Vehicle	Mercer
115	2003 All-Terrain Vehicle Trailer	Mercer
116	2003 All-Terrain Vehicle	Ocean
117	2003 All-Terrain Vehicle Trailer	Ocean
118	2003 All-Terrain Vehicle	Cumberland
119	2003 All-Terrain Vehicle Trailer	Cumberland
120	2003 All-Terrain Vehicle	Hudson
121	2003 All-Terrain Vehicle Trailer	Hudson
122	2004 Ultra Low Temperature Freezer	Gloucester
123	2004 Ultra Low Temperature Freezer	Essex
124	2004 Ultra Low Temperature Freezer	Passaic
125	2004 Ultra Low Temperature Freezer	Somerset
126	2004 Ultra Low Temperature Freezer	Union
127	2004 Ultra Low Temperature Freezer	Hudson

Program Director: Claudia O'Malley, Office of Mosquito Control Coordination
Department of Environmental Protection

State Mosquito Airspray Program

As is always the case, the fiscal year began in the midst of the calendar year mosquito season. The latter half of the 2005 season was fairly dry, with a resultant slight decrease in program activity. The bulk of the operations conducted during this period were larvicide applications, made to the Atlantic coastal salt marshes and the Delaware Bayshore salt hay farms. Mosquito production in these habitats is mainly influenced by the monthly tidal cycles.

Operationally, a total of 39 aerial spraying applications were made, encompassing 59,359 acres in eight New Jersey counties (Table 2). The Airspray Program's primary focus continues to be the control of mosquitoes in the larval stage, in order to reduce the need to perform applications for adult mosquito control. To that end, the acreage treated for larval control comprised 68% of the program's total. The insecticides utilized in these larvicide applications were temephos (5% granular form), methoprene (20% liquid), and various formulations of *Bacillus thuringiensis* var. *israelensis* (Bti). As was the case during the previous fiscal year, the main larvicide used in Atlantic County salt marsh applications was an aqueous suspension formulation of Bti. This was necessitated by a lack of efficacy with methoprene in controlling salt marsh mosquitoes. The Airspray Program continues to achieve good larval control with Bti. As was noted in last year's report, however, the higher flow rate used with this formulation has resulted in a significant increase in the amount of aircraft time and expense required in order to accomplish these applications. In order to resolve all inconsistencies with regard to the efficacy of alternate aerially applied larval control formulations, representatives of the State Commission are engaged in cooperative investigations with several county mosquito control agencies, representatives from the formulating companies and the New Jersey Agricultural Experiment Station at Rutgers University.

Although this aggressive program to control mosquito larvae limited the need for routine aerial applications for adult mosquito control, the absence of the need for such work in any season would be remarkable. A total of six ULV Malathion adulticiding applications were therefore conducted during the fiscal year, comprising 32% of the total acreage treated. Four of these applications were made in Atlantic County; the remaining two were made in Burlington County.

As in the past, the program used a variety of aircraft for insecticide applications. These included a twin-engine Beechcraft A90 "King Air" for high speed ultra-low volume insecticide applications; single-engine Grumman G164A "Ag Cats" and a Mielec "Dromader" M18-B for high payload applications; Cessna 182K and 182N "Skylanes" for observation and survey work; a Bell 206B "Jet Ranger" rotary-wing aircraft for surveillance and for insecticide applications.

As an example of the Mosquito Commission's continued policy of interagency cooperation and concern for ecology and the environment, program aircraft, in the form of a Bell 206B "Jet Ranger", were provided to personnel from the Division of Fish and Wildlife's Endangered and Nongame Species Program on March 21, 2006. This enabled them to conduct bald eagle surveillance in the central portion of the state.

Continuing a policy initiated in fiscal year 1996, state aid was provided to those counties that made insecticide applications for mosquito control to state-owned lands within their corporate borders. This aid was made in the form of in-kind replacement of the insecticides applied. Cape May and Ocean Counties participated in this program. The Cape May Department of Mosquito Control was reimbursed with 8,800 pounds of Abate 5BG; the Ocean County Mosquito Extermination Commission was reimbursed with 528 gallons of Vectobac 12AS and 4,000 pounds of Vectobac CG, for insecticides applied by the counties to state-owned lands during the calendar 2005 mosquito season. Additionally, reimbursement in-kind was made in advance, for anticipated applications made during the calendar 2006 mosquito season. Numbers were arrived at based on a four-year average of state-owned acreage treated. Thus, Cape May received 10,700 pounds of Abate 5BG; Ocean County received 1,584 gallons of Vectobac 12AS and 2,680 pounds of Vectobac CG.

Table 2. State Airspray Program acreage treated in FY2006 by mode and county.

County	Larviciding Acreage	Adulticiding Acreage	Total Acreage
Atlantic	22,033	11,596	33,629
Burlington	- 0 -	7,254	7,254
Camden	150	- 0 -	150
Cape May	2,600	- 0 -	2,600*
Cumberland	5,350	- 0 -	5,350
Essex	6,350	- 0 -	6,350
Morris	5,030	- 0 -	5,030
Ocean	5,493	- 0 -	5,493*
State Total	**40,509**	**18,850**	**59,359**

*State reimbursed insecticides applied by county aircraft to state-owned land. Not included as part of Airspray Program total acreage as applied by State aircraft.

Program Director: Claudia O'Malley, Office of Mosquito Control Coordination
Department of Environmental Protection

Biological Control Program

The Biological Control Program continued to play an important role in the State Mosquito Control Commission's integrated pest management approach to mosquito control in New Jersey during fiscal year 2006. By maintaining fiscal support for this program, the Commission continued to offer five species of mosquito-eating fish to the county mosquito control commissions and agencies, for use in their programs as an alternative to the use of insecticides.

The Commission renewed its long-standing Memorandum of Agreement with the New Jersey Division of Fish and Wildlife for developing, maintaining and providing fishery stocks at the Charles O. Hayford Fish Hatchery at Hackettstown. Bureau of Freshwater Fisheries personnel raised healthy stocks of fish for release into known sites of mosquito production throughout New Jersey. The assistance supplied by these individuals to the Office of Mosquito Control Coordination and the participating county mosquito control agencies is a key element to the success of this program. All stocking is performed in strict accordance with the guidelines and policy outlined in the DEP document "How to Use the State Bio-Control (Mosquitofish) Program for Mosquito Control in New Jersey".

SMCC #11, the 1986 Koehring hydraulic excavator, is now assigned to the Division of Fish and Wildlife, and is housed at the Charles O. Hayford Fish Hatchery. This piece of equipment was used on pond maintenance projects at the Hatchery during fiscal year 2006, enabling an increase in fish production.

Drought conditions during the first half of the fiscal year resulted in a reduction of some mosquito habitat. Correspondingly, the demand for mosquito-eating fish was lower than it had been in previous fiscal years. A total of 65,029 fish were stocked in suitable habitat through the Commission's Biological Control Program in fiscal year 2006, in twelve New Jersey counties (Table 3). Species stocked included the Mosquitofish, *Gambusia affinis*; the Fathead Minnow, *Pimephales promelas*; and the Freshwater Killifish, *Fundulus diaphanous*.

As was reported in fiscal year 2005, the Commission has expanded the Biological Control Program to include investigations into the use of other organisms as mosquito control agents. The first of these involves the use of copepods, crustaceans that occur naturally in New Jersey. To that end, the Commission has entered into a Memorandum of Agreement with the New Jersey Department of Agriculture. Tremendous progress has been made on this project in fiscal year 2006. Native New Jersey copepod species were collected and identified. Of these, *Macrocyclops albidus* was identified as the native species with the greatest potential for use as a mosquito biological control agent. The unstinting efforts of staff of the Phillip Alampi Beneficial Insect Rearing Laboratory resulted in success in mass-producing this cyclopoid copepod and establishing a protocol for their laboratory propagation. The fiscal year ended with plans to begin very limited field trials with *Macrocyclops albidus* in tires. The major emphasis of this work will be to observe the dynamic of copepods in field tires, to determine if they establish populations, at what rate, and to determine if they overwinter successfully.

Table #3. Mosquitofish stocking by county and species during FY 2006

County	Species	Number of Fish
Bergen	*Gambusia*	10,000
Camden	Fathead minnows	5,000
Cumberland	Fathead minnows	3,500
Mercer	*Gambusia*	3,700
Middlesex	Fathead/Killifish mix *Gambusia*	1,533 626
Monmouth	*Gambusia*	8,310
Morris	*Gambusia*	11,200
Passaic	Fathead minnows *Gambusia*	1,400 2,400
Salem	Fathead minnows *Gambusia*	2,360 1,000
Somerset	Fathead minnows *Gambusia*	2,250 1,250
Union	Fathead/Killifish mix	500
Warren	Fathead minnows	10,000
Total		65,029

Program Director: Claudia O'Malley, Office of Mosquito Control Coordination
Department of Environmental Protection

Host-seeking *Aedes sollicitans* females were collected as in past years from four locations in southern New Jersey: West Creek in Ocean County, Leeds Point in Atlantic County, Sutton Lane (Dennis Twp.) in Cape May County, and Heislerville (East Point Lighthouse) in Cumberland County. Collections were made between May and September 2005. The females were brought to the lab and fed cattle blood (purchased from the Carteret Abattoir) with a Hemotek apparatus. They were transferred to glass shell vials (2 females per vial) equipped with a moistened cotton ball and sealed with a piece of fabric screen (bridal veil) through which they could take further blood meals, if needed. After they had laid eggs and died, each female was identified by microscopic inspection. Vials with dead females that were not *Ae. sollicitans* were discarded. The egg-containing shell vials were stored at 24°C+/-2°C in an environmental incubator set at a 16/8 day/night cycle, and the moisture level of the cotton was monitored and adjusted weekly.

A closer look at the numbers of total vials and vials containing eggs revealed that the overall efficiency of the method for procuring eggs was 72%, Table 4. The highest yield of eggs, 80%, was from females collected in Ocean County and the lowest, 59%, from females collected in Cumberland County. Data indicate that *Ae. sollicitans* is most abundant in Ocean County followed by Atlantic County. These two ocean-side sites harbor much higher mosquito populations than the two bay-side field sites. The lowest number of mosquitoes was collected in Cumberland County; there were slightly higher numbers collected in Cape May County. The number of vials with eggs per visit is also significantly lower from the bay-side sites. The Cumberland County mosquitoes appear to have lower fecundity than mosquitoes from the other three counties.

Table 4. Summary of collections of mosquitoes in 2005.

County	Total vials	Vials with eggs	Percent vials with eggs	Number of visits	Average # of vials with eggs per visit
Ocean	864	689	80	16	43
Atlantic	574	393	68	16	25
Cape May	324	213	66	12	18
Cumberland	227	134	59	10	13
TOTAL	1989	1429	72	18 Trips	

Obtaining the mosquito larvae.

The eggs were allowed to dry for at least three weeks, and when needed, hatching was accomplished by adding clean water to the vial and depleting the dissolved oxygen by applying a vacuum. This accomplished a more synchronized hatching, but no apparent increase in hatching. The larvae were raised on ground rat chow in fresh water.
The water was kept at 24° C and cleaned by toweling the surface each day before feeding. Only uniformly sized 4th instar larvae were selected for the experiments.

***In vivo* toxicity assays with temephos and methoprene.**

Analytical grade, >99% pure, temephos and methoprene were purchased from Chem Service, West Chester, PA. The methoprene used was a racemic mixture of the R and S forms. Test solutions were prepared by dissolving the insecticide in analytical grade acetone and serially diluting the stock solution with acetone.

For temephos, sets of 250-mL Pyrex glass beakers were used; each beaker had 100 mL of pure, fresh water, 10 mosquito larvae, and µL quantities of temephos solutions. Last (4^{th}) instar larvae were used for all experiments. Temephos toxicity (dead larvae) was assessed 24 hours after application.

The methoprene toxicity test was done according to A. Ali, J.K. Nayar and R.D. Xue, 1995 (Comparative toxicity of selected larvicides and insect growth regulators to a Florida laboratory population of *Aedes albopictus*, J. Amer. Mos. Cont. Assoc., 11:72-76.) Each experiment consisted of a set-up of 14 (six methoprene and a control, all in duplicate) 250 mL glass beakers inside plastic mosquito breeding cages. Each beaker contained 100 mL of pure fresh water, 10 4^{th} instar mosquito larvae, and ground rat chow. The test beakers also contained a range of concentrations of methoprene dissolved in 20 µL or less of acetone. When all larvae in the control beaker had emerged as adults, the experiment was terminated and adults emerged in all beakers were counted. The fourth instar larvae were selected to be as young as possible (as opposed to as old/big as possible).
This year, oldest eggs from all four field sites were hatched first so that replicates were done with eggs of approximately the same storage age in the vials. The toxicity data for temephos and methoprene against larvae from females collected in 2005 are summarized in Table 5. These data are based on bioassays from the entire year and generated with the PoloPlus® Software (Summaries of the PoloPlus data are in Appendix 2).

Table 5. LC_{50} data for temephos and methoprene to 4^{th} instar larvae of *Ae. sollicitans* in 2005 (95% lower - upper confidence limits of the LC_{50} value); slope of the regression line.

County	Temephos (ppb)	Methoprene (ppb)
Ocean	6.3 (5.8 – 6.9); 3.8	0.1 (0.08 – 0.14); 0.9
Atlantic	4.5 (3.9 – 5.0); 3.6	0.3 (0.23 – 0.38); 1.1
Cape May	3.3 (2.8 – 3.7); 1.0	0.49 (0.38 – 0.61); 1.1
Cumberland	3.7 (3.3 – 4.1); 2.9	0.16 (0.11 – 0.20); 0.8

Compared to the LC_{50} data generated by plotting the data on probit mortality / log so==dose graph pap the LC_{50} data generated by the PoloPlus software program are probably more accurate but certainly of the same order of magnitude and within the confidence interval in all cases (see the progress report for 7/1/05 – 12/31/05). The data for the past six years are summarized in Table 5. for temephos and Table for methoprene.

Table 6. Six-year summary of LC_{50} data for temephos

Location	1999	2000	2001	2002	2003	2004	2005
Ocean	32	24	10	16	27	28	6.3
Atlantic	22	16	10	11	4	16	4.5
Cape May	7	8	7	7	4	8	3.3
Cumberland	-	10	11	8	5	7	3.7

Table 7. Six-year summary of LC_{50} data for methoprene

Location	1999	2000	2001	2002	2003	2004	2005
Ocean	-	10	14	13	19	12	0.1
Atlantic	5	7	8	7	258	54	0.3
Cape May	-	-	12	10	5	1	0.5
Cumberland	-	-	10	-	1	2	0.2

Compared to data from previous years, Tables 6 and 7, the toxicities of both larvicides to mosquito larvae from 2005 are overall considerably lower. Mosquito larvae from Cumberland County and Cape May County have been consistently highly susceptible to both larvicides over the six years of this study. There is a very considerable drop in toxicity of both larvicides to larvae from females collected in Atlantic County and Ocean County. Very little or none at all of these two larvicides have been used in these counties this season and most of the 2004 field season (W. Reinert, T. Candeletti, personal communication).

In order to exclude experimental error accounting for these unusually low LC_{50} data, all procedures were recalculated for making the insecticide solutions were perfomed and replicates than in previous years. There was considerable variability in this year's data as seen in the 95% confidence limits of the LC_{50} data in Table 2, more so than in previous years.

APPENDIX 1. Shell vials with eggs from mosquitoes collected on each of 18 field trips between May 18 and September 22, 2005

DATE	OCEAN		ATLANTIC		CAPE MAY		CUMBERLAND	
	Total Vials	Vials with Eggs	Total Vials	Vials with Eggs	Total Vials	Vials with Eggs	Total Vials	Vials with Eggs
18-May	0	0	0	0	0	0	0	with Eggs
27-May	5	4	8	3	3	1	26	0
31-May	0	0	0	0	1	0	33	13
10-Jun	117	114	48	43	5	2	5	23
21-Jun	34	29	50	31	0	0	0	3
28-Jun	0	0	6	5	8	4	0	0
30-Jun	95	64	0	0	91	80	67	0
6-Jul	78	60	60	58	95	52	3	43
19-Jul	0	0	32	25	40	33	0	0
26-Jul	48	35	6	0	9	0	3	0
29-Jul	68	62	65	44	27	21	69	1
3-Aug	18	2	69	26	15	7	10	41
11-Aug	52	33	46	40	6	6	11	5
16-Aug	148	144	22	16	0	0	0	5
30-Aug	73	58	64	48	24	7	0	0
1-Sep	69	46	65	41	0	0	0	0
12-Sep	54	33	27	9	0	0	0	0
22-Sep	5	5	6	4	0	0	0	0
TOTAL	**864**	**689**	**574**	**393**	**324**	**213**	**227**	**134**

Appendix 2. Summary of PoloPlus Data for 2005 toxicities of Temephos & Methoprene

West Creek, Ocean County

Temephos toxicity; 8 doses; 8 assays
subjects 630 controls 10
slope=3.771+-0.265 nat.resp.=0.000+-0.000
heterogeneity=0.71
LC10=2.887 95% limits: 2.483 to 3.260
LC50=6.313 95% limits: 5.795 to 6.885
LC90=13.805 95% limits: 12.153 to 16.183

Methoprene toxicity; 10 doses; 8 assays
subjects 800 controls 10
slope=0.898+-0.064 nat.resp.=0.000+-0.000
heterogeneity=0.99
LC10=0.004 95% limits: 0.002 to 0.007
LC50=0.108 95% limits: 0.081 to 0.140
LC90=2.894 95% limits: 1.939 to 4.799

Leeds' Point, Atlantic County

Temephos toxicity; 7 doses; 8 assays
subjects 550 controls 10
slope=3.601+-0.277 nat.resp.=0.000+-0.000
heterogeneity=1.32
LC10=1.974 95% limits: 1.592 to 2.323
LC50=4.481 95% limits: 3.987 to 5.038
LC90=10.169 95% limits: 8.628 to 12.644

Methoprene toxicity; 9 doses; 8 assays
subjects 710 controls 10
slope=1.122+-0.080 nat.resp.=0.000+-0.000
heterogeneity=0.65
LC10=0.022 95% limits: 0.012 to 0.034
LC50=0.302 95% limits: 0.235 to 0.381
LC90=4.190 95% limits: 3.008 to 6.334

Sutton Lane, Cape May County

Temephos toxicity; 7 doses; 8 assays
subjects 470 controls 10
slope=2.561+-0.186 nat.resp.=0.000+-0.000
heterogeneity=0.67
LC10=1.033 95% limits: 0.815 to 1.250
LC50=3.270 95% limits: 2.848 to 3.758
LC90=10.349 95% limits: 8.508 to 13.217

Methoprene toxicity; 8 doses; 9 assays
subjects 800 controls 10
slope=1.123+-0.076 nat.resp.=0.000+-0.000
heterogeneity=0.70
LC10=0.036 95% limits: 0.020 to 0.055
LC50=0.493 95% limits: 0.383 to 0.618
LC90=6.828 95% limits: 5.024 to 9.953

East Point, Cumberland County

Temephos toxicity; 7 doses; 8 assays
subjects 550 controls 10
slope=2.916+-0.219 nat.resp.=0.000+-0.000
heterogeneity=0.43
LC10=1.339 95% limits: 1.088 to 1.578
LC50=3.684 95% limits: 3.297 to 4.121
LC90=10.136 95% limits: 8.560 to 12.568

Methoprene toxicity; 10 doses; 8 assays
slope=0.810+-0.058 nat.resp.=0.000+-0.000
heterogeneity=0.53
LC10=0.004 95% limits: 0.002 to 0.007
LC50=0.155 95% limits: 0.115 to 0.204
LC90=5.904 95% limits: 3.675 to 10.794

Program Director, Dr. Lena Brattsten, Cook College
Rutgers University

Surveillance for the Mosquito Vectors of Eastern Equine Encephalitis and West Nile Virus in New Jersey

The NJ State Mosquito Control Commission (SMCC) has monitored potential vectors of mosquito-borne encephalitis in New Jersey since 1975 with a vector surveillance program designed to keep health related agencies aware of the potential for human involvement. Eastern equine encephalitis (EEE) was the original target for investigation because of its impact on coastal resorts in the southern portion of the state. West Nile virus (WNV) was added to the program in 2000 following an outbreak in New York City the previous year. EEE virus tests have been conducted by the NJ State Department of Health laboratories in Trenton since the program was conceived. During the early years of the study, Rutgers was able to conduct all of the field investigations in the southern half of the state. The inclusion of WNV, however, required statewide surveillance of mosquito populations to adequately follow the seasonal progression of virus activity in potential mosquito vectors. County mosquito control personnel were recruited to collect and process specimens after WNV appeared. The program now functions as a cooperative effort that includes the NJ Department of Environmental Protection, the NJ Department of Health, the NJ Agricultural Experiment Station at Rutgers and the 21 county mosquito control agencies in the state. The goal is a disease surveillance effort that provides mosquito control with information to target vector populations for the prevention of human disease. This report documents the results of virus surveillance efforts during the 2005 encephalitis season.

METHODOLOGY FOR EEE SURVEILLANCE

The mosquito, *Culiseta melanura*, is monitored from late May to mid-October as the primary indicator of EEE virus in southern New Jersey. This bird feeding mosquito does not bite humans but can be used to monitor virus levels in local bird populations as the season progresses. Weekly collections of *Cs. melanura* are made from resting boxes at permanent study sites by a team of field staff from Rutgers. The mosquitoes are frozen on dry ice at the collection site and transported to Headlee Research Labs at Rutgers for further processing. The frozen specimens are sorted on a chill table to maintain the cold chain and are identified to species, pooled by stage of blood meal digestion and submitted weekly to the Public Health Environmental Laboratory (PHEL) facility in Trenton for virus tests. Positive pools are detected by Reverse Transcriptase-Blymerase Chain Reaction (RT-PCR). Information from the investigation is summarized and distributed weekly to mosquito control agencies in New Jersey. The resting box collection sites for 2005 included: Turkey Swamp in Monmouth Co., Green Bank in Burlington Co., Corbin City in Atlantic Co., Dennisville in Cape May Co., Waterford in Camden Co., and, Centerton in Salem Co.

RESULTS FOR EEE SURVEILLANCE IN 2005

The 2005 Vector Surveillance season began with lower than normal levels of *Culiseta melanura*, suggesting the probability of limited virus activity for most of the year. An unexpected influx of nulliparous specimens appeared at most sites in June which significantly increased the potential for EEE amplification in local birds at the time that nestlings were being fledged. July and August was a period for above normal EEE

activity in much of the northeast with high infection rates in mosquitoes from Rhode Island, Massachusetts and New Hampshire as well as a confirmed equine case from Long Island. In most years, EEE appears in New Jersey long before it is detected in states to the north. In 2005, however, EEE was not detected at New Jersey study sites until July 26, well after virus activity was described as intense throughout much of New England.

A pool of *Cs. melanura* collected from the Green Bank site on July 26 represented the first EEE positive from New Jersey for the 2005 season. *Culiseta melanura* population levels at Green Bank were lower than normal but the Mullica River drainage has traditionally been a primary focus for early season EEE activity. The first confirmed horse case in New Jersey was reported from Gloucester Co. on July 31. A pool of *Cs. melanura* collected August 2 from Turkey swamp in Monmouth Co. confirmed that EEE was being amplified over a fairly wide geographic area. New Jersey experienced extended drought conditions for the rest of the summer which minimized floodwater mosquito populations as potential bridge vectors. Four total equine cases (1 each from Gloucester, Ocean, Burlington & Monmouth) occurred during the month of August.

Table 8 lists the total number of mosquitoes tested for EEE by site in 2005, together with positives and earliest isolation dates. EEE was eventually confirmed from 4 of the 6 sites in the monitoring network including: Green Bank (5 positives), Dennisville (2 positives), Centerton (3 positives) and Turkey Swamp (5 positives). *Culiseta melanura* populations were extremely low at Waterford which, partially, explains the paucity of virus activity at that site. No virus activity was detected at Corbin City in 2005, a site where EEE frequently occurs at high levels.

Table 8. Resting box populations of *Culiseta melanura* tested for EEE in New Jersey during 2005.

SITE	TOTAL TESTED	NO. POOLS	NO. EEE POSITVES	EARLIEST POSITIVE
Coastal Sites				
Green Bank	1,183	69	5	July 26
Corbin City	649	69	0	-
Dennisville	5,067	138	2	August 8
Inland Sites				
Waterford	199	29	0	-
Centerton	974	75	3	September 16
Turkey Swamp	1,019	75	5	August 2
TOTALS	**9,091**	**455**	**15**	

Data suggests that conditions for intense EEE activity were present in New Jersey during the 2005 season. Drought conditions, however, aborted the possibility of floodwater mosquito involvement when EEE was most active. As a result, transfer to mammalian hosts was limited to the period when *Coquillettidia perturbans* were most numerous. The 4 equine cases reported from New Jersey were contracted over a fairly short span of time in late July and early August. Data from New Jersey's State Mosquito Surveillance program point toward *Cq. perturbans* as the probable bridge vector in a year where floodwater mosquito numbers were exceptionally low.

METHODOLOGY FOR WNV SURVEILLANCE

New Jersey's WNV surveillance program in 2005 relied on a significant county initiative to conduct meaningful surveillance throughout the state. Most county programs focused their trapping efforts in areas where prior surveillance data pointed toward high WNV activity. The Rutgers program used gravid traps and CO_2 baited traps to collect mosquitoes from areas where equine cases required special surveillance investigations. The Rutgers program also conducted WNV surveillance activities for counties that asked for assistance. In all cases, each of the agencies identified and pooled their own specimens for virus isolation attempts. The NJ State Mosquito Control provided Rutgers with a vehicle for weekly courier service to assure that specimens were delivered to the PHEL labs in Trenton for rapid turnover of results.

RESULTS FOR WNV SURVEILLANCE IN 2005

During the 2005 mosquito season, a total of 126,967 specimens were tested in 5,868 pools. Results from the surveillance effort produced 298 WNV positive pools. All of New Jersey's 21 county mosquito control agencies participated in the state program in 2005. Table 9 combines collections made by Rutgers personnel with those collected and processed at agency facilities and lists totals by county

Table 10 lists WNV infection rates in the mosquitoes that were tested in 2005. Infection rates in both amplification vectors and bridge vectors have been declining over the past several years. In 2004, WNV was limited to bird feeding mosquitoes with no evidence of transfer to any of the bridge vector species that tested positive in prior years. In 2005, single positives were obtained from 4 known mammal biters including: *Aedes vexans*, *Anopheles quadrimaculatus*, *Ochlerotatus japonicus* and *Ochlerotatus triseriatus*. As expected, Minimum Infections Rates (MIR) were highest in bird feeding mosquitoes. *Culex pipiens* had the highest MIR (4.5 positives per 1000 tested) emphasizing that this mosquito continues to function as the primary amplification vector in our region. *Culex restuans* and *Culiseta melanura* had infection rates of 2.5 and 0.1 per thousand, respectively, re-emphasizing that those 2 bird feeding mosquitoes species are secondary vectors in the WNV transmission cycle.

Table 9. Mosquitoes tested for West Nile in New Jersey during 2005.

County	No. Pools Submitted	Total Mosquitoes for the Year	No. Positive Pools
Atlantic	356	8,400	**13**
Bergen	406	21,602	**118**
Burlington	330	4,822	**3**
Camden	135	1,481	**3**
Cape May	486	12,501	**5**
Cumberland	239	1,131	**0**
Essex	207	3,482	**15**
Gloucester	195	4,358	**4**
Hudson	209	5,962	**24**
Hunterdon	263	8,779	**4**
Mercer	421	9,094	**53**
Middlesex	414	8,068	**23**
Monmouth	464	5,618	**10**
Morris	173	3,348	**1**
Ocean	356	6,257	**5**
Passaic	165	4,141	**11**
Salem	300	3,615	**0**
Somerset	180	4,118	**1**
Sussex	283	2,181	**0**
Union	78	1,077	**3**
Warren	208	6,932	**2**
TOTAL	**5,868**	**126,967**	**298**

Table 10. WNV Infection Rates in New Jersey Mosquitoes during 2005.

Species	Total Tested	Positive Pools	MIR
Primary Amplification Vectors			
Cx. pipiens	16,215	73	4.5
Cx. spp.	74,650	214	2.9
Cx. restuans	2,397	6	2.5
Cs. melanura	11,183	1	0.1
Potential Bridge Vectors			
Ae. albopictus	2,418	0	0
Ae. vexans	2,569	1	0.4
An. punctipennis	689	0	0
An. quadrimaculatus	2,317	1	0.4
Cx. salinarius	2,212	0	0
Oc. cantator	54	0	0
Oc. japonicus	2,744	1	0.4
Oc. sollicitans	2,532	0	0
Oc. triseriatus	1,046	1	1.0
Oc. trivittatus	367	0	0
Ps. columbiae	343	0	0
Ps. ferox	467	0	0

CONCLUSIONS

Drought conditions throughout most of NJ limited bridge vector populations for most of the summer and directly impacted the progression of both EEE and WNV during the 2005 mosquito season. EEE virus was active throughout much of New England but did not appear in NJ until late in July. Four equine deaths in August were attributed to probable *Cq. perturbans* transmission, a permanent water swamp species that was not impacted by the drought. Although EEE was detected at 4 of New Jersey's 6 permanent

study sites, the virus remained within the amplification cycle for most of the season. All of New Jersey's 21 county mosquito control agencies collected and processed specimens for the WNV surveillance initiative. WNV was largely limited to bird feeding mosquitoes in 2005. Single positives from *Ae vexans*, *An. quadrimaculatus*, *Oc. triseriatus* and *Oc. japonicus* represented the only indication of virus acquisition by mammal biting mosquito species in 2005. Increased levels of antibody in avian hosts represent an unstudied factor in the seasonal dynamics of this exotic disease.

Program Director: Dr. Wayne J. Crans, Cook College
Rutgers University

A State Mosquito Surveillance Program For New Jersey

From 1973 to 1985, the NJ State Mosquito Control Commission supported a program that examined mosquito population changes within geographical regions. New Jersey light trap records from county mosquito control agencies were used to monitor mosquito populations. At that time, the state was divided into 6 geographical regions based primarily on mosquito breeding habitats. Collections from selected county light traps were statistically analyzed to compare regional population levels of nuisance species. Data were analyzed at the New Jersey Agricultural Experiment Station and distributed to participating agencies as a weekly report. The program was funded for more than a decade but was discontinued in 1986 because of budgetary restraints.

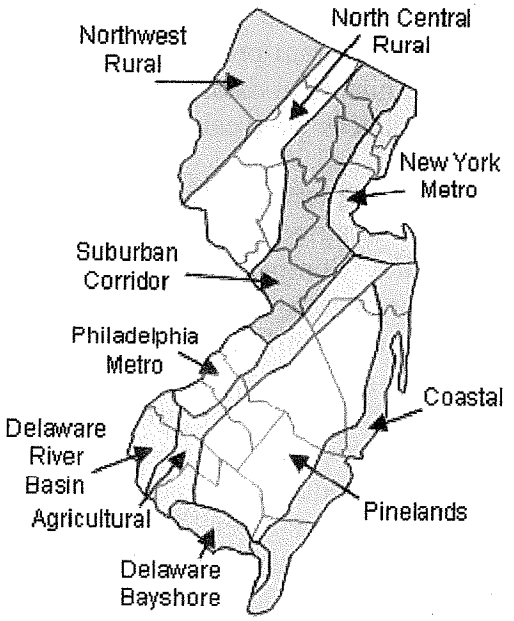
In light of recent arboviral activity, such as outbreak from emerging diseases (West Nile) and resurgent Eastern Equine encephalitis activity, the value of monitoring nuisance and public-health pests is rapidly becoming all too evident. County mosquito control agencies continue to collect such information, but this information remains relevant only within each county. Combination of light traps from many counties reflecting general mosquito population levels can provide information beyond what is available within each county. This information is then shared with all counties.

This project has been charged with re-instituting the State Mosquito Surveillance Program to make use of the vast historical database the county programs have compiled over the years. Project goals include continued training in the calibration of light traps, the collection of raw trap light data and conversion to regional means, weekly reporting of mosquito population trends, and the production of a dichotomous identification key of New Jersey species commonly found in light traps.

1 July 2005 to 31 June 2006

Participation of Geographic Regions

The current plan includes 10 regions including: Northwest Rural, North Central Rural, Suburban Corridor, Agricultural, Pinelands, Atlantic Coast, New York Metropolitan, Philadelphia Metropolitan, Delaware River Basin and Delaware Bay Shore. Figure 1 maps the regions and shows which counties contribute to each.



Most of the counties provided data toward the project. One county (Sussex) provided partial data during 2005 due to a reduced personnel force. During the 2005-6 winter, we received the previous season's missing data and updated the historical dataset. During 2006, Gloucester did not participate

due to a reduced personnel force. We expect full cooperation from this county in the future as they had participated previously. Light trap data from most counties were sometimes delayed during the most active portion of the season. Delays generally were less than one week.

Beginning the Season with a Review on Trap Calibrations.

Counties were invited to bring the light traps used for this program to Headlee Labs where a presentation on trap maintenance was presented and the county traps could be calibrated using a dial anemometer. The dial anemometer was also available for any county wishing to calibrate all their light traps. Counties that attended were generally located close to Headlee Labs and could easily bring their traps in. Other counties preferred to calibrate their traps in their own maintenance areas but did send personnel for the presentation.

Our recommendation is that counties that currently do not have anemometers purchase a digital anemometer such as the Kestrel model to use for light calibrations. Calibrations can easily be done in a few seconds in the field. This ease of calibration would allow counties to quickly monitor the consistency and reliability of the light traps to capture mosquitoes, maintaining the integrity of the dataset throughout the season.

Acquisition of County Light Trap Records

Individual counties were asked to either fax or email data sheets from each of the light traps making up the State Surveillance Program effort. Data was entered into an Excel spreadsheet and average number of mosquitoes per trap per region per week was calculated, along with the respective variance.

Historical data is represented by data of participating traps from 1999 through 2004. All traps have at least two years of historical data, and at least one trap from each regional has 5 years of historical data. The historical dataset will become complete as this program progresses. The data of the current year will become incorporated into the historical dataset the following year. Historical averages as well as their associated variances were calculated and displayed along with the current mosquito trends.

Reporting on Specific Species and on Special Events.

We reported on four species for the majority of the mosquito season: *Aedex vexans, Culex* Complex, *Ochlerotatus sollicitans* and *Culiseta melanura*. *Culex* Complex, representing a mix of *Cx. pipiens, Cx. restuans, and Cx. salinarius*, were combined due to the difficulties in reliably identifying members of this group to species. Due to this, regional differences in *Culex* population trends likely represent differences in the relative contributions of the three species.

Throughout the reporting season, information about the region or about specific species was given. For example, the top ten species list for each region was generated. The population trends of species of potential disease interest that showed increased activity (*Aedes japonicus*) or distinctive relational trends such as with the *Psorophora* were also included from time to time.

Use of a Secure Website to Broadcast Information to a Select Group.

Initially, reports were sent out to individuals as attachments. However, due to increased security concerns regarding attachments and the concern over broadband abuse, we decided a more economical method of broadcasting the reports was through the use of a website (http://www-rci.rutgers.edu/~lreed/moslock/reports.htm). The website was secured through the use of Unix htpasswd programs to restrict access by only those with the appropriate password. Announcements of the availability of the weekly reports were sent through email to the appropriate county and State officials from L. Reed.

Identification Aid and Verification

As part of maintaining the integrity of the dataset, Linda McCuiston provided species identification verification for two counties and is preparing to aid a third county by providing instructional support for individuals.

Program Director: Dr. Lisa Reed, Cook College
Rutgers University

NEW JERSEY STATE SURVEILLANCE

Final Weekly Report for 2005

Including data for the week ending 31 October.

Submitted by Lisa Reed
Mosquito Research and Control Unit
Rutgers University, New Brunswick, NJ 08901

Purpose: Data from 84 New Jersey light traps contributed by county mosquito control agencies are used to calculate trends in mosquito populations for species of nuisance or health concerns.

Calculations are based on regional distributions, with emphasis on mosquito habitat and land use. Trends will allow a statewide evaluation of changing mosquito populations, in response to control and/or changes in habitat.

This is New Jersey Agricultural Experiment Station publication No. PT-40500-45-05 supported by Hatch funds and funding from the NJ State Mosquito Control Commission. Prepared by Dr. Lisa M. Reed.

Figure 1a: Map of ten regions selected for the New Jersey Surveillance Program overlaid with county boarders.

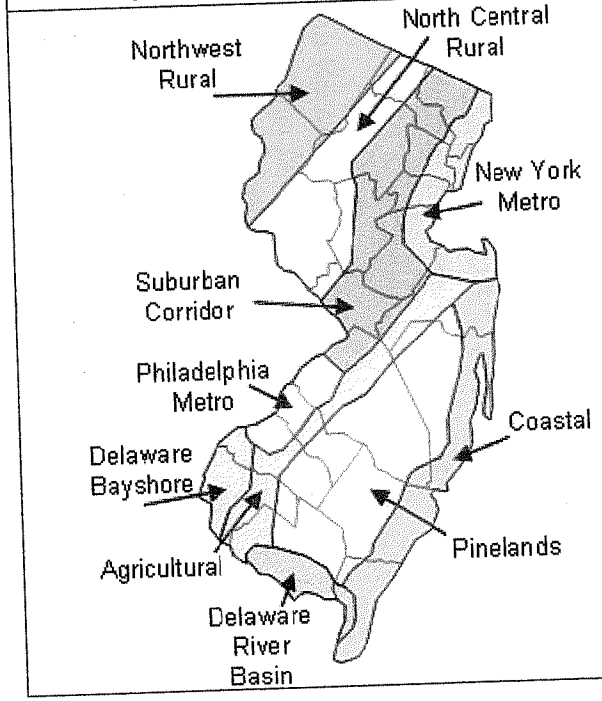
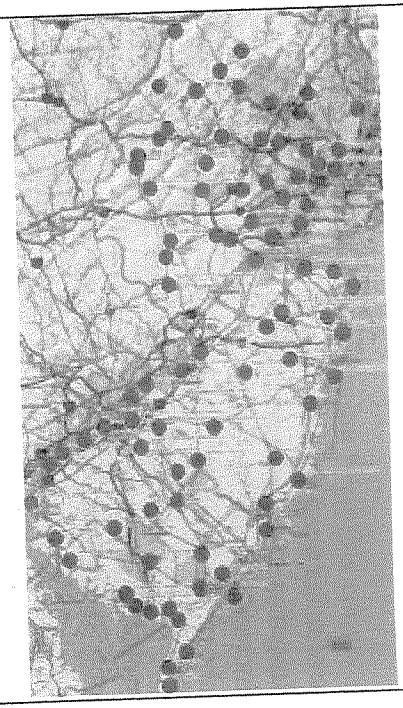


Figure 1b. Trap lat-long locations.



The State Surveillance Program Overview

In New Jersey, county-level mosquito control agencies use New Jersey light traps to monitor certain nuisance and health-risk mosquito species. Agencies have many years worth of experience in the placement, use, and interpretation of light traps and their data as monitoring mosquito populations is an essential part of an integrated pest management approach. But county agencies are limited to county data, and a landscape-wide view of changing mosquito trends is not available. The purpose of this program is to cover that gap and provide information of nuisance and health-risk mosquito populations on a regional level.

The 2005 Season: Twenty of the 21 county mosquito agencies participated in this program. Most agencies provided data in a timely matter. However, at times, most agencies were occasionally pressed to get the data to Headlee Labs. Therefore, interpretation of the data is more robust at the previous weeks' report than during the current week. Care must be taken with the interpretation of the most current week's data.

Weather affected the trap catches considerably in 2005. Last year, a total of 42 species in 330,000 individuals were caught in the light traps throughout New Jersey. This year, after a cold spring and dry summer, only 220,910 mosquitoes from 35 species were recorded in the same light traps. Last year, species abundance was high in the Agricultural and Pinelands regions. This year, species abundance fell to moderate levels in the Agricultural region. The Delaware Bayshore and Pinelands regions continue to represent the low and high values of species diversity, respectively. The difference between total species caught in New Jersey and the highest number found per region indicate the diversity of species found from one end of the state to the other.

Region	Number of Traps	Number of Species
Agricultural	6	26
Coastal	9	30
Delaware Bayshore	6	19
Delaware River Basin	4	25
New York Metro	10	26
North Central Rural	8	19
Northwestern Rural	6	23
Philadelphia Metro	6	21
Pinelands	11	33
Suburban	17	29
Total	83	35

Historical data was entered for all regions as a running mean encompassing the previous five years. For some regions, historical data is based on as few as 2 or 3 traps. This paucity of data will decrease as the current dataset becomes incorporated into the historical dataset. Historical data is represented by a solid red line, plotted with error bars, against the black bars of the current year's dataset.

Mosquito Species Collected in 2005: The mosquitoes collected in county operated light traps belong to a series of very different life cycle types as described by Crans (2004) A classification system for mosquito life cycles: life cycle types for mosquitoes of the northeastern United States. *Journal of Vector Ecology*, June: 1-10. We present the seasonal data for the 26 species from last year's report.

Univoltine Aedine (*stimulans/canadensis*) Species: Members that belong to this group overwinter as eggs and have a single generation in early spring. The eggs hatch when water temperatures are still quite cold and the adults are usually on the wing during the month of May. In most species, the eggs laid in May and June enter diapause and do not hatch until they are flooded the following year. Some of the members in this group have a generation that reappears in the fall. Most biologists feel that these are eggs that did not hatch during the spring flooding and were left behind as survival insurance. Mosquito species collected in light traps that belong to this group include: *Oc. stimulans, Oc. canadensis, Oc. sticticus & Oc. cinereus*.

Multivoltine Aedine (*vexans*) Species: Members of this group also overwinter as eggs but do not hatch until later in the season when water temperatures rise to ideal levels. These mosquitoes have multiple generations during the summer months that are regulated by flooding patterns. Each period of excessive rainfall produces a major brood. Minor floodings can generate overlapping broods that are usually localized. Mosquito species collected in light traps that belong to this group include: *Ae. vexans, Oc. trivttatus, Ps. ferox, Ps. columbiae, Ps. ciliata*

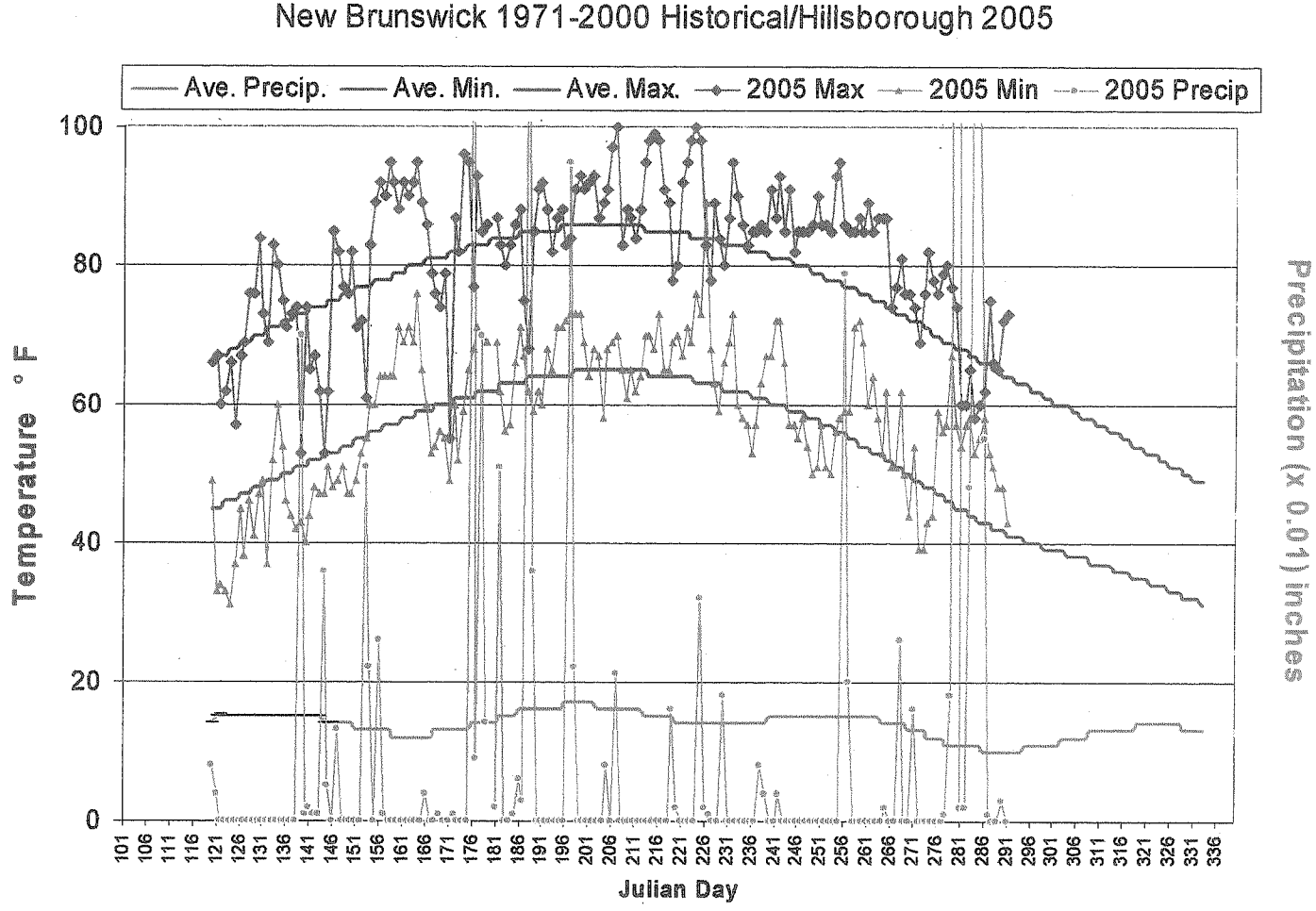
Multivoltine Aedine (*sollicitans*) Species: Members that belong to this group overwinter as eggs but lay them on tidal marshes where lunar tides provide a method to inundate the eggs. There are multiple generations during the summer months with as many as 2 broods each month from May to October. Rainfall can produce egg hatch which complicates the picture. As a result, biting populations can include mosquitoes of mixed age. Mosquito species collected in light traps that belong to this group include: *Oc. sollicitans & Oc. cantator.*

Multivoltine Aedine (*triseriatus*) Species: These mosquitoes glue their eggs to the sides of containers above the water line and rely on rains to raise the water level and hatch the eggs. Like other Aedines, they overwinter as eggs and reappear each spring when water temperatures begin to rise. Most members of the group are active during the day and are enter light traps in very low numbers. Mosquito species collected in light traps that belong to this group include: *Oc. triseriatus & Oc. japonicus.*

Multivoltine Culex/Anopheline (*quadrimaculatus) Species*: Members that belong to this group have a life cycle strategy that is very similar to the Multivoltine *Culex*. They overwinter as mated females and build their populations over the course of the summer. They are included as a separate group because they represent an entire genus. Mosquito species collected in light traps that belong to this group include: A*n. quadrimaculatus, Cx. territans & Cx. erraticus.*

Multivoltine Culex/Anopheline (*salinarius*) Species: Members of this group overwinter as mated females that will lay eggs in a variety of brackish water, showing a wide degree of salt tolerance. Larvae generally reach highest numbers in brackish water and with multiple generations, the

Climate Data



This figure shows historical average maximum and minimum temperatures and average precipitation recorded in the New Brunswick, NJ weather station over a recent 30 year period. Also graphed are the current year's minimum and maximum temperatures as recorded at the Hillsborough NJ weather station (a station close to central NJ which recorded all three parameters and was available online at the NJ state climatologist).

FINANCIAL STATEMENT
STATE MOSQUITO CONTROL COMMISSION
END OF YEAR
(FY'06)

FY'06 STATE MOSQUITO CONTROL, RESEARCH, ADMINISTRATION AND OPERATIONS APPROPRIATION	**$1,515,000.00**
FY'05 APPROPRIATION CARRIED FORWARD AMOUNT	**$ 140,681.00**
Reappropriated Statewide Surveillance balance	**$4, 558.26**
FY'06 STATE MOSQUITO CONTROL COMMISSION	**$1,270,707.26**

PROGRAMS/SERVICES	AMOUNT ALLOCATED	COMMITTED/ EXPENDED	BALANCE
Administration AMCA Sustaining Memb. ($500.00) Recorder ($375.00) Tapes ($21.00) Engraving ($107.40) Legis. Index ($295.00) MMWR subsript. ($199.00) Proceedings 2005 ($100.00) Signature Stamp ($23.40) NJMCA Exhibitor ($150.00) S.O.V.E. Subscription ($100.00)	$ 5,000.00	$ 1,870.80	$ 3,129.20
State Airspray Program Insecticides ($10,032.00) Insecticides ($21,037.00) Insecticides ($10,032.00) Insecticides ($15,048.00) Calibration tools ($96.30) Zawicki Services ($5,000.00) Supplies ($187.50) Downstown-July ($74,315.66) Downstown-Aug. ($50,393.01) Downstown- Sep't. ($21,835.68) Insecticides- Cape May ($37,400.00) Mapping Software ($180.00) Insecticides ($22,233.20) Downstown ($65.00) Downstown ($1,272.00) Downstown balance ($26,101.60) Insecticides ($12,883.20)	$ 600,000.00	$659,578.99	($ 59,578.99)

State Airspray Program			
Insecticides ($17,603.20)			
Insecticides ($41,812.00)			
Insecticides ($25,766.40)			
Insecticides ($45,475.00)			
Downstown-May ($82,988.80)			
Downstown-June ($95,254.60)			
Insecticides ($34,691.40)			
Insecticides ($7,452.50)			
Calibration balance ($422.94)			
Equipment Repairs/Purchases	$ 200,000.00	$152,845.49	$ 47,154.51
Marsh-Master ($50,000.00)			
Electra-Mist repair ($500.00)			
Ocean Rotary rep. ($18,000.00)			
Hyd. Exc. manuals ($326.14)			
Salem- Amph. Exc. Repair ($45,000.00)			
Essex- Excavator repair ($1485.38)			
Cape May- Amph. Exc. Repair (1,299.47)			
Salem- Dozer repair ($8,031.12)			
Salem- Lng. Rch. Exc. Repair ($2,378.50)			
Salem- LGP Exc. Repair ($5, 267.08)			
Atlantic Rotary Repair ($2,800.00)			
Mercer-Microscope ($172.80)			
Sussex-Flowmeters ($16,400.00)			
Somerset Freezer Repair ($1,185.00)			
Education and Information			
Toll-free Number	$ 10,000.00	$ 285.27	$ 9,714.73
MOA'S			
DH/SS WNV Testing	$ 145,000.00	$ 84,937.58	$ 60,062.42
Mosquitofish Program	$ 25,000.00	$ 25,000.00	$ 0.00
Biological Control-copepods	$ 25,000.00	$ 25,000.00	$ 0.00
Sampling tools ($104.79)			
NJN – copepod video ($185.00)			
J. Reid – copepod ($650.00)			
Research-Trans. Cycle WNV	$ 2,000.00	$ 1,030.00	$ 970.00
Vec-Test antigen ($1,030.00)			
Professional Services	$ 254,149.00	$ 243,049.17	$ 11,099.83
Vector Surveillance ($172,498.00)			
Monitor of Insecticides ($49,113.00)			
Statewide Surveillance ($32,538.00)			
'05 Reappropriated statewide surveillance	$ 4,558.26	$ 0.00	$ 4,558.26
TOTALS AS OF 6/20/06	**$1,270,707.26**	**$1,193,597.30**	**$ 77,109.96**

PROFESSIONAL SERVICES CONTRACTS – FY06

PROGRAMS	FY	ALLOCATED	PAYMENTS TO DATE	BALANCE OF 06/20/06
Statewide Surveillance	06	$ 32,538.00	$ 31,332.85	$ 1,205.15
Vector Surveillance	06	$172,498.00	$ 162,603.32	$ 9,894.68
Monitoring of Insecticides	06	$ 49,113.00	$ 49,113.00	$ 0.00

COMMISSION-SUPPORTED PUBLICATIONS AND PRESENTATIONS

Bartlett, K. 2006. Blood Meal Analysis of *Culex territans*. *Proc. New Jersey Mosquito Control Assoc.* In Press.

Chianese, R., M. Mayer and D. Palmer. 2006. Symposium: Copepods as a Biological Control Agent for Mosquitoes. The NJ Department of Agriculture's Biological Pest Control Program. Presented, 93rd Annual Meeting; New Jersey Mosquito Control Assoc. Atlantic City, NJ.

Crans, W. and R. Kent. 2006. Mosquito-borne encephalitis in New Jersey, 2005. *Proc. New Jersey Mosquito Control Assoc.* In Press.

Gruener, J. 2006. Diel Biting Activity of West Nile Virus Mosquito Vectors to Horses. *Proc. New Jersey Mosquito Control Assoc.* In Press.

Huang, S. and L. Brattsten. 2006. Expression of Cytochrome P450's, CYP6P10 and CYP6B10 in the Salt Marsh Mosquito *Aedes sollicitans. Proc. New Jersey Mosquito Control Assoc.* In Press.

Kent, R. 2005. The New Jersey State Report. *Proc. Northeastern Mosquito Control Association.* 52:

Kent, R. 2005. Public Health Confronts the Mosquito; A C.D.C. National Standard. *Proc. Northeastern Mosquito Control Association.* 52:

Kent, R. 2006. A Report of the NJ State Mosquito Control Commission and the Office of Mosquito Control Coordination. *Proc. New Jersey Mosquito Control Assoc.* In Press.

Kent, R. 2006. Symposium: Copepods as a Biological Control Agent for Mosquitoes. Presented, 93rd Annual Meeting; New Jersey Mosquito Control Assoc. Atlantic City, NJ.

Kent, R., C. O'Malley and M. Vlazny. 2006. Symposium: Copepods as a Biological Control Agent for Mosquitoes. Current Efforts to Establish a Program Utilizing Copepods as a Biological Control Agent for Mosquito Control. Presented, 93rd Annual Meeting; New Jersey Mosquito Control Assoc. Atlantic City, NJ.

Marten, G. 2006. Symposium: Copepods as a Biological Control Agent for Mosquitoes. Using Cyclopoid Copepods for Mosquito Control. . Presented, 93rd Annual Meeting; New Jersey Mosquito Control Assoc. Atlantic City, NJ.

Meyer, R. and A. Rush. 2006. Resmethrin Residues Detected Following ULV Applications. *Proc. New Jersey Mosquito Control Assoc.* In Press.

O'Malley, C. 2006. The New Jersey State Airspray Program, 2005. *Proc. New Jersey Mosquito Control Assoc.* In Press.

Reinert, W., P. Capotosto, A. Gettman, J. Howard, R. Kent, S. Macgregor, W. Montgomery, et. al. 2005 Panel Discussion: Eastern Equine Encephalitis and West Nile Virus

in the Northeast; Protocols for Response and Much More. Presented, 52nd. Annual Meeting; Northeastern Mosquito Control Association. Springfield, Mass.

Reed, L. 2005. NJ State Surveillance Program, 2005. . *Proc. Northeastern Mosquito Control Association.* 52:

Reed, L., W. Crans and R. Kent. 2006. The NJ State Surveillance Program, 2005. *Proc. New Jersey Mosquito Control Assoc.* In Press.

Sun, D. and L. Brattsten. 2006. Expression of *Ochleratatus sollicitans* Cytochrome P450 Reductase Activity in *Escherichia coli. Proc. New Jersey Mosquito Control Assoc.* In Press.