ANNUAL REPORT

1990

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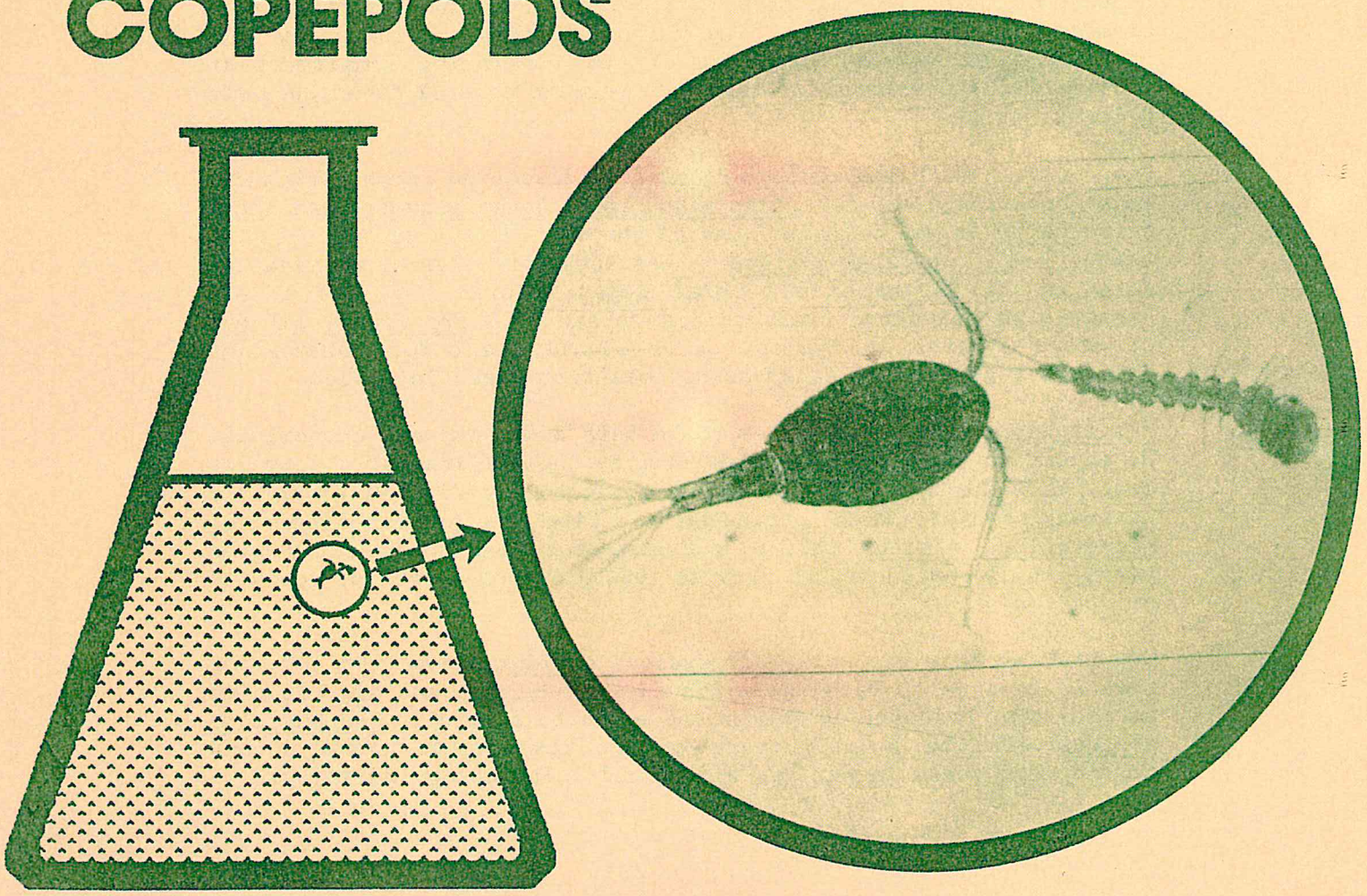
NEW ORLEANS MOSQUITO CONTROL BOARD

LARVIVOROUS COPEPODS



CONTINUING THE QUEST FOR NEW BIOLOGICAL CONTROL AGENTS

COVER STORY

In 1988 the New Orleans Mosquito Control Board and the Centers for Disease Control began a collaborative project to evaluate cyclopoid copepods (known as "cyclops") for biological control of container-breeding Aedes mosquitoes. Exploration of this promising new form of biological control was part of our continuing commitment to provide safe and economical means of mosquito control techniques for Orleans Parish.

Field trials with the cyclops focused on discarded tires, which are major breeding sites for Aedes albopictus, Aedes aegypti, and Aedes triseriatus in New Orleans. One of the species of cyclops that was tested -- Macrocyclops albidus -- was 100% effective at eliminating first-instar larvae of all three Aedes species from the tires. Recently we initiated field trials to see if Macrocyclops albidus or other species of cyclops serve equally well for controlling floodwater species of Aedes mosquitoes that breed in swales.

Macrocyclops albidus promises to be both effective and economical. We expect to be able to produce them by the millions at a very low cost, and they can be applied to mosquito breeding sites with a backpack sprayer. Once introduced to a tire or other breeding site, Macrocyclops albidus thrive and last for months, possibly even years, while continuing to provide 100% protection against mosquito production.

Now that we know how well Macrocyclops albidus can do the job, our task is to develop techniques for mass production and distribution of this tiny predator in integrated mosquito control. Macrocyclops albidus will be a major part of the operational research and development scene in our new Biocontrol / Toxicology Building.

CITY OF NEW ORLEANS

NEW ORLEANS MOSQUITO CONTROL BOARD

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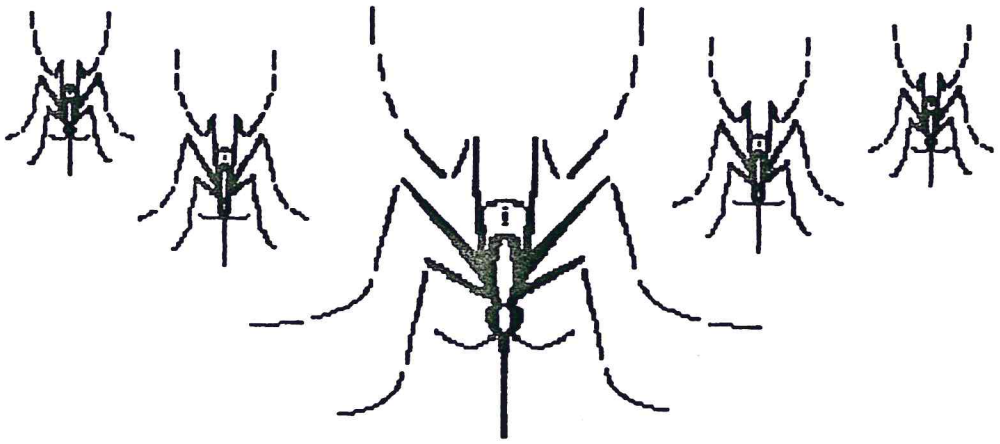

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1990
ANNUAL REPORT

Director's Report

EDGAR S. BORDES, JR.

This past year witnessed a reduction in floodwater mosquito problems and an increase in permanent water mosquito breeding. During this year, 92% of the total light trap collection was permanent water breeding species and only 8% were floodwater breeding species. Culex salinarius emerged as the most abundant pest mosquito in Orleans Parish. Rainfall patterns were a significant factor in the accumulation of Cx. salinarius because 40 inches of the annual 50 inch total precipitation was recorded during the first five months of the year. Heavy rainfall in late winter and early spring flooded all of the normal flood water mosquito breeding habitat, thus forcing the floodwater mosquito species to lay their eggs on surfaces that would not flood. Only the tidal areas, outside the levee system, were productive floodwater breeding habitat.

With the abundance of spring rainfall, our inspection and larviciding program was extremely active and some changes were made to better correlate our database of mosquito breeding areas. Larviciding areas were restructured to utilize the same nomenclature as the adulticiding areas. New maps were made of all the mosquito breeding sites and all of the breeding sites were coded for use in the new computer program (FileMaker Pro). A computer database was also established for the location of tire piles throughout the city. This information will be utilized to determine the extent and severity of the tire dumping problem and its relationship to breeding foci for Aedes aegypti and Aedes albopictus.

Does a wet spring and a hot dry summer really enhance the chances of encephalitis virus activity? These climatological conditions happened this year and we did experience increased virus activity in our bird populations. With 6% of our wild bird bloods positive for St. Louis Encephalitis, our adulticiding program began a systematic treatment of all of the areas at risk in Orleans Parish. Both ground and aerial treatments were utilized to reduce adult mosquito populations and

thus reduce the potential for virus transmission to the human population. In addition to the wild bird samples, over 1000 mosquito pools were sent to CDC for attempted virus isolation, to confirm the identification of the virus that was active in the bird populations. The Louisiana State Virology Lab and the Virology Branch of the Centers for Disease Control were very cooperative during these very trying times. The staff and Board of New Orleans Mosquito Control thank these organizations for their help and prompt attention to our potential epidemic situation.

Source reduction projects were concentrated in the inner city, with maintenance of existing projects and the construction of new projects in the major mosquito breeding areas. Work in the Bayou Sauvage Wildlife Refuge is awaiting permit changes and equipment replacement.

Public education efforts resulted in several new educational tapes for use by the Orleans Parish School Board, cable television, the public library, universities, the Federal Government and other mosquito control programs. Several public service announcements were produced for use in commercial television markets and the cable network system. Our public education department has over 100 stock video tapes in varying lengths of 20 minutes to 1 hour. We now have a computer database to keep track of all of the shots. These tapes are time coded to allow for rapid screening to locate the desired shot for production purposes. In addition to training provided to foreign visitors and local schools and universities, public education cooperated with the City's Public Information Department to produce several tapes for use by the City of New Orleans.

Buck moth caterpillar control activities centered around a network consisting of New Orleans Mosquito Control Board, Parkway and Parks Commission, U.S. Forest Service, Louisiana State University, Louisiana Extension Service, and the commercial pest operators. With such a force brought to bear on the buck moth caterpillars, we have experienced a very successful control effort against the caterpillars. The first egg hatch was noted on February 22, 1990, one week later than the observed hatch time of the prior year. Spray operations began on March 22nd using Bacillus thuringiensis kerstaki. As the caterpillars matured, an advance pyrethriod product was utilized. Spray operations were concluded by the beginning of May with very few repeat treatments required.

Biocontrol efforts were expanded by the mixing of Bti with cyclops to treat our tire piles. This mixing of these two larviciding methods gives us immediate control that will last for at least one year. This same hybrid treatment technology is being utilized in swales, the marsh environment and ditches. The New Orleans Biocontrol Facility came on line in September of this year and we are no longer limited by lack of space for production of biocontrol agents.

Mosquito control continues to be a dynamic process that must be able to change with climatological conditions that dictate the numbers and species of mosquitoes produced in Orleans Parish. The mosquito

control effort works because of the people involved in the effort. The Mayor of New Orleans, the New Orleans City Council, the CAO and his administrative staff, the New Orleans Mosquito Control Board and the staff of our mosquito control program deserve to be recognized as the real reasons for the success of the mosquito control effort in New Orleans.

In addition to training Mr. Unda from Ecuador, two groups of students from Tulane School of Public Health and Tropical Medicine were hosted during the month of July. The following list of students represent ten countries including Egypt, Ethiopia, Guatemala, India, Indonesia, Nigera, Pakistan, Somalia, USA and Vietnam:

1990
INTERNATIONAL VISITORS

Warren McWilson	Centers for Disease Control	United States
Hector Cevallos	Vector Control	Ecuador
Carlos Alberto Diez Torres	Vector Control	Ecuador
Poonsak Pranootnaraparn	District Officer	Thailand
Araya Vivatanavanich	District Officer	Thailand
Wenyan Che (since 1988)	Centers for Disease Control	U.S. / China
Marco F. Saurez	John Hopkins University	Puerto Rico
Andy Arata	Vector Biology Control	United States
Llewellyn J. Legters, MPH	Professor/Chairman	United States
Andrew Spielman	Prof.of Tropical Medicine	United States
William O. Loftis	HM1 Naval Officer	United States
John Mawvel	Pest Controller, NAS	United States
Robert Sanford	HM1 Naval Officer	United States
John Wildie	Entomologist LCDR Officer	United States
Juan Roberto Unda	Technical Officer	Ecuador
John Barber	Pest Management Consultant	Australia
Antonio Leva Bulnes	Mayor of LaCeiba	Honduras
Dr. Camilo Cruz		Honduras
Rodolfo Irias Navas	President of Congress	Honduras
Alfredo Canto	Secretary of Health	Yucatan
Medardo Cooper		Honduras
Maj.Dr.Harinder Singh, C.O.	Ministry of Defense	India
Dr. Magda Palacio	Health Prog. Coordinator	Colombia
Dr. Marcos Arevala Damas	Social Service Physician	El Salvador
Nemani Seru	Medical Assistant	Fiji
Mrs. Betty Sanetra Finlay	Nutrition Ed. Coordinator	Grenada
Bhisma Murti	Health Education Head	Indonesia
Ms. Sando Jerusha Jones	Nat'l Claims Director	Liberia
Ms. Talat Rizvi	Medical Officer in Charge	Pakistan
Dr. Leith Zakraoui	Associate Professor	Tunisia
Dr. Mungala Kipasa	Chief Medical Officer	Zaire
Runesha Muderhwa	Nutrition Chief	Zaire
Juan Rafael Maroles	Vector Control	Honduras
Ramon Flores Mejia	Governor	Honduras
Fidel Funes Flores	Vector Control	Lima

ENTOMOLOGICAL REPORT - MICHAEL CARROLL

Mosquito activity during 1990 was increased dramatically compared to last year, with the light trap counts double 1989's counts and man hours adulticiding quadrupling those of 1989.

During this year, 92% of the light trap catch was permanent water species and only 8% floodwater. In 1989, 60% of the catch was permanent water and 40% flood water species. Our two main floodwater species, Aedes vexans and Ae. sollicitans, dropped off dramatically in 1990. Our year-round adversary in 1990 was Culex salinarius.

Rainfall appears to be the obvious factor in the shift to the predominance of the permanent water species. Rainfall in January, February and May doubled or tripled the normal average, and during the first six months of the year, many of the normal floodwater swales became permanent water breeding areas.

SURVEILLANCE - ED FREYTAG

Although the spring of 1990 commenced with lots of flooded swales and ditches due to copious precipitation, the mosquito production level was kept to a minimum with regular inspections and the use of larvicides. Culiseta inornata, Aedes vexans and Culex salinarius were the most commonly collected larvae in the field. Inspections continued throughout the summer following any significant precipitation. Most of the swales and ditches remained dry or non-breeding for the rest of the year due to the hot, dry weather. The few sites that were breeding Ae. vexans and Cx. salinarius larvae were treated with Bti, Altosid or Golden Bear larviciding oil.

Remapping and restructuring of the larviciding areas was a major undertaking in 1990. The old system of mapping the swales and ditches was changed so that the same nomenclature was used as in the fogging folders. That is, when one refers to the P-1 area, both larviciding and fogging maps will have the same boundaries. New maps were made and the swales and ditches redrawn and relabeled. Each area map was divided into sections labeled A, B, C, etc., and within each section each swale labeled 1, 2, 3, etc. Once the mapping and labeling was finalized, a master database was developed on our Macintosh computer and larviciding forms were printed for each area which includes the area, section, swale or ditch number, location, whether it is dry or wet, larval density, etc. The advantages of this system are that the inspectors no longer have to write the address and location of each site and it does away with "cards" for each swale. The inspectors simply have to write the date, the site visited and circle the appropriate qualifiers (wet, dry, density, etc.). Once the area has been inspected, the form and any collected labeled samples are returned to the taxonomist who identifies the larvae and

enters the number and species on the form and later onto the computer database. Only the code number of each swale is entered and the database automatically enters the location and type of site. This method is more efficient because it has reduced errors due to ineligible handwriting, excess paperwork, and repetition. With the built-in search and find capabilities of the database program (FileMaker Pro), summary reports, larvae breeding histories, and queries are executed within a matter of minutes for each area, swale, date or species.

The Lower Coast Algiers area was thoroughly inspected both by airplane and by land to try to determine the origin of thousands of Cx. salinarius adults that were being collected in the light trap in this area. Many mosquito complaints were received from this area, but due to the tall trees and thick underbrush, ground and aerial treatments were not very effective. A series of flooded clear cuts were observed from the airplane next to the Orleans-St. Bernard Parish line which appeared to be a potential breeding site for the Cx. salinarius mosquitoes. Several wood duck boxes were also spotted from the airplane and still photographs taken during the flight. A follow-up flight was scheduled later and the area photographed with a video camera to show the director and the inspectors the areas that needed inspection. This area was inspected by ground over a three month period, but no Cx. salinarius mosquitoes were found breeding either in the clear-cuts or in the old plantation irrigation ditches and swales that crisscross the deep woods of Lower Coast Algiers. It is most probable that the mosquitoes are breeding in the marsh in St. Bernard Parish and flying across the Mississippi River into Lower Coast Algiers aided by the predominant easterly winds. While inspecting the English Turn golf course, the manager informed us that the clear-cuts were made to provide a refuge to wood ducks and that the whole area is being flooded for this purpose. This area will also be the future site for an endangered animal breeding facility.

A significant breeding source for Culex mosquitoes was found in the storm drain system of the Fairgrounds complex. The storm drain system is all interconnected by pipes, which in itself is not a mosquito breeding problem, but directly under each storm drain cover there is a catch basin. Each catch basin becomes a mosquito breeding haven for Cx. salinarius, Cx. quinquefasciatus and Cx. restuans since they will hold water for prolonged periods of time and the mosquitoes are not washed away after a storm. Additionally, during the period when horses are kept in the stalls, a rich broth of hay, feed, and urine provides the mosquito larvae with plenty of nutrients. Originally, the inspectors were asked to inspect and collect larvae samples from each storm drain, but because the covers are so heavy and cumbersome to remove, only a few storm drains were inspected and the rest were treated with a larviciding oil. The Fairgrounds storm drains were inspected regularly and the whole drain system treated if larvae were found.

Telephone calls requesting inspection for mosquito breeding were more frequent in August and September when adult Aedes aegypti and Ae. albopictus mosquitoes became a nuisance to the residents of Orleans Parish. Approximately 91% of all larvae collected were Ae. aegypti, found in backyards in buckets and tires that were holding rainwater. Mosquito breeding was

destroyed by source reduction or by removing the water, and the residents were given a leaflet containing literature on mosquito biology and control.

ADULT SURVEILLANCE

Adult mosquito surveillance in Orleans Parish utilized thirty-two Standard New Jersey light traps, set bi-weekly on Sunday and Wednesday nights. Mosquitoes that are attracted to incandescent light were collected during the entire year from all parts of the city with an operational rate of 97.2%. Trap failures resulted from power outages, burned out light bulbs and inaccessibility due to flooding. All traps were refurbished at the end of the year when the cold weather causes a decline in mosquito activity.

The use of CO_2 enhanced landing rates and the truck trap were used primarily to monitor mosquitoes that are not attracted to the New Jersey light traps, and to verify that telephone complaints originated from mosquitoes and not from gnats or midges.

A three month summary of the New Jersey light trap collections in Lower Coast Algiers (Fig. 1) indicated an increase of Cx. salinarius adults during March, peaking up to four thousand mosquitoes per trap night in April, and then decreasing to a more normal level in April. To determine the peak biting period of Cx. salinarius, a series of CO_2 enhanced landing rates were taken in mid-April when the mosquito population was causing distress to the residents of this area. Landing rates were taken in an open on the English Turn golf course at least 50 feet away from the woods starting at 5:15 PM and every half hour until 9:00 PM (Fig. 2). The study indicated that Cx. salinarius is most active after sundown (7:30 PM), and will pursue its host well into the night (9:00 PM when the test was ended). Prior to dusk (5:15 PM), the Cx. salinarius could not be coaxed out in the open. In contrast, no CO_2 was needed to attract the Cx. salinarius in the woods even in the middle of the day when temperatures reached the low 90's and the relative humidity was in the 90's.

Figure 1.

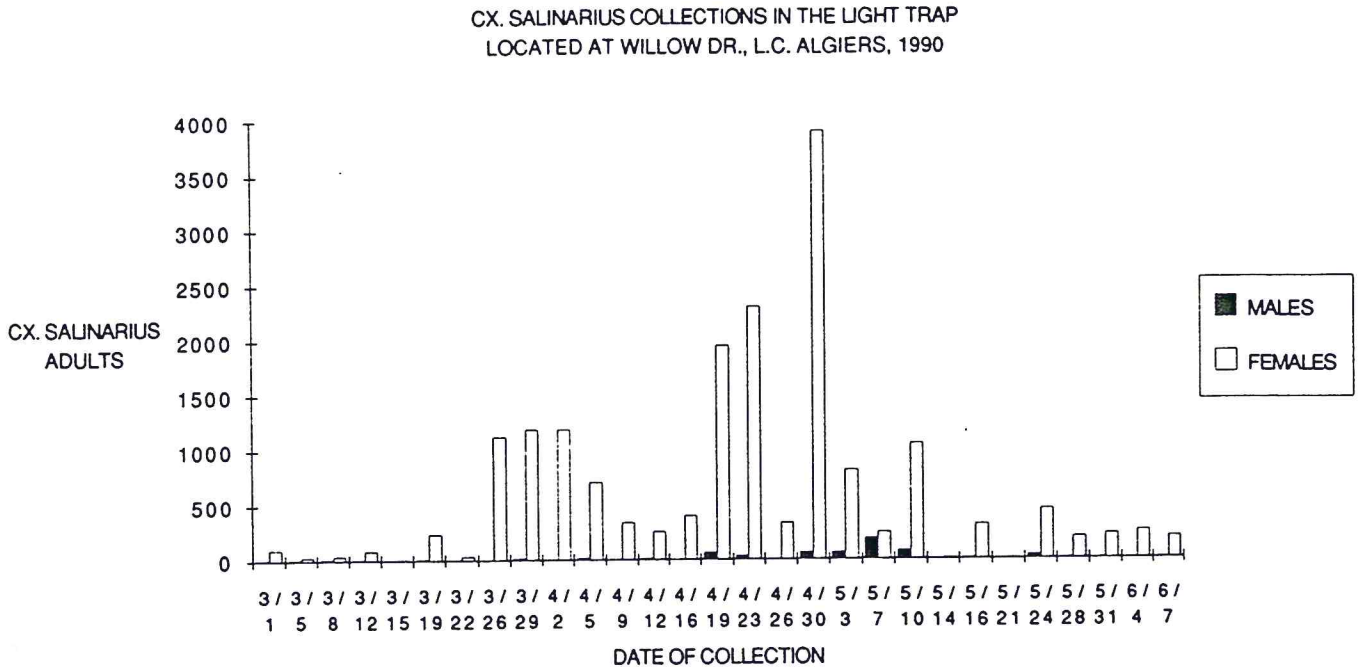
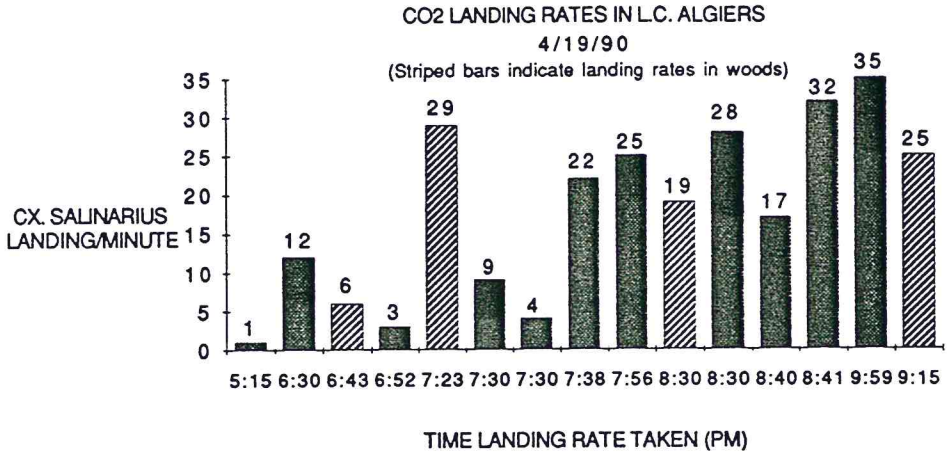


Figure 2.



Several truck trap runs were scheduled on separate days in late April in the Lower Coast Algiers area to determine if the Culex salinarius adults were originating from this site or if they were migrating from neighboring areas. Each truck trap run was divided into three 15 minute collections at

dusk (between 8 and 8:30 PM) along the perimeter of Lower Coast Algiers (see Fig. 3 and 4). It was not possible to conclude from the truck trap data where the mosquitoes were originating from or if they were migrating to the area, but it did indicate that the adults were concentrating in the most populated section of Lower Coast Algiers. A thorough ground inspection was scheduled in this area to locate possible breeding sites, but no larvae were found.

Figure 3.

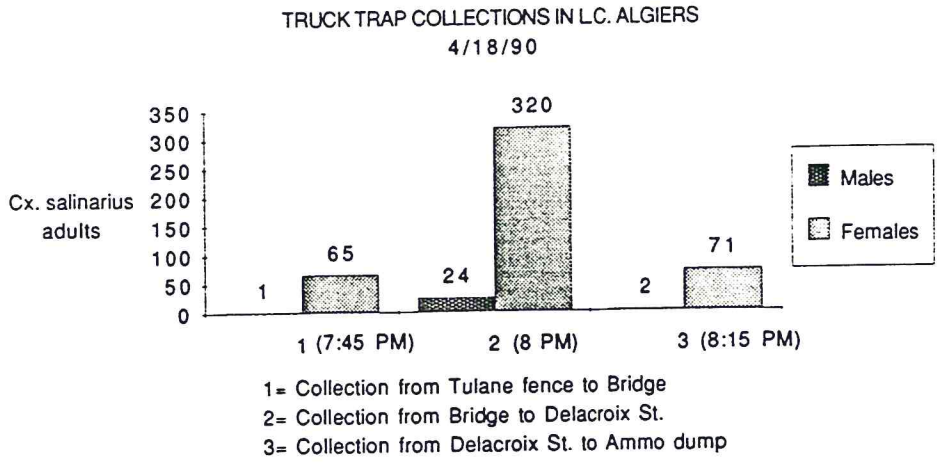
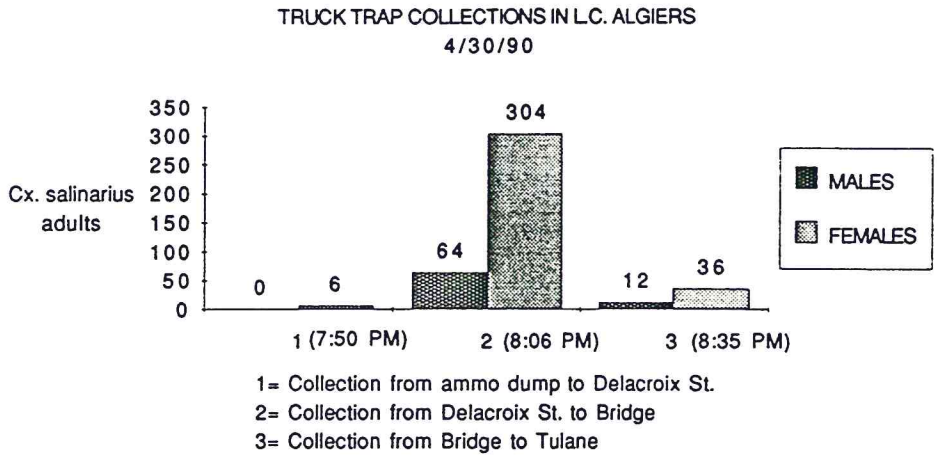


Figure 4.



New Orleans experienced below freezing temperatures for about a week in December and even the water held in tire piles was frozen solid. To determine if the freeze affected the survival of both Ae. aegypti and Ae. albopictus, CO_2 enhanced landing rates were taken in June in tire piles in eastern New Orleans and across the Industrial Canal in the Gentilly area. High populations of Ae. albopictus were present in Eastern New Orleans and in the Gentilly area, but no Ae. aegypti were collected in eastern New Orleans (this was expected since they have been displaced by Ae. albopictus long ago). In the Gentilly area, extremely low numbers of Ae. aegypti were collected and this appears to be related to the effects of prolonged low temperatures on egg survival; however, it is not clear to what degree displacement by Ae. albopictus may have contributed to the population decrease.

A computer database was developed containing the location of tire dumps throughout the city in an effort to determine the extent and severity of the tire dumping problem and its relationship to serving as breeding foci to Ae. aegypti and Ae. albopictus. The inspectors recorded all tire piles on their daily routes using three levels to categorize tire piles: 1) 1-5 tires, 2) 5-50 tires, and 3) greater than 50 tires. The tire pile locations were eventually placed on the operations map and identified with different color dots. The majority of the large tire piles are located in woodlots in New Orleans East along the industrial corridor, with many small "hot spots" scattered throughout the city. The Lower 9th Ward has the most tire piles in category 1. Tire pile information was summarized and shared with a special committee appointed to study the feasibility of tire shredding and/or recycling in New Orleans.

Positive bird bloods for SLE prompted the use of several New Jersey light traps with the timers set on all day and night and modified with a nylon net instead of a killing jar to collect live mosquitoes for SLE pooling. With the help of CDC equipment and personnel, gravid traps and CDC traps baited with CO_2 were set daily inside storm drains and in backyards in low income housing by Bonita Street and in the Lower 9th Ward and in other areas where positive bird bloods were collected. The results of the mosquito pools tested at the CDC facility in Fort Collins, Colorado were inconclusive as to whether the SLE virus was present in the mosquitoes.

ADULTICIDING

Adulticiding operations by ground and by air began as early as February and required treatment periodically until the end of the year due to influxes of Cx. salinarius, Ae. vexans and Ae. sollicitans. The majority of the telephone complaints requesting treatment throughout the year were for Cx. salinarius, our most abundant species. The Oak Island subdivision in eastern New Orleans was treated several times by ground and by air in May to suppress Anopheles crucians mosquitoes. Several aerial treatments in the Rigolets-Lake Catherine area during the summer were aimed at controlling this same mosquito.

Ground adulticiding operations during June and July were conducted in areas where SLE-positive bird bloods had been collected. All areas at risk were treated two to three times per week to suppress Culex adult populations

in an effort to deter possible SLE transmission. Hundreds of hours and miles were logged with the ULV trucks using malathion in these areas, which included Lower 9th Ward, eastern New Orleans, Algiers, City Park, and Chef Menteur Highway. Aerial application of Scourge with the Islander was also utilized in several of these high-risk areas to compliment ground adulticiding. To monitor aerial treatment efficacy, caged adult Ae. albopictus were placed in six sites in eastern New Orleans during an actual suppression flight. To obtain droplet size data, Teflon-coated slides were placed in spinners, and oil-sensitive dye cards were used to determine coverage. Twenty-four hour mortality was 100 percent at all sites except for site 1 (see Table 1), where wind currents and trees may have prevented the insecticide from reaching the target area. The LMD of the droplets collected in site 5 was 45.9 um. Few droplets were collected by the spinners and the dye cards in the other sites, but the insecticide was extremely effective on the caged targets nonetheless.

Table 1. Percent mortality of caged Aedes albopictus adults - June 19, 1990.

	Percent Mortality			
	Male		Female	
Site	6 hr.	24 hr.	6 hr.	24 hr.
1	0	0	0	0
2	100	100	95	100
3	100	100	100	100
4	100	100	100	100
5	100	100	93	100
6	100	100	92	100

Treatment Time: 4:30-5:30 AM
Wind Speed: 2-4 mph
Temperature: 82°F. RH: 62-76%
Tee-Jet 8002 (2 per boom)
Scourge/Orchex mix 1:2.3

BUCK MOTH CATERPILLAR - STEPHEN SACKETT

A network between the New Orleans Mosquito Control Board, the Parkway and Park Commission, the U.S. Forest Service, New Orleans home owner's associations, and commercial pest control contractors has been established to provide a unified attack against the buck moth caterpillar. In the past, this insect has defoliated large numbers of oak trees and inflicted injury on our citizens with its venomous spines. Our research and control efforts began in 1989 and have continued to improve with experience.

The following division of project responsibilities was established for 1990:

NEW ORLEANS MOSQUITO CONTROL BOARD

1. Surveillance of buck moth pupae, adults and eggs
2. Pre- and post-treatment surveillance of caterpillars
3. Determine larval susceptibility to pesticides
4. Field trials to monitor chemical efficacy
5. Public education as it relates to buck moths

PARKWAY AND PARK COMMISSION

1. Prepare contract agreement for caterpillar treatments
2. Establish buck moth "hotline" for telephone complaints
3. Assign contractors areas to be treated
4. Tree trimming to remove buck moth eggs
5. Issue permits for private contracts
6. Tree inventory
7. Develop contacts with neighborhood associations to improve private participation

EGG MASS COLLECTIONS

In January, buck moth egg masses were collected from live oak trees throughout the city in an attempt to monitor populations and determine the larval infestation potential. Because of the tremendous number of branches available for oviposition on the average live oak tree, egg sampling is a tedious task and quantifying egg densities is difficult. In the past, binoculars have been used to spot egg masses within the trees, but a more efficient method of survey was adopted this year. Inspectors worked closely with the tree trimming crews of the Parkway Commission and private contractors, examining limbs for egg masses as they were removed from the trees.

Limbs from 257 trees were examined, revealing 28 new and 19 old egg masses. As of now, we do not know how long (in years) these egg masses may remain attached to the limbs, or the resultant ration of old to new eggs within a stable buck moth population. Egg masses were returned to the laboratory, with some placed outdoors to indicate natural hatch time, and others placed indoors to induce early hatch.

DORMANT OIL TEST

A test was also conducted to evaluate the effectiveness of dormant oil in reducing egg hatch. A local contractor was recommending to his clients that trees be sprayed with the oil in January or February (in addition to normal caterpillar treatments) to reduce larval infestations. Using a 50:1 water and dormant oil mixture, 10 treated and 5 untreated egg masses were placed indoor to monitor hatch success, and similar numbers of masses were placed outdoor so that they would be exposed to the elements. The results were as follows:

Controls (indoor)	-	87% hatch
Controls (outside)	-	94%
Treated (indoor)	-	1% hatch (Treatment date 2-5-90)
Treated (outside)	-	10% hatch

Although egg hatch was significantly reduced in the target groups, it was obvious during the application of the oil that coverage of all the limbs of a large oak tree would be very difficult. The use of dormant oil will therefore not play a significant role in the buck moth suppression program.

CONTROL EFFORTS

The first hatch of buck moth eggs for 1990 was noted on February 22nd, one week later than observed in 1989. Major surveys were initiated in early March to determine the areas with highest larval infestations and to monitor the growth rate of the insects. Three contractors began spray operations on March 22nd using Bactospene, a B.t.k. product, at a rate of 1 qt./100 gallons of water. Post-treatment evaluations indicated a product failure (possibly due to over-heating of the material during warehouse storage), and all trees were then re-treated with Tempo 2, an advanced pyrethroid.

The use of B.t.k. was required by the U.S. Forest Service until the larvae reached the fourth instar, and has proved to be highly effective under most circumstances. Tempo 2 was approved for use after larvae reached the fourth instar (March 28th).

Spraying of city-owned trees was concluded by April 28th, and operations went smoothly. Post-treatment evaluations of treated trees indicated 100% kill of buck moth larvae in most situations. A second treatment with Tempo 2 was required in only a few areas.

PUPAL AND ADULT SURVEYS

Beginning in October, inspections for buck moth pupae were made in various parts of the city, two of which were St. Charles Avenue and Fleur de Lis Park. No pupae were located under the leaf litter in the St. Charles area, which has received comprehensive caterpillar treatments for the past 2 years. The Fleur de Lis Park, which has not been treated for buck moths, yielded over 30 pupae, most of which were found near the bases of oak trees under a shallow cover of leaves or soil.

The first adult buck moths were observed on November 29th in Palmer Park and Fleur de Lis Park, with adult mating activity peaking in mid-December. The majority of adults in flight were males, with most of the females attached to low level vegetation. In order to attract males to their resting sites, females "call" their mates by extending their abdomens and emitting a strong pheromone. This calling may bring in several males, one of which will inseminate the female. Since female moths are gravid (egg bearing) when they emerge from the pupal cases, oviposition may follow soon after mating.

We attempted to quantify buck moth flight activity this year by systematically surveying various sections of the city, but it did not take long to realize that these surveys did not give a true reflection of the moth populations. Factors such as temperature, cloud cover, and the time of survey appeared to play a major role in determining the

number of adults in flight in a given area, making it difficult to assess the potential for subsequent tree infestation by the caterpillars.

ENCEPHALITIS SURVEILLANCE - C.J. LEOANRD

The 1990 Encephalitis season was active and frustrating. Positive bird bloods were detected in June, a spraying program was mounted in the effected areas, and the positives decreased to zero by August, there were no human cases reported.

Although this would seem to be a succesful response to a classic encephalitis outbreak, the lack of confirmation of the positive blood samples rendered the entire episode suspect.

Of 1022 birds sampled during the year, 68 were reported positive for St. Louis Encephalitis by the State Lab. These positives were not confirmed when sent to the Centers for Disease Control. The Mosquito Control Board was obliged to treat these as true positives. We responded immediatly by spraying the affected areas, increasing surveillance, and collecting mosquitoes for virus isolation.

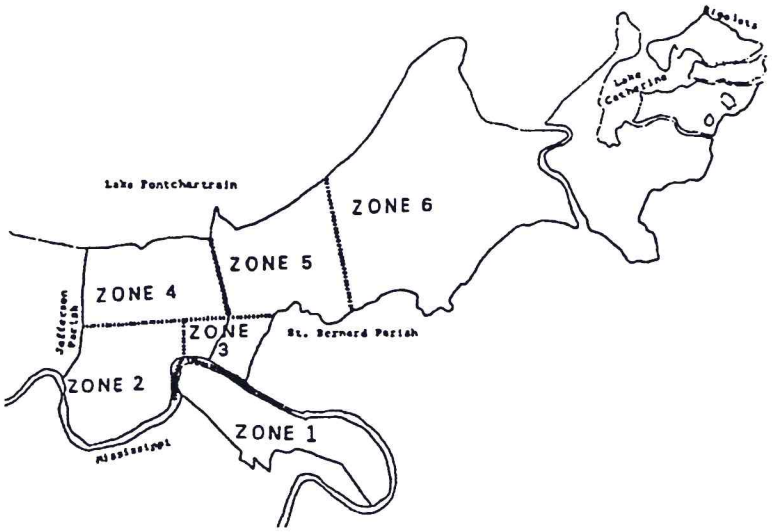
Over 1000 mosquito pools were sent to the Centers For Disease Control in July. Although several other viruses were found, none of the pools were positive for SLE.

In spite of the fact that the positives were not confirmed, the location and time of occurance of the positive samples seems to rule out lab error. We remain convinced that the ELISA test used by the State Lab was detecting a virus. The lack of confirmation by CDC leads us to wonder whether that virus was SLE, or some other virus. Although the experts maintain that the ELISA test is very specific, the detection of an unknown virus by the ELISA method leaves us unconvinced.

Both the State Lab and the Centers for Disease Control assure us that these problems will be ironed out before the next encephalitis season. This seasons discrepancies remain unexplained.

ENCEPHALITIS SURVEILLANCE
1990

	TOTAL	SPARROWS ADULT	SPARROWS IMMATURE	OTHERS ADULT	OTHERS IMMATURE
Zone - 1	2 / 43	1 / 8	0	1 / 32	3
Zone - 2	52	17	15	18	2
Zone - 3	11 /269	1 / 78	5 / 58	5 /127	6
Zone - 4	5 /131	2 / 25	30	3 / 68	8
Zone - 5	34 /292	2 / 36	16 /108	10 /106	6 / 42
Zone - 6	16 /235	1 / 40	5 / 96	8 / 82	2 / 17
TOTAL	1022	204	307	433	78
# POS / % POS	68 / 6.6 %	7 / 3.4 %	26 / 8.4%	27 / 6.2%	8 / 18%



Encephalitis Zones

AVIATION OPERATIONS - JOSEPH RIEDL

The FAA required Annual Inspections on the Britten-Norman Islander and the Grumman Ag-Cat were completed during the months of February and March. Inspection and calibration on the spray systems were conducted in preparation for the 1990 season. Post maintenance test flights were accomplished and records updated. Both aircraft were subjected to inspection by the Federal Aviation Agency and were found to be in compliance.

Two new contract pilots were added to the roster. Re-certification of existing Aerial Applicator's Certificates were carried out. Preparations for the upcoming retirement of the Aviation Coordinator was started. Continued cholinesterase examinations were conducted on the airmen as usual.

Cockpit lights and a landing light was installed on the Ag-Cat to qualify it for operation at night. On the same airplane, the lower hopper assembly was removed and a new closure panel, fabricated in our shop, fitted. Mounting brackets were also attached to accommodate the landing light.

The single-engine Ag-Cat was utilized this year for adulticiding, survey, test, proficiency and training flights. Its maneuverability is particularly useful in some of these operations.

A two seated, single-engine aircraft was rented to transition one of the pilots to the Ag-Cat. This was accomplished and the check-out in our aircraft completed.

Preparations for the hangar project have been completed. Construction is scheduled to start soon.

SOURCE REDUCTION - BROOKS HARTMAN

During 1990, the source reduction program was involved with inner city projects, along with some new ditch construction in the New Orleans East and other areas of the city. Existing ditch maintenance consisted of the removal of dense vegetation and other obstructions from storm drains and drainage pipe within existing source reduction projects in Orleans Parish. All existing areas will be monitored throughout the coming year. The W-2 Wetlands project (east of Paris Road) is still on hold pending the Nature Conservancy Land Use Plan and scheduled acquisition of new amphibious marsh equipment. Ditching of the W-2 project is important to eastern New Orleans because of its location close to homes, schools, shopping centers and residential areas. Source reduction efforts will continue throughout Orleans Parish.

PUBLIC EDUCATION - C.J. LEONARD

Distribution of videotape programs to schools and civic groups continues to be focus of our public education effort. Several programs have been produced for this purpose including, "THE MOSQUITO PROBLEM", "MOSQUITO CONTROL SCIENCE AT WORK", AND "INTEGRATED PEST MANAGEMENT". These programs have been provided to the school board for use on their cable TV channel. Several showings are scheduled each year, and science teachers are notified in advance so that they can include these videos in their lesson plans. These and other programs are also available through the public library, and at our office for free rental or for sale.

Public service announcements have been produced for use on the local broadcast media as well as the cable channels. These short "commercials" usually 30 seconds or less are used by the broadcast media in fulfillment of the FCC's public service requirement at no charge to us. The only costs we bear for PSA's are their production and duplication. Although they are used at the stations discretion, any use at all constitutes a chance to reach the public that we could not otherwise afford.

In order to produce high quality videos of interest to various age groups it has been necessary to make video and still micro photographs of several insect species, and their life cycles. With the work currently being done on Copepods at N.O.M.C.B., techniques had to be developed to photograph these tiny creatures. Copepods are not only small, but transparent when normal lighting is used. A special darkfield illumination setup had to be developed, using strobe lights for the still photographs, and a cool high intensity light for the video. The resulting images showed several species of copepods as well as feeding on mosquito larvae.

The stock video shot by our public education department now consists of over 100 tapes in lengths from 20 minutes to one hour each. A computer database helps to keep track of all these shots, but it is still necessary to view the video on occasion rather then rely on a brief written description. To simplify this process, all stock video has been copied to 6 hour VHS cassettes with time code on the screen. This allows rapid scanning to locate a particular scene, while always knowing the exact location of the scene on the master tape. Eight cassettes were all that were needed to hold all the stock video. Using the VHS tapes will also permit the production of "rough cuts" or drafts of video programs without using expensive editing equipment or using the master tapes until ready for the final edit.

Other services provided by the public education department during the year include producing slides for several papers presented at the annual American Mosquito Control Association meeting, a video

presentation for the Louisiana Mosquito Control Association meeting, and identification cards for Mosquito Control personnel.

Classes were held for several groups including an environmental health class from Dillard, and a group of students from Pakistan.

Other video projects completed during the year include, "the War on Drugs" for the city's public information department, taping and editing the city's substance abuse seminar, and taping and editing an international seminar on mosquito borne diseases held at New Orleans Mosquito Control.

BIOLOGICAL CONTROL (COPEPODS) - GERRY MARTEN

During 1990 we continued to monitor field experiments that we started in 1989 with cyclopoid copepods (i.e., "cyclops") in discarded tires. All the Macrocyclops albidus that were in our Big Oak Island experimental tire piles during 1989 were killed when the water in the tires froze solid during a severe cold spell in December 1989. We reintroduced Macrocyclops to the tires in March 1990. The single treatment provided excellent control of Aedes albopictus and Ae. triseriatus larvae for the rest of 1990.

Many of the Macrocyclops albidus, Acanthocyclops vernalis, and Diacyclops navus that we introduced to the large tire pile near Resthaven Cemetery survived the cold spell and continued to provide control of Aedes larvae in 1990.

In 1990 we added a new species of cyclops to our mosquito control arsenal: Mesocyclops longisetus. We started field trials with M. longisetus in tires in May 1990. Mesocyclops longisetus proved highly effective for control of Aedes larvae. All fifty tires that were treated with M. longisetus at the beginning of the summer still had them at the end of the year, and the number of Aedes larvae in tires treated with M. longisetus was on average about 0.1% of the number of larvae in untreated tires.

Bti became a routine part of our cyclops operations during 1990. Bti has no deleterious effect on cyclops, but it can accelerate the full effect of cyclops treatment by killing larvae that are too large for cyclops to kill at the time the cyclops are introduced to a mosquito breeding site. The Bti kills all larvae, and the cyclops maintain the treatment by killing all new larvae. We tested the effectiveness of this procedure by treating 10 tires only with Bti and Macrocyclops at the same time. Ten untreated tires served as controls. All larvae were killed in the tires treated with Bti, but in tires with only Bti, the larvae were back in full force within a few weeks. All larvae eventually disappeared from the tires treated with Macrocyclops, but it took more than a month in some tires. In the tires treated with both Bti and

Macrocyclops, the larvae disappeared immediately and no more were seen for the rest of the year.

Our work with cyclops and container-breeding Aedes also included technical backup to add cyclops to Rockefeller Foundation/Johns Hopkins University projects for Ae. aegypti control in Puerto Rico and Honduras. The project in Puerto Rico was operated by the CDC San Juan Laboratory, and the project in Honduras by the Honduran Ministry of Public Health.

We started to explore the role of cyclops for mosquito control in groundwater habitats during 1990. We conducted a survey of cyclops in swales (temporary pools) that were created after a period of exceptionally heavy rainfall in February. About half the swales without larvivorous cyclops contained Ae. vexans larvae, and the same was true for swales that contained only Diacyclops navus. However, only 28% of the swales with Acanthocyclops vernalis contained Ae. vexans larvae, and none of the swales with Macrocyclops albidus contained Ae. vexans larvae.

We also studied cyclops in rice fields. At the beginning of May, shortly after the rice fields were flooded for the first crop, Mesocyclops ruttneri, Mesocyclops edax, Mesocyclops longisetus, and Macrocyclops albidus were introduced to a field in Jefferson Davis Parish. There were natural populations of Acanthocyclops vernalis in the treated field and adjacent fields at the time of the introductions. We did not see any of the introduced species in the field until the beginning of July, when all four introduced species were abundant. In the meantime, Acanthocyclops had disappeared from the treated field, even though it was still in adjacent, untreated fields. There were virtually no Anopheles larvae in the field, even though there were larvae in adjacent fields. The field was not flooded for a second crop, but when damp soil in the field was collected in November and flooded with water, live cyclops of all three species of Mesocyclops were abundant in the soil. When the field was examined in February 1991, Macrocyclops albidus was abundant in puddles in the field.

With collaboration from Jefferson Davis Parish Mosquito Control, we sampled a series of rice fields there for cyclops and mosquito larvae in August, a few weeks after flooding for the second crop. Some of the fields contained Acanthocyclops vernalis, and the other fields contained Mesocyclops ruttneri. Fields with Acanthocyclops vernalis contained fewer Anopheles larvae than fields with no larvivorous cyclops at all, and fields with Mesocyclops ruttneri contained even fewer larvae than fields with Acanthocyclops.

In collaboration with St. Tammany Mosquito Control, we sampled Nunez Marsh in St. Tammany Parish for cyclops in July 1990. Natural populations of Macrocyclops albidus were abundant in most of the marsh, though we did not find them everywhere. We sampled Bayou de Lesiere Marsh in Orleans Parish. This marsh is dry much of the time.

Acanthocyclops vernalis was abundant throughout the marsh, except in areas of open water, where there were fish.

We also studied cyclops in septic ditches in collaboration with St. Tammany Mosquito Control. Macrocyclops albidus was abundant in the ditches on a patchy basis in the spring. Small numbers of Acanthocyclops vernalis were occasionally found in the ditches. In the summer, when many parts of the ditches dried up and the water that remained was shallow, Acanthocyclops disappeared, and Macrocyclops retreated to the culverts. Macrocyclops began to appear in the ditches again in the autumn. We conducted experiments in 5-foot-diameter cylindrical enclosures in the ditches by placing the enclosures where there were natural populations of Macrocyclops or by introducing Macrocyclops to the enclosures if there were none in the first place. We then placed 1,000 or 3,000 newly hatched Culex quinquefasciatus larvae in the enclosures and counted them after five days. Whereas survival of the Culex larvae was 60% in controls (without cyclops), there were no survivals when 1,000 larvae were introduced. When 3,000 larvae were introduced, there were usually no survivors, but sometimes as many as one hundred larvae survived.

In summary, the results from various kinds of groundwater habitats have been very promising. It appears that natural populations of larvivorous cyclops are reducing mosquito larvae in every kind of groundwater that we examined. We will continue to monitor cyclops and mosquito larvae in these habitats during 1991, to clarify the relationship between cyclops and mosquito larvae, and we will initiate field trials by introducing larvivorous cyclops to some of the groundwater habitats.

We moved into our new biocontrol facility in September. The laboratory has an abundance of space for cyclops production. For cyclops production in the facility, we set up fifty fiberglass trays of the same design that the New Orleans Mosquito Control Board has used for Toxorhynchites production. By the end of the year, the production process was going smoothly, and we had the capacity to produce more than a million cyclops per month.

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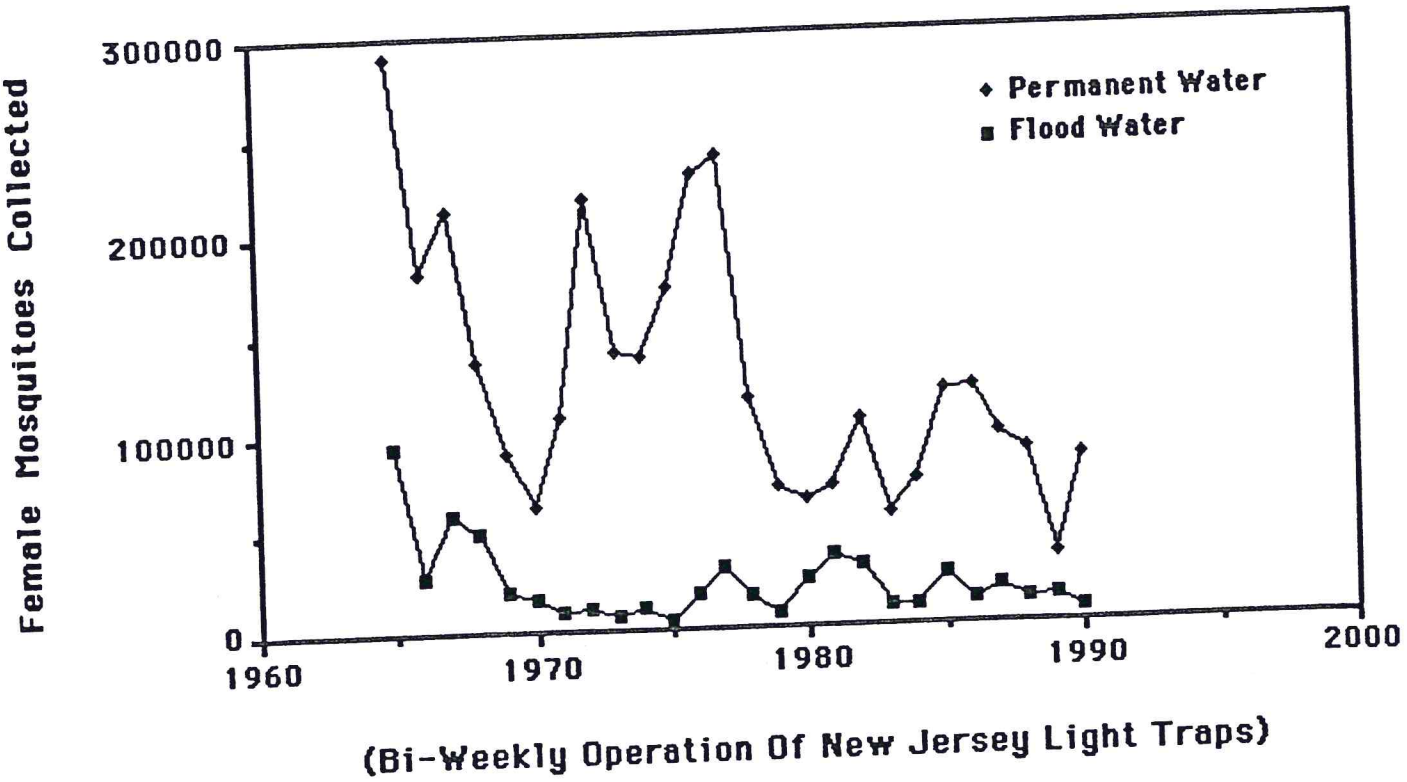
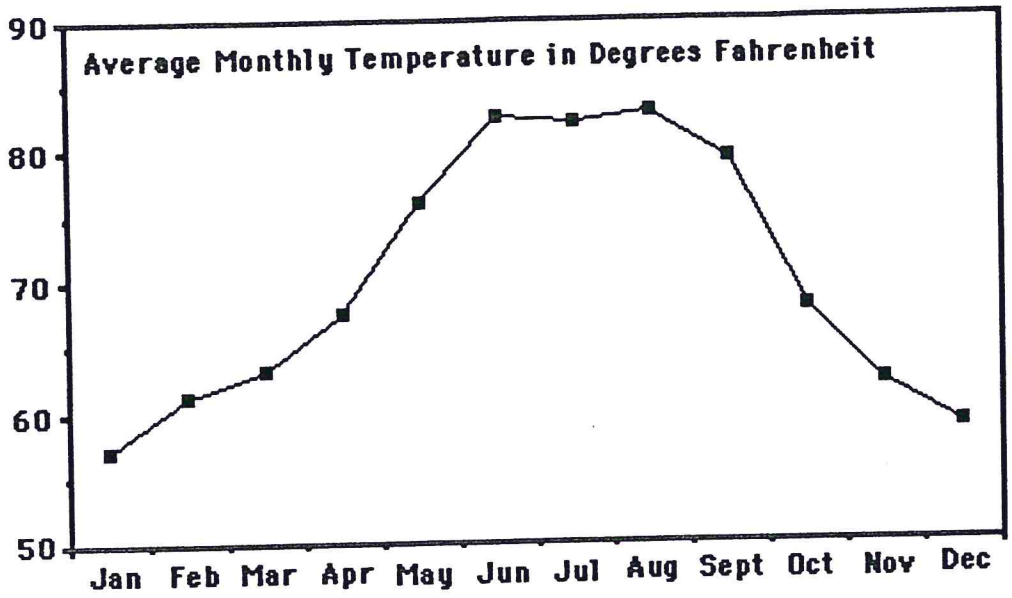
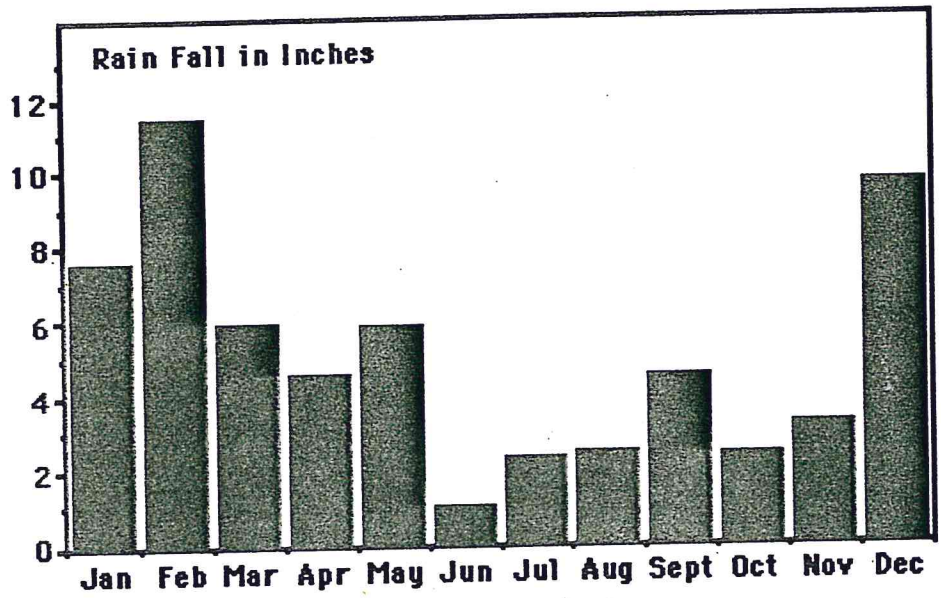
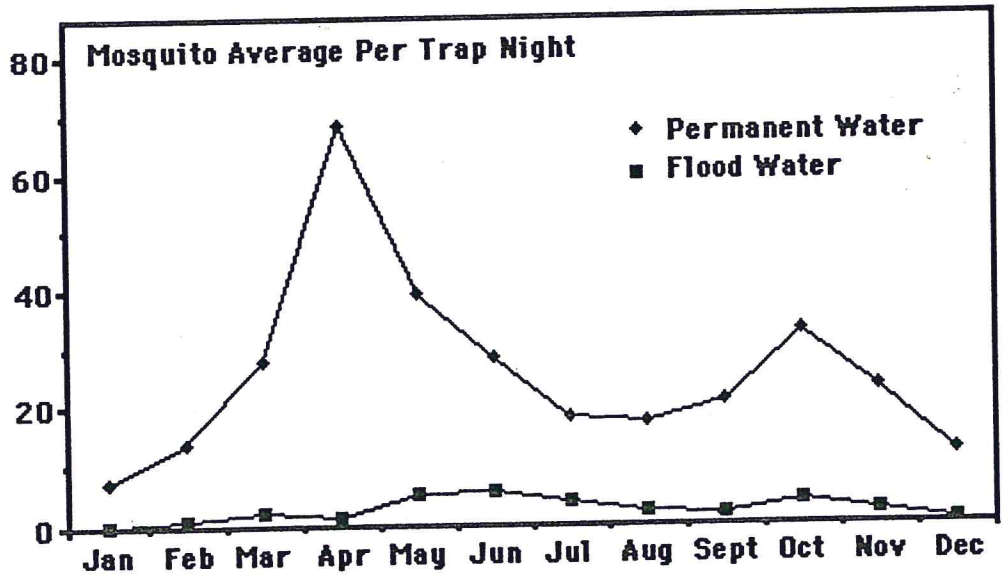
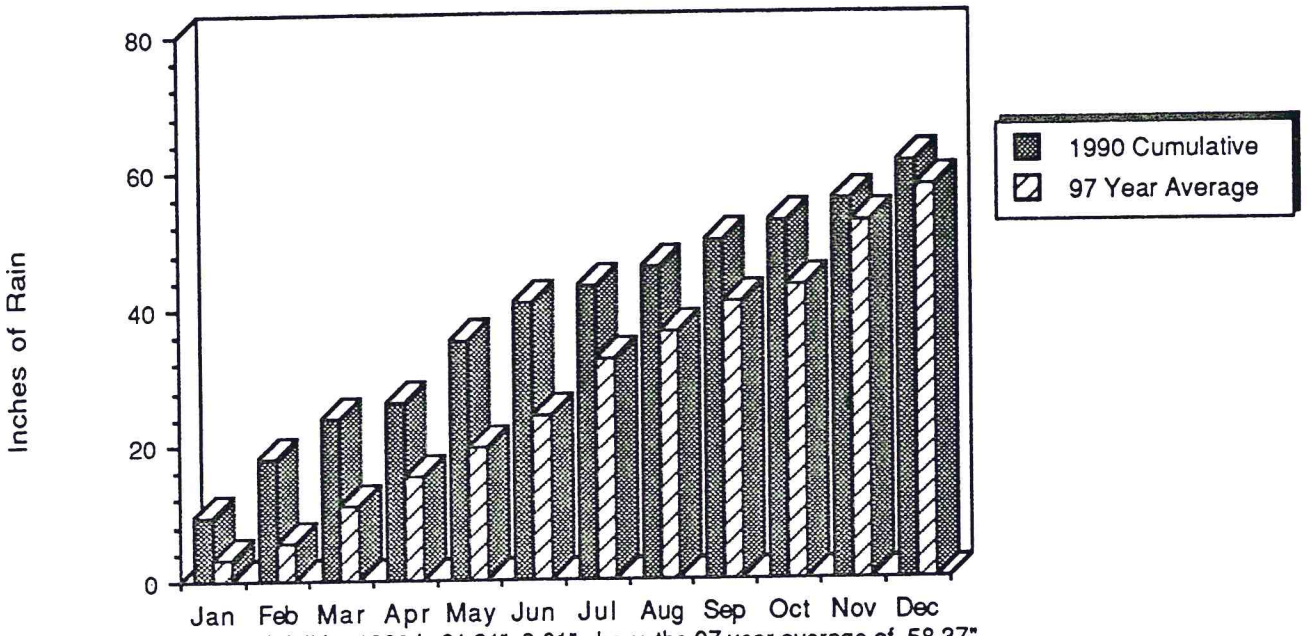

Female Mosquitoes Collected
300000
200000
100000
0
1960
1970
1980
1990
2000
Permanent Water
Flood Water
(Bi-Weekly Operation Of New Jersey Light Traps)


Average Monthly Temperature in Degrees Fahrenheit
90
80
70
60
50
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec


Rain Fall in Inches
12
10
8
6
4
2
0
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

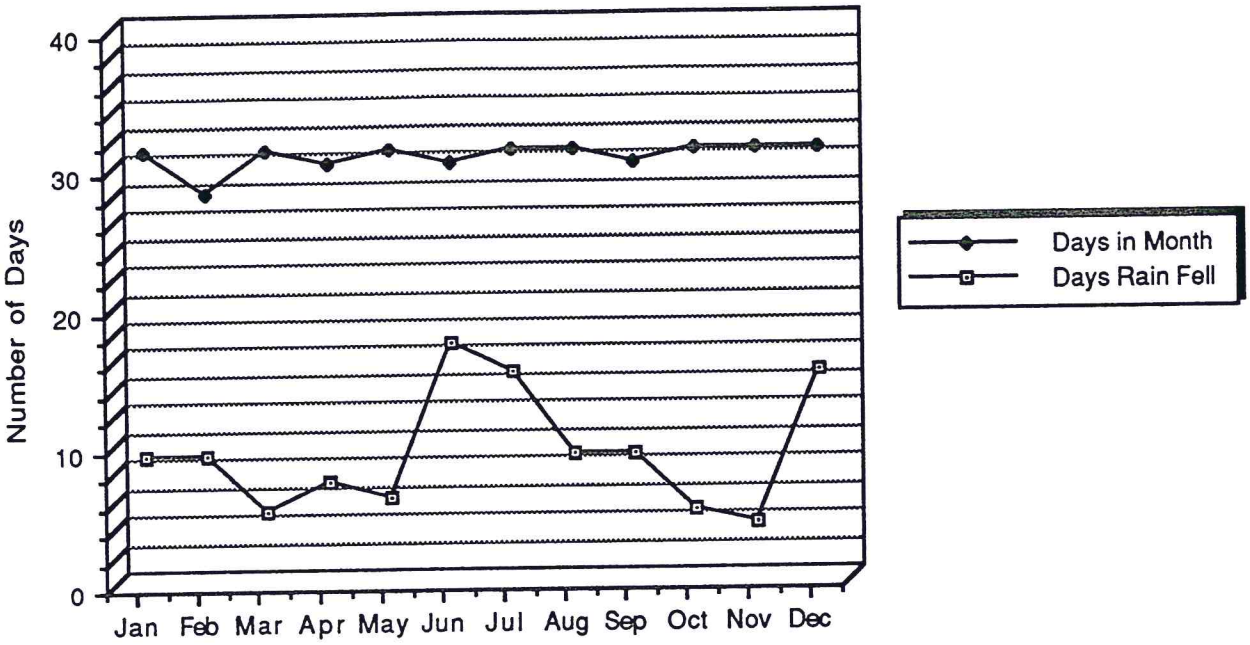

Mosquito Average Per Trap Night
Permanent Water
Flood Water
80
60
40
20
0
Jan Feb Mar Apr May Jun Jul Aug Sept Oct Nov Dec

1990 Rainfall Report



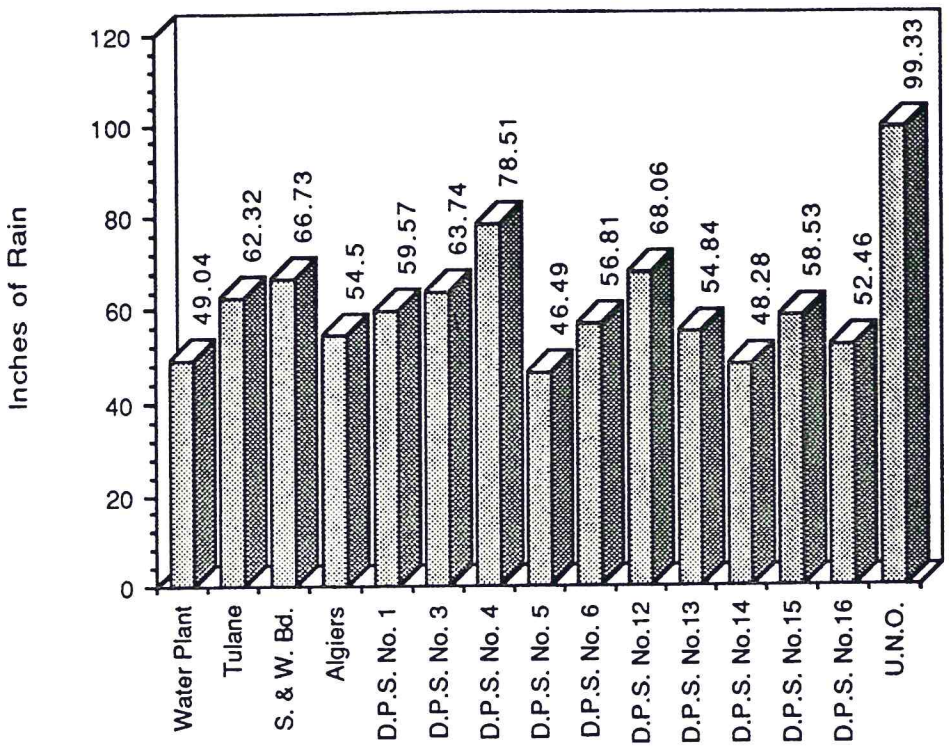
Average rainfall for 1990 is 61.31", 3.61" above the 97 year average of 58.37". Rainfall for the Southeast Region is considered below normal for 1990. On a statewide basis, we were considered "warmer and wetter" than normal during 1990.

Number of Days Rain Fell During 1990



Rain fell on 101 days during 1990 with the highest intensity rainfall for a 24 hour period recorded at the UNO station on May 13th with 9.15".

1990 Rainfall by Station



STATIONS	LOCATION
N.O. Water Plant	8801 Spruce St.
Tulane University	8623 St. Charles Ave.
Sewerage & Water Board	625 St. Joseph St.
Algiers Water Plant	1120 Elmira St.
D.P.S. No. 1	2501 So. Broad St.
D.P.S. No. 3	2251 No. Broad Ave.
D.P.S. No. 4	5700 Warrington Dr.
D.P.S. No. 5	4841 Florida Ave.
D.P.S. No. 6	345 Orpheum St.
D.P.S. No. 12	7223 Ponchartrain Blvd.
D.P.S. No. 13	4201 Tall Spruce Dr.
D.P.S. No. 14(Jahncke)	12200 Hayne Blvd.
D.P.S. No. 15	Gulf Intracoastal Waterway
D.P.S. No. 15(St.Charles)	7200 Wales St.
U.N.O.	University of New Orleans-Lake Front