ANNUAL REPORT

NOMCB

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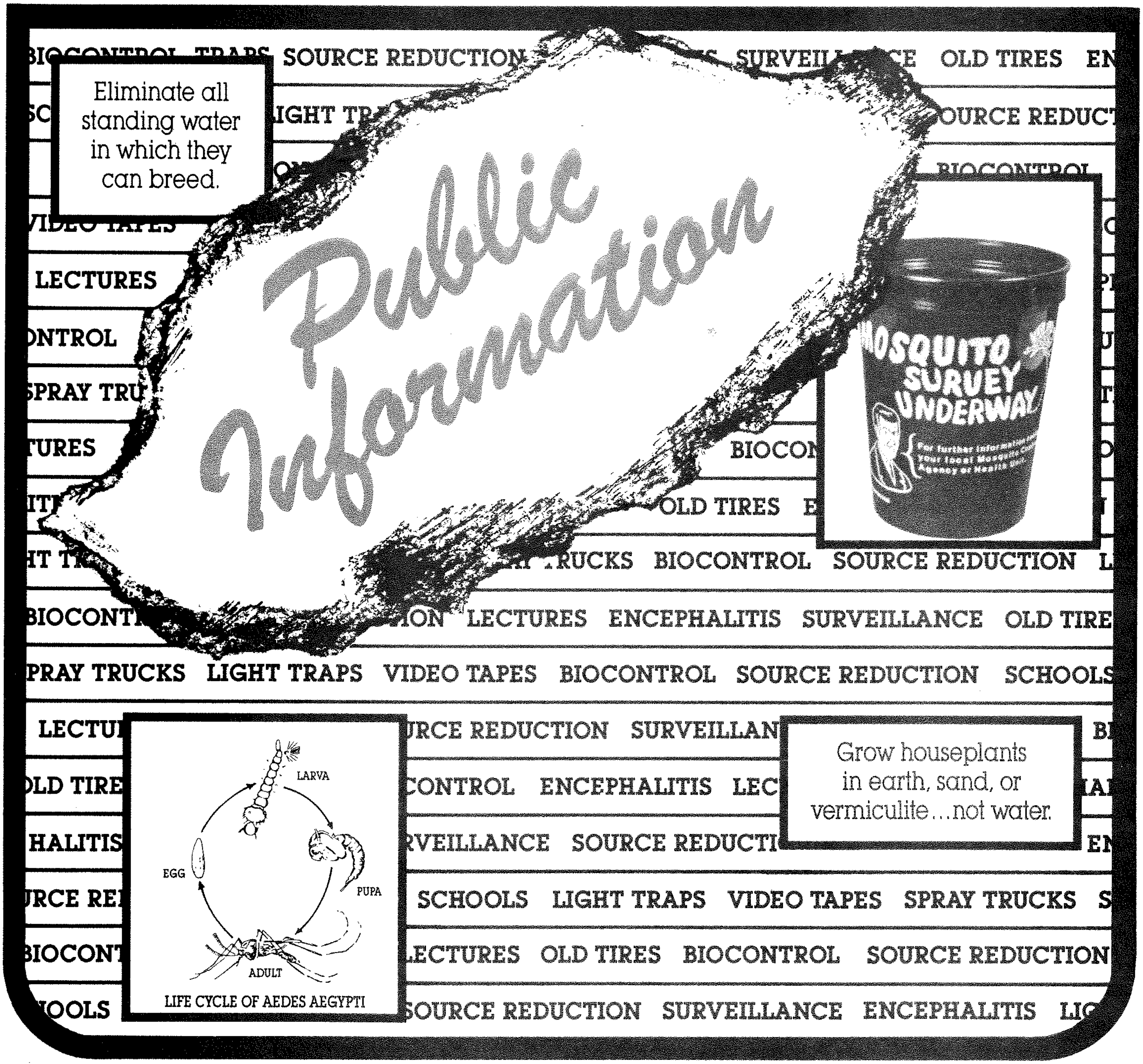
NEW ORLEANS MOSQUITO CONTROL BOARD

1985



CITY OF NEW ORLEANS

ERNEST N. MORIAL
MAYOR

NEW ORLEANS MOSQUITO CONTROL BOARD

1985 ANNUAL REPORT

Jay St. Amant, Chairman   Mary Beal, Vice-Chairman

Wayne Babovich - Ulysses Williams

Gino Carlucci

Dr. Brobson Lutz

Oscar Medrano

Aaron Mintz

George Parker, Jr.

Florence Schornstein

Dr. Harold Scott

Dr. Harold Trapido

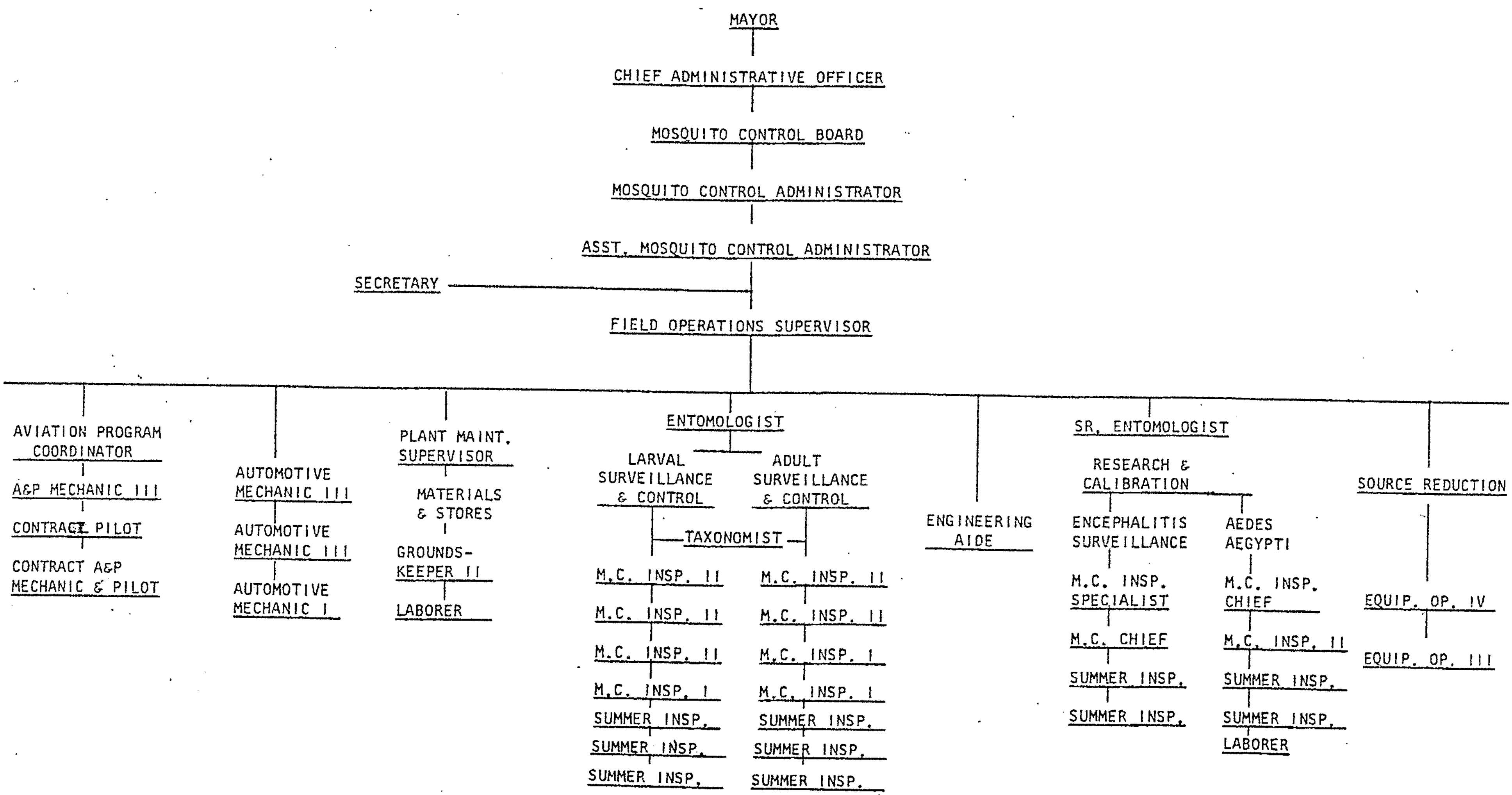
George T. Carmichael, Director

Edgar S. Bordes, Assistant Director

New Orleans Mosquito Control / George T. Carmichael, Administrative Director
6601 Lakeshore Drive / New Orleans, La. 70126 (on Lakefront Airport)

NEW ORLEANS MOSQUITO CONTROL BOARD

ORGANIZATIONAL CHART



1985

TABLE OF PERSONNEL

1	Director
1	Assistant Director
1	Field Operations Supervisor
1	Aviation Program Coordinator
1	Sr. Entomologist
1	Entomologist
1	Engineering Aide
1	Plant Maintenance Supervisor
1	Source Reduction Supervisor
1	Mosquito Control Specialist
2	Mosquito Control Inspector Chief
6	Mosquito Control Inspectors II
3	Mosquito Control Inspectors I
1	Secretary
1	Taxonomist
1	A & P Mechanic III
2	Auto Mechanic III
1	Auto Mechanic I
1	Equipment Operator IV
1	Equipment Operator III
1	Groundskeeper II
2	Laborers
10	Seasonal Part-time Workers

MOSQUITO CONTROL EQUIPMENT LIST

1	1982 4-dr. Ford Sedan
1	1976 4-dr. Ford Sedan
1	1979 4-dr. Chevrolet
1	Aircraft, Britten Norman BN2A-21
1	Aircraft, Grumman
1	Aircraft, Beechcraft E-50
2	Backhoes, John Deere 310
1	Crawler, Case 350
1	Dragline, Little Giant Amphibious
1	Dump Truck, 1981 Ford - Diesel
1	1965 Ford F-250
5	1976 Chevy Luv Pickups
1	1967 Ford Pickup 4 Wheel Drive
3	1975 GMC Pickups
6	1978 Ford F-100 Fog Trucks
13	1981 Chevy 1/2 Ton Pickups
1	1981 Ford F-100 Fog Truck
2	1973 Ford Econoline Vans
1	Forklift, Caterpillar
1	Forklift, Allis-Chalmers
1	Wheel Buggy
1	Track Marsh Buggy with Ditcher
1	Tractor Mule
2	Utility Trailers
2	Boat Trailers
2	Outboard Motors - 5 & 25 HP
4	Aluminum Flat Boats
2	Electrical Power Plants
1	Lawn Care Mower
1	Ford Tractor with Grass Cutter

ANNUAL REPORT - 1985

The public information theme, which has been on our covers for our monthly reports, is also featured on our annual report cover. Public Information is a vital part of any mosquito control program, particularly in our area where the *Aedes aegypti* mosquito is fast becoming our major species. This domestic mosquito can only be suppressed through an adequate control program and cooperation of each home owner.

The Public Information Program was expanded during 1985 with a new video tape entitled "Mosquito Control: Science At Work". This presentation was shown at all the high schools in the area and the video tape entitled "The Mosquito Problem" was distributed to all elementary and middle schools.

The average rainfall, as recorded in the sixteen (16) Sewerage and Water Board automatic rain guages was 63.92 inches, which is 5.63 inches above normal. The range between the gauges was a low of 48.44 inches at Press Drive to a high of 100.99 inches at gauge No. 15 in eastern New Orleans. The rain patterns were well spaced to produce several broods of mosquitoes, particularly during the months of September, October and November. Hurricanes, which passed close to our area, produced rainfalls and flooding which resulted in heavy mosquito production throughout South Louisiana. Assistance was provided to some areas where mosquito densities were extremely high. Our Islander aircraft sprayed Lafourche Parish on two occasions and St. Charles Parish four times. The operations in St. Charles Parish were monitored by local mosquito control personnel and excellent kills were reported.

The Encephalitis Surveillance Program captured, bled and released 1590 birds, mostly common house sparrows. The collections were all negative and the program was terminated one month early since it was evident that SLE was not in our area.

The Insecticide Susceptibility Program was particularly active during the year and valuable information was obtained (see insecticide susceptibility section of this report). This information will be used as a guide to our selection and use of insecticides for the coming year.

In August of 1985, the program conducted a "simulated arboviral epidemic" for the purpose of evaluating our response to such an epidemic and to evaluate the effectiveness of our response. A comprehensive evaluation of the aerial treatment proved to us that we can respond to an arboviral epidemic in the City of New Orleans and effectively break the chain of transmission. Details of the exercise is outlined in this report (see emergency vector-borne disease control).

The newly acquired Britten-Norman "Islander" aircraft was put in operation after the Micronair spray system was installed and the FAA certification was obtained. This aircraft, along with the single-engine Ag-Cat, gives us the desired aerial adulticiding capability we will need for the foreseeable future.

The Toxorhynchites Program in 1985 included many evaluations of methods for mass rearing for our future needs. A new temporary building was completed at the USDA facilities where our trailer has been housed for the last few years. The program's primary function now is to develop a more efficient and cost effective system for mass production. The city has provided a two acre site for a permanent mass rearing facility at a new city training academy. Funds for the building have been recommended in the 1986 capital budget. The building will be our "Bio-control" facility and will also house our work with the silverside fish (Menidia beryllina) which is a cooperative project with EPA being conducted in eastern New Orleans.

The 1985 capital budget included a hangar building which will be utilized to hangar our two aircraft. This building is now in the design stage with construction scheduled to be completed in 1986.

ENTOMOLOGICAL REPORT

Environmental and climatalogical conditions that determine mosquito breeding activities in Orleans Parish were totally unpredictable during 1985. Severe drought conditions during the months of April and May reduced the June light trap collection total to the lowest ever recorded for that month in the 21 year history of mosquito control in Orleans Parish. Hurricane activity during the month of October changed the dryest month of the year to the wettest month of the year. Flooding conditions produced by the late hurricane season precipitated the worst saltmarsh mosquito problem on the Gulf Coast in the last decade. Some areas of the Gulf Coast experienced the most severe saltmarsh mosquito problem of the last 20 years. Unusual conditions were the rule rather than the exception during the past year.

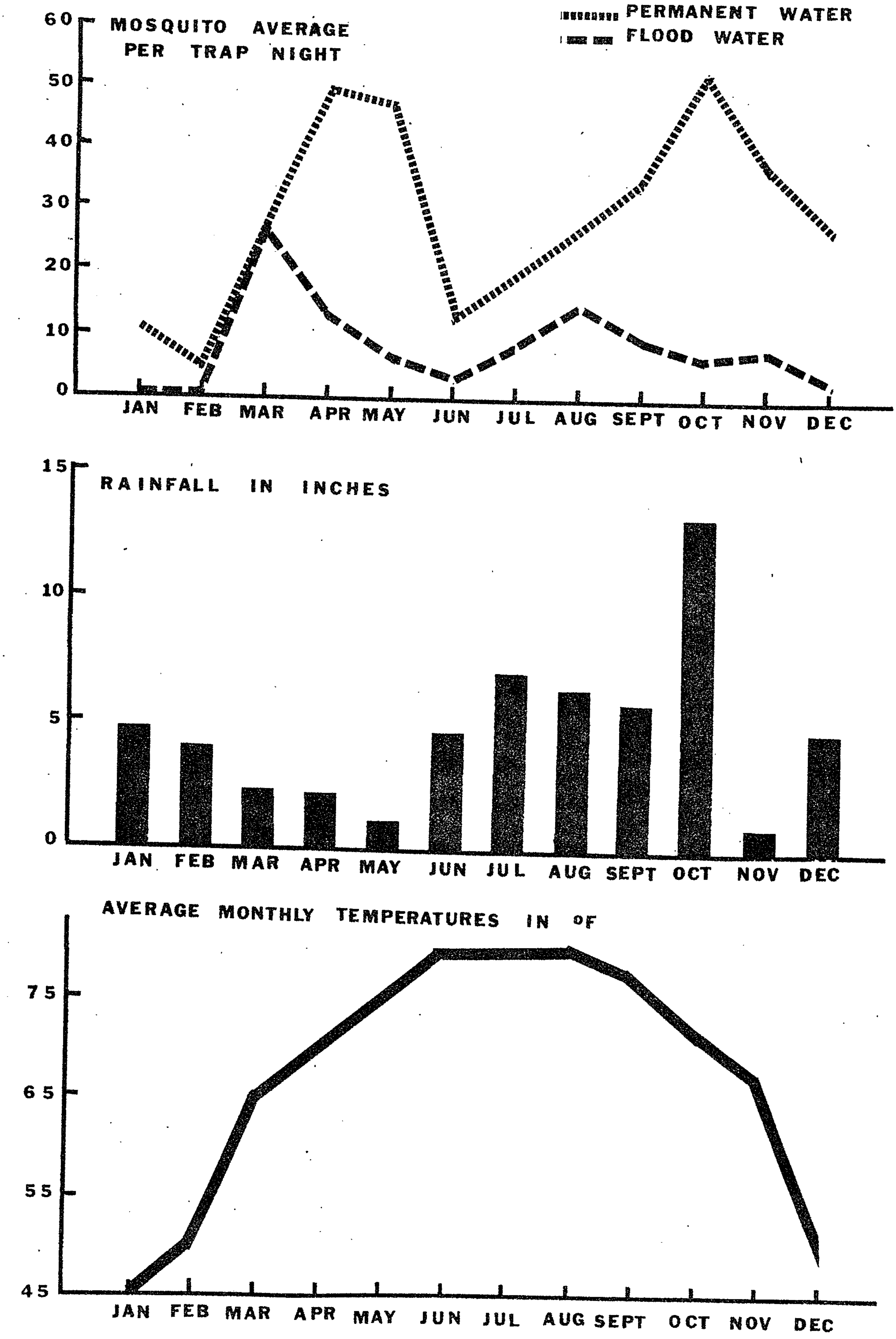
The first quarter of the year was relatively wet and received 18 inches of rainfall during that period. Culex salinarius was the primary pest species during January and February, but when warm wet conditions replaced winter's cold, March's light trap collections increased tenfold over February's collection and Aedes vexans became the predominant species collected in March. CO_2 enhanced landing rates were very productive during March and 32% of the collection were Aedes sollicitans. Aedes sollicitans would again show up as the dominant species in CO_2 collections in August and October.

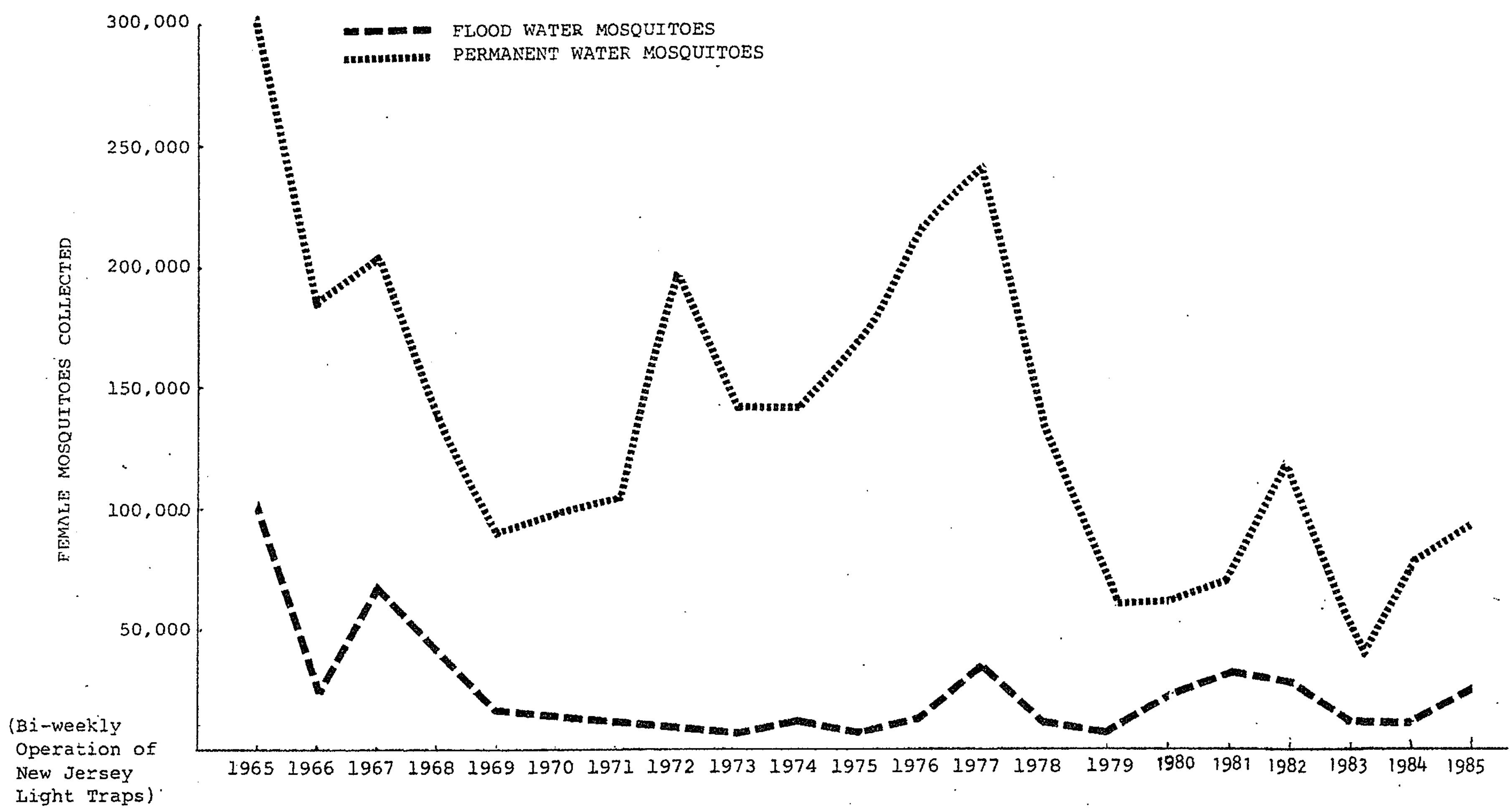
April, May and June experienced a significant reduction in rainfall and the severe drought conditions during April and May reduced the mosquito population to a record low for the month of June. Culex salinarius was the primary pest species during the second quarter of the year. Because there was so little rainfall during this second quarter of the year, there were very few floodwater mosquitoes produced during this period. Anopheles mosquitoes were the primary species collected by the CO_2 enhanced landing rates. Culex quinquefasciatus (the southern house mosquito) became a very important species during this drought period and the possible transmission of encephalitis and dog heartworm was a distinct possibility. "Quinks" become more active during drought conditions because its breeding habitat is in stagnant or polluted water. Without the benefit of rainfall flushing areas that hold water, the organic content of these stagnant waters increase and thus the "quink" habitat is extended.

July, August and September signaled the return of precipitation to Orleans Parish and the mosquito population responded with September recording the highest light trap collection of the year. Total numbers of mosquitoes is not always the most important aspect of a light trap collection as the species caught can far overshadow the total numbers. Almost half of the September collection were *Uranotaenia* species (amphibian feeder) which do not take blood from humans. Summer conditions prevailed during the third quarter of the year and scattered showers were the routine. During the summer months when the average rainfall is 5 to 6 inches, the high and lows will range from 3 or 4 inches of rain to 13 to 14 inches of rainfall. There are definite areas of the city that receive more rainfall than others and we must be responsive to these wide variations in rainfall patterns.

October was a difficult month for the entire Gulf Coast, as late hurricanes dumped abnormal amounts of rainfall from Florida to Texas. Fifteen (15) inches of precipitation was the average rainfall throughout Orleans Parish for the month of October. This is a real contrast when compared to less than 0.05 inches of rainfall received in April of this year. Saltmarsh mosquito problems were further perpetuated by the occurrence of a very abundant late brood of this highly pestiferous species throughout the entire Gulf Coast. A late *sollicitans* brood means that the spring hatch will be more abundant than normal. Mild winter conditions combined with more verile eggs could produce severe problems for the coming year.

MOSQUITO / ENVIRONMENTAL CORRELATION




FLOOD WATER MOSQUITOES
PERMANENT WATER MOSQUITOES
FEMALE MOSQUITOES COLLECTED
300,000
250,000
200,000
150,000
100,000
50,000
(Bi-weekly
Operation of
New Jersey
Light Traps)
1965 1966 1967 1968 1969 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985

During a year that was marked by the unusual, it ended with an abundance of water and adult mosquitoes. Weather conditions did not become cold enough to restrict mosquito breeding and adult male mosquitoes were collected in our truck traps through the month of November. The past year could be characterized as a year of the anomaly and the year that the saltmarsh mosquito returned to the Gulf Coast in numbers characteristic of the 1960's. It will be our unenviable task in 1986 to protect our expanding human population from the invading saltmarsh mosquito population. We will need to refine our survey methods and hone the timing of our treatments to give mosquito control the edge over our invading adversary.

LARVAL SURVEILLANCE AND CONTROL

In 1985, 2858 immature mosquitoes were collected and identified. This is a 48% increase over 1984. The predominating species were _Culex quinquefasciatus_ (37%) and _Aedes vexans_ (28%). The three most active months were March, June and October, with no samples collected in April.

Storm and hurricane activity in September and October produced small broods of _Aedes sollicitans_ (7% of yearly larval collection).

The primary larvicide was Vectobac-AS and the pupacide was an oil/surfactant mixture. Other larvicides used to a much lesser extent were Altosid SR-10 (Methoprene) and Altosid briquets.

Frugal use of larvicides and adulticides continues to keep our mosquito populations resistant free (see "Insecticide Susceptibility" report).

After c. 6 years in operation, our truck-mounted CO_2 pressurized larviciding rigs have proved efficient and almost maintenance free.

	Total	No. Wet	No. Dry	No. Positive	% Wet Positive
Potential Breeding Sites Inspected	2307 (1772)[1]	1216 (877)	1091 (885)	201 (109)	17 (12)

[1] 1984 Data

	Total		Cost	
Total Man Hours Inspecting & Treating	2199	(1343)[1]	$ 13,194	($ 8,373)
Total Man Hours Supervising, Office, Misc.	226	(186)	2,938	(2,046)
Miles Traveled	10978	(5979)	1,647	(899)
Gal. Altosid SR-10 Mix (4 oz./10 gal. water)	0	(6)	0	(3)
Gal. Diesel/Triton	15	(25)	19	(43)
No. Altosid Briquets	30	(182)	9	(54)
Gal. BTi in water @ 0.1 pt./tech/ac	19	(2.5)	15	(0)
Total Cost:			$ 17,822	($11,527)

[1] 1984 Data

ADULT MOSQUITO SURVEILLANCE

New Jersey light traps during 1985 ran on 3196 of a maximum potential 3326 trap nights for an average of 96% (same percentage in 1983 and 1984). Light trap No. 26, previously located at Halter Marine, was relocated near Lake Barrington (Beaconfield Street). This suburban area in New Orleans East is rapidly becoming populated and needed more surveillance. The Halter site is in a low population density area and is adequately covered by light traps on nearby Highway 11 and in Venetian Isles.

The Outside CO_2 enhanced landing rates were taken on 79 (80 in 1984) occasions and the Algiers CO_2 on 21 occasions (11 in 1984). The Outside CO_2 landing rate averaged 8.9 females/station-day, up from 6.0 in 1984 and the Algiers CO_2 averaged 4.8 females/station-day, again up slightly from 3.4 in 1984.

The truck mounted funnel trap was run 29 times (15 times last year).

	Man Hours		Cost		Miles		Cost	
Light Traps	1807	(2134)[1]	$10842	(12804)	19555	(19605)	$2933	($2942)
CO_2 Landing Rates	547	(468)	3222	(2876)	7445	(6750)	1117	(1012)
Truck Traps	91	(48)	546	(315)	728	(453)	109	(67)
Miscellaneous	4258	(3481)	25548	(20868)	5237	(1439)	786	(215)
Supervisory & Office	291	(518)	3458	(5268)	1925	(1967)	289	(298)
Totals:	6994	(6649)	$41964	($42131)	34891	(30214)	$5234	($4534)

[1] 1984 Data

1985 TRUCK TRAP TOTALS

	ALMONASTER
Aes	574/4162
Aev	194/1532
Anc	91/454
Anq	0/4
Cxq	0/238
Cxs	4331/6077
Cqp	0/6
Other	348/1757
Run I	4723/11869
Run II	815/2361
Total	5538/14230

1985 CO_2 COUNTS

	OUTSIDE	ALGIERS
Aes	3482	210
Aev	747	178
Aet	147	3
Aetri	18	5
Anc	1719	22
Anq	3	2
Cxs	1/1582	194
Csi	3	1
Psf	72	26
Cqp	2	-
Other	6/ 150	30/ 60
Total	7/7925	30/701

1985 LARVAE TOTALS

Aes	197
Aev	791
Aeae	76
Cxq	1057
Cxs	154
Cxr	328
Csi	9
Other	158
Pupae	88
Total	2858

	Male	Female	Soll.	Vex.	Cruc.	Quad.	Quinks	Sals.	Uran.	Csi	Aet	Ae.ae.	Cxr	Cxn	Psc	Other	Trap Days
1. Low. Algiers	522	11370	0/70	56/772	18/235	5/20	1/20	428/9935	0/38	2/62	0/8	0/24	3/51	1/34	4/90	4/11	96
2. Tall Timbers	588	3129	2/48	123/1673	3/47	0/8	1/1	426/1137	9/49	9/21	0/4	0/4	8/42	4/13	3/75	0/7	103
3. Mid-Algiers	106	583	0/2	29/279	0/29	1/7	1/3	59/169	1/50	2/6		0/1	10/27	1/0	0/9	2/1	102
4. Alg. Point	165	310		32/90	1/6		10/25	87/124	5/9	0/7		15/10	14/38	0/1	1/0		102
5. Bodenger Pk.	95	460		34/271	2/8	0/2	4/8	40/129	0/2	1/6	0/2	3/5	10/25	0/1	0/1	1/0	104
6. Benton	146	410	5/24	47/105	2/6		6/6	70/209	1/16	1/9	0/2	6/5	8/26	0/2			104
7. St. Roch Cem.	77	216	0/2	28/121	1/5		6/3	27/45	0/2	0/7		1/5	13/23	1/1	0/2		103
8. Irish Channel	190	404		73/204	1/14	0/1	22/27	65/89	3/11	0/1		10/3	15/52	1/1	0/1		104
9. S. Claiborne	267	521		59/308	1/14		36/28	110/89	3/10	0/1	1/0	25/7	32/60	0/1	0/3		101
10. Audubon Zoo	296	766		31/330	5/60	0/16	44/23	110/180	1/8	1/10		62/21	39/113		0/2	3/3	104
11. Audubon	498	2117		91/978	21/138	3/18	79/169	199/493	14/43	1/45		3/7	62/178	15/21	0/4	10/23	104
12. DeSaix	525	3589	0/50	65/1490	2/132	0/5	13/90	375/1412	2/24	5/14		6/5	54/279	2/8	1/76	0/4	94
13. City Park	335	3873	1/50	75/1787	20/289	3/29	6/62	206/1215	3/40	4/118	0/1		13/173	0/8	0/99	4/2	103
14. Lakewood	41	116		16/66	0/2		0/2	19/24	0/2	1/4	0/1	4/2	1/13				102
15. Longvue Gd.	659	4294	0/9	192/1842	6/205	1/12	22/210	358/1337	23/126	4/41		0/2	43/491	8/5	0/2	2/12	104
16. Lake Terrace	639	2800	2/35	99/1031	14/133	0/3	15/75	453/1265	19/83	0/29	0/1	2/4	29/133	1/2	0/2	5/4	104
17. Louisville	278	942		97/554	4/52	2/2	1/11	129/209	12/47	3/27		6/4	20/33	2/3		2/0	104
18. Pont. Park	215	1104	1/19	44/243	5/58		0/5	155/696	2/15	1/27	0/5		3/25	2/6	0/5	2/0	97
19. Gentwood	86	331	0/4	26/180	6/20		0/3	35/79	1/3	1/16	0/1	9/2	7/19		0/3	1/1	104
20. Gentilly E.	865	2096	1/81	99/923	4/53		0/12	730/862	1/21	5/72	0/7	2/4	14/39	2/3	0/16	7/3	104
21. Lil. A'Corn	583	3364	9/149	87/1243	10/116	0/1	0/6	463/1635	3/48	3/59	0/7	1/0	6/60	0/4	1/29	0/7	103
22. Vincent	1097	6469	0/45	253/1555	3/153	0/15		814/4321	13/204	10/73	0/1	0/8	3/40	1/7	0/24	0/23	103
23. Vil. DeL'Es.	196	1273	0/34	26/367	1/42	0/3		153/667	2/71	1/45	0/6	0/1	4/12	9/20	0/2	0/3	102
24. Resthaven Mem.	160	3156	16/350	16/491	14/135	1/4		102/1969	0/41	2/29	1/68	0/1	3/35	1/3	0/12	4/18	89
25. Joe Madere's	2707	29430	0/3	229/357	151/608	3/30	0/2	1205/5011	492/22842	2/22			0/25	625/526	0/4		76
26. Lk. Barrington	547	5235	0/23	30/144	0/696	0/32	0/1	510/4146	0/53	0/87		1/0	2/14	2/22	0/16	2/1	96
27. Iris Bayou	340	1976	1/1	11/44	51/297	1/0		270/1603	2/4	2/11			1/10	1/5		0/1	87
28. Venet. Isles	2334	17142	19/562	48/192	290/3348	0/8		1952/12654	4/148	3/35	14/161		0/5	0/27	4/2		102
29. Green Ditch	716	17052	51/1828	12/174	184/6721	32/32		433/8007	0/52	0/109	4/72		0/13		0/20	0/24	99
30. Rigolets	360	10595	12/1292	14/619	102/3464			216/4650	8/321	4/114	4/54		0/14	0/29	0/37	0/1	97
31. Lake Forest	446	1347	0/5	66/492	1/15	1/2		369/761	0/20	2/31			4/14	1/4	0/3	2/0	103
32. Oak Island	1174	8955	0/72	174/1542	123/2265	0/10		811/3848	48/912	1/60			0/63	15/148	0/10	2/25	96
Total	17253	145425	120/4758	2282/20067	1046/19766	53/260	267/792	11379/68970	672/25315	71/1198	24/401	156/125	421/2145	695/965	14/549	53/174	3196
%			3.3	13.8	13.6	0.2	0.5	47.4	17.4	0.8	0.3	0.1	1.5	0.6	0.4	0.1	

1985 GROUND ULV

	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	TOTAL
TOT. MAN HRS./$	0 $ 0	0 $ 0	121 $1089	124 $1116	54 $ 486	30 $ 270	48 $ 432	53 $ 477	101 $ 909	120 $1080	128 $1152	18 $ 162	797 $ 7173
HRS. SPRAYING	0	0	71	67	31	18	26	32	62	75	71	10	462
GAL. MIX./$ *	0 $ 0	0 $ 0	328 $2158	286 $1882	162 $1066	93 $ 612	131 $ 862	155 $1020	314 $2066	355 $2336	315 $2073	43 $ 283	2182 $14358
TOT. MILES TRAV./$	0 $ 0	0 $ 0	1548 $ 232	1508 $ 226	678 $ 101	442 $ 63	609 $ 128	770 $ 116	1188 $ 178	1465 $ 220	1504 $ 226	214 $ 32	9926 $ 1522
TOT. COST SPRAYING	$ 0	$ 0	$3479	$3784	$1653	$ 945	$1422	$2213	$3153	$3636	$3451	$ 447	$24183
TOT. ACRES SPRAYED	0	0	25697	24361	11272	6399	9454	11635	22543	27270	25816	3527	167974
SPRAY COST PER ACRE	$ 0	$ 0	$0.14	$0.16	$0.15	$0.15	$0.15	$0.18	$0.14	$0.13	$0.13	$0.14	$ 0.15

* By volume: 33% Cythion, 67% HAN @ 10 mph and 12 oz./min.

Mosquito Identification:	191,577	(117,854)[1]	adults and
	3,212	(1,926)	immatures requiring
	824	(873)	man hours at a cost of
	$ 4,574	($ 4,846)	

[1] 1984 Data

ADULTICIDING

Ground and aerial adulticiding increased for the third consecutive year, with 167,973 acres treated by the ground ultralow volume (ULV) spray trucks, and a total of 102,905 acres was treated by the aircraft. Of the aircraft acreage, 55,440 acres were sprayed with the twin Islander (13,860 at 2 oz./ac. technical 91% Malathion, 41,580 ac. with 3 oz./ac. technical 91% Malathion, 5,280 ac. with Scourge/mineral oil at 0.0035 lb./ac AI at 1 oz./ac. of the 1:2.33 mix) and 42,185 acres were sprayed with the single-engine Ag-Cat (naled technical 85% at 0.75 oz./ac.). In 1984, 131,896 acres were ground treated and 37,265 acres were treated aerially. We did not have a usable twin aircraft in 1984. Aerial spraying of neighboring parishes after hurricane Juan is not reflected in this report.

The truck-mounted ULV units (LECO-HD's) sprayed a volume-to-volume mixture of 33% Cythion (91% Malathion) and 67% heavy aromatic naptha (HAN), at 10 mph and 12 fl. oz./min. (6.06 ac./min.). Approximately 3,000 ground-treated acres were sprayed with various Scourge/mineral oil formulas in determining formulations for use in 1986. The amount of ground spraying in descending order was October (16%), November (15.4%), March (15.3%), April (14.5%), September (13.4%), August (6.9%), May (6.7%), July (5.6%), June (3.8%) and December (2.1%).

The majority of ground spraying in 1986 will probably incorporate the use of Scourge (resmethrin/PBO). On the basis of extensive laboratory tests and economic comparisons, our initial mixture will be 1 part of Scourge to 14 parts of 50-55 sec. mineral oil (V/V) sprayed 8 oz./min. at 10 mph. Cage tests in the early spring will determine the actual effectiveness of this formulation.

INSECTICIDE SUSCEPTIBILITY

Our comprehensive mosquito control program is a carefully planned and executed management operation aimed at ensuring effective and continuous control of mosquitoes in New Orleans. Although integrated management strategies have been successfully implemented, the chemical control of adult mosquitoes continues to play a major and integral role in our program. The application of insecticides generally yields rapid mosquito reduction and may be the only practical measure that can be taken to suppress massive mosquito populations as well as epidemics of mosquito-transmitted diseases.

However, we are aware that whenever an organic insecticide is repeatedly applied for mosquito control, resistance usually supervenes after a period of 2 - 10 years of its uninterrupted use. If undetected, resistance will manifest itself as a progressive decrease in the control obtained by the insecticide at the recommended dosage, and result in decreased operating efficiency and unneeded environmental contamination.

Consequently, the question of whether a population is resistant to a given insecticide is of great importance in planning and executing an efficient chemical control program, especially where the target species is a vector of disease-causing organisms. In addition, the rising public expectation that mosquito control operations shall be conducted with great precision, economy, safety, effectiveness, and without adverse environmental side effects, has set the stage for the NOMCB to provide evidence that our program, in this regard, is indeed second to none. In this awareness, insecticide susceptibility tests are routinely conducted in a continuing effort to monitor, refine, and improve the chemical aspect of our mosquito control program. Such tests are essential for routine surveillance of control operations, even when resistance is not yet expected. A reduction in susceptibility to any insecticide can be determined before resistance is prevalent, and thereby provide time to develop new tools to control resistant species.

The results of adult and larval susceptibility tests conducted during 1985 are presented in Tables 1 and 2, respectively. Initially, the dosage-mortality responses were established for colonized Aedes aegypti and Culex quinquefasciatus that are maintained under insecticide free conditions. The results verify that these colonies remain homogeneously susceptible to the insecticides used for mosquito control and, therefore, their values represent the baseline state, which is modified upon insecticide exposure. Susceptibility tests were then conducted to establish the dosage mortality responses of field collected Ae. aegypti and Cx. quinquefasciatus to insecticide exposure. Comparison of the field and colony responses provide information on the susceptibility status of native populations. A tenfold decrease in the larval and a fourfold decrease in the adult susceptibilities, relative to the susceptible colony values, is considered indicative of insecticide resistant field populations. Fortunately, when the confidence limits and slopes computed from probit analysis were compared for all chemicals, no significant differences in adult or larval responses existed between the insecticide susceptible colony and field populations of Ae. aegypti or Cx. quinquefasciatus. We can therefore conclude with confidence, that these species remain homogeneously susceptible to the insecticides used for mosquito control in New Orleans. Thus, proper insecticide management and the information from our susceptibility surveillance program should allow these insecticides to continue to contribute to the integrated control of mosquitoes in New Orleans.

In addition to ensuring that the native mosquito populations are not developing insecticide tolerance, comparison of the data, relative to a malathion standard, indicates which of the available insecticides are most toxic to mosquitoes and suggests minimum rates of application. The reciprocal LC_{90} ratios to malathion are presented in Tables 1 and 2 in decreasing order of toxicity. Graphic illustrations of the chemical's relative toxicities are presented in Figures 1 - 3. Against Ae. aegypti adults, only chlorpyrifos and naled were shown to be less toxic than malathion, while Scourge and bendiocarb were 4.5 and 1.9 times more toxic than the malathion standard, respectively (Fig. 1 A). Against Cx. quinquefasciatus adults, Scourge, bendiocarb, chlorpyrifos, and naled were 99.3, 39.7, 2.6, and 1.9 times more toxic than malathion, respectively (Fig. 1 B). The differences in insecticide susceptibility between the two species, shown in the last column of Table 1, are substantial and of operational importance. While malathion, chlorpyrifos, and naled were more effective against Ae. aegypti than Cx. quinquefasciatus, the reverse was true with Scourge and bendiocarb. When compared to malathion, naled was more toxic to Cx. quinquefasciatus adults but considerably less toxic than malathion to Ae. aegypti. The magnitude of the differences is also of operational significance. Against adults of both species, Scourge and bendiocarb was appreciably more toxic than the malathion standard.

Standard World Health Organization susceptibility tests indicate that the most effective insecticide against larvae of Ae. aegypti was Scourge, which was ca. 9 times as toxic as malathion at the LC_{90}. Chlorpyrifos was 4 times as effective, naled was slightly more effective, and bendiocarb was less effective against Ae. aegypti larvae than the malathion standard (Fig. 2 A). Against Cx. quinquefasciatus, Scourge, naled, and chlorpyrifos were more toxic larvicides than malathion (Fig. 2 B). Against Ae. sollicitans larvae, Scourge and naled were more toxic than malathion (Fig. 3). The differences in insecticide susceptibilities among the three species of mosquito larvae is obvious. Malathion and chlorpyrifos were more effective against Ae. aegypti than Cx. quinquefasciatus, although the reverse was true with Scourge, naled, and bendiocarb. Scourge,

Table 1. Toxicity of selected adulticides to colonized insecticide-susceptible and field collected mosquito adults.

		Lethal concentrations in % a.i.						Reciprocal LD_{90} ratio to malathion		LD_{90} ratio of Culex to Aedes
		Ae. aegypti			Cx. quinquefasciatus					
Insecticide	Strain	LD_{50} (95% C.L.)	LD_{90} (95% C.L.)	Slope	LD_{50} (95% C.L.)	LD_{90} (95% C.L.)	Slope	Aedes	Culex	
Malathion	Colony	0.032 (0.0300-0.035)	0.053(0.051-0.056)	2.7	0.29 (0.2740-0.3060)	0.72 (0.670-0.779)	3.3	—	—	13.6
	Field	0 054 (0.0310-0.062)	0.110(0.054-0.125)	4.2	0.57 (0.2970-0.6140)	1.39 (0.765-1.610)	3.7	—	—	12.6
Scourge [a]	Colony	0.0034(0.0021-0.007)	0.009(0.007-0.015)	2.7	0.0056(0.0053-0.0059)	0.013(0.012-0.014)	3.4	5.9	55.4	1.4
	Field	0.0076(0.0055-0.008)	0.025(0.010-0.027)	3.9	0.0095(0.0047-0.0132)	0.014(0.011-0.017)	4.3	4.5	99.3	0.6
Naled	Colony	0.0960(0.0800-0.140)	0.188(0.140-0.220)	4.4	0.1360(0.1290-0.1430)	0.393(0.364-0.427)	2.8	0.3	1.8	2.1
	Field	0.1240(0.0900-0.160)	0.247(0.190-0.290)	3.1	0.3600(0.1390-0.4160)	0.730(0.400-0.860)	3.4	0.4	1.9	3.0
Chlorpyrifos	Colony	0.0214(0.0150-0.023)	0.071(0.053-0.091)	2.9	0.1840(0.1670-0.2110)	0.277(0.224-0.319)	3.7	0.7	2.6	4.0
Bendiocarb	Colony	0.022 (0.0210-0.023)	0.051(0.047-0.054)	3.6	0.019 (0.0182-0.0198)	0.04 (0.038-0.042)	4.0	1.0	18.0	0.8
	Field	0.027 (0.0210-0.030)	0.057(0.051-0.063)	4.0	0.023 (0.0186-0.0280)	0.035(0.031-0.039)	4.2	1.9	39.7	0.6

Table 2. Toxicity of selected adulticides to colonized insecticide-susceptible and field collected mosquito larvae.

		Lethal concentrations in ug/ml						Reciprocal LC_{90} ratio to malathion		LC_{90} ratio of Culex to Aedes
		Ae. aegypti			Cx. quinquefasciatus					
Insecticide	Strain	LC_{50} (95% C.L.)	LC_{90} (95% C.L.)	Slope	LC_{50} (95% C.L.)	LC_{90} (95% C.L.)	Slope	Aedes	Culex	
Malathion	Colony	0.097(0.090-0.104)	0.193(0.184-0.204)	4.2	0.31 (0.224-0.340)	0.60 (0.510-0.720)	4.0	-	-	3.1
	Field	0.160(0.110-0.203)	0.330(0.279-0.353)	4.4	0.75 (0.684-0.830)	1.62 (1.390-1.970)	3.8	-	-	4.9
Scourge [a]	Colony	0.009(0.007-0.013)	0.021(0.019-0.037)	3.5	0.011(0.009-0.025)	0.019(0.016-0.024)	4.1	9.2	20.7	0.9
	Field	0.012(0.009-0.019)	0.035(0.033-0.039)	4.0	0.022(0.018-0.027)	0.044(0.022-0.057)	3.7	9.4	36.6	0.8
Naled	Colony	0.110(0.071-0.117)	0.214(0.119-0.249)	4.4	0.095(0.075-0.110)	0.144(0.099-0.210)	7.1	0.9	4.2	0.6
	Field	0.115(0.111-0.120)	0.246(0.234-0.252)	3.9	0.104(0.092-0.117)	0.163(0.125-0.231)	6.6	1.3	3.7	.0.7
Chlorpyrifos	Colony	0.024(0.017-0.031)	0.048(0.041-0.055)	4.1	0.119(0.116-0.122)	0.231(0.206-0.261)	4.0	4.0	2.6	4.8
Bendiocarb	Colony	0.405(0.360-0.520)	0.613(0.581-0.866)	7.1	0.229(0.210-0.341)	0.331(0.272-0.451)	8.0	0.3	1.8	0.5
	Field	0.513(0.465-0.537)	0.827(0.777-0.912)	6.6	0.314(0.277-0.361)	0.445(0.411-0.467)	7.2	0.4	0.7	0.5

[a] Based on amount of resmethrin only

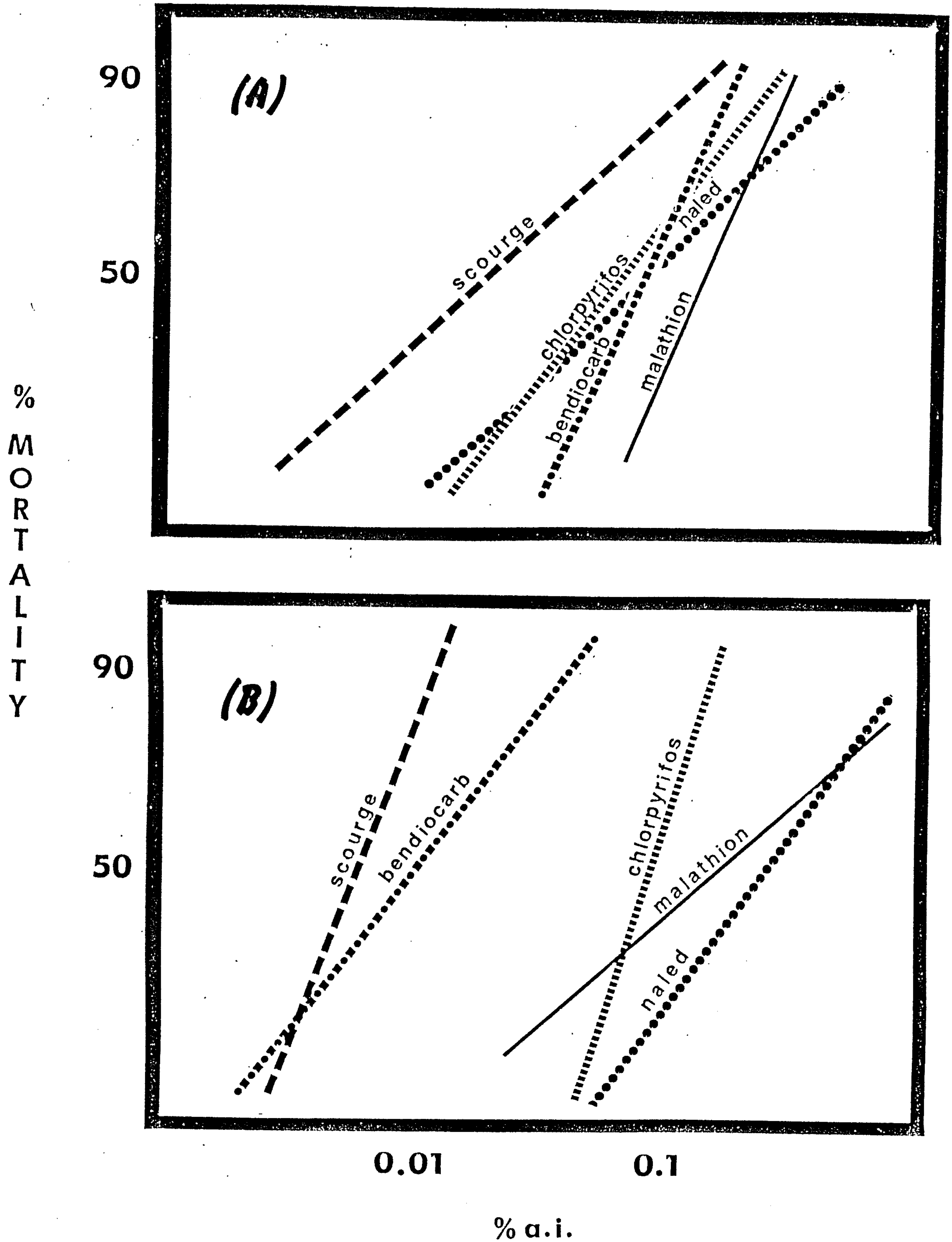


FIGURE 1: Dosage-mortality responses of (A) *Ae. aegypti* adults and (B) *Cx. quinquefasciatus* adults to insecticide exposure.

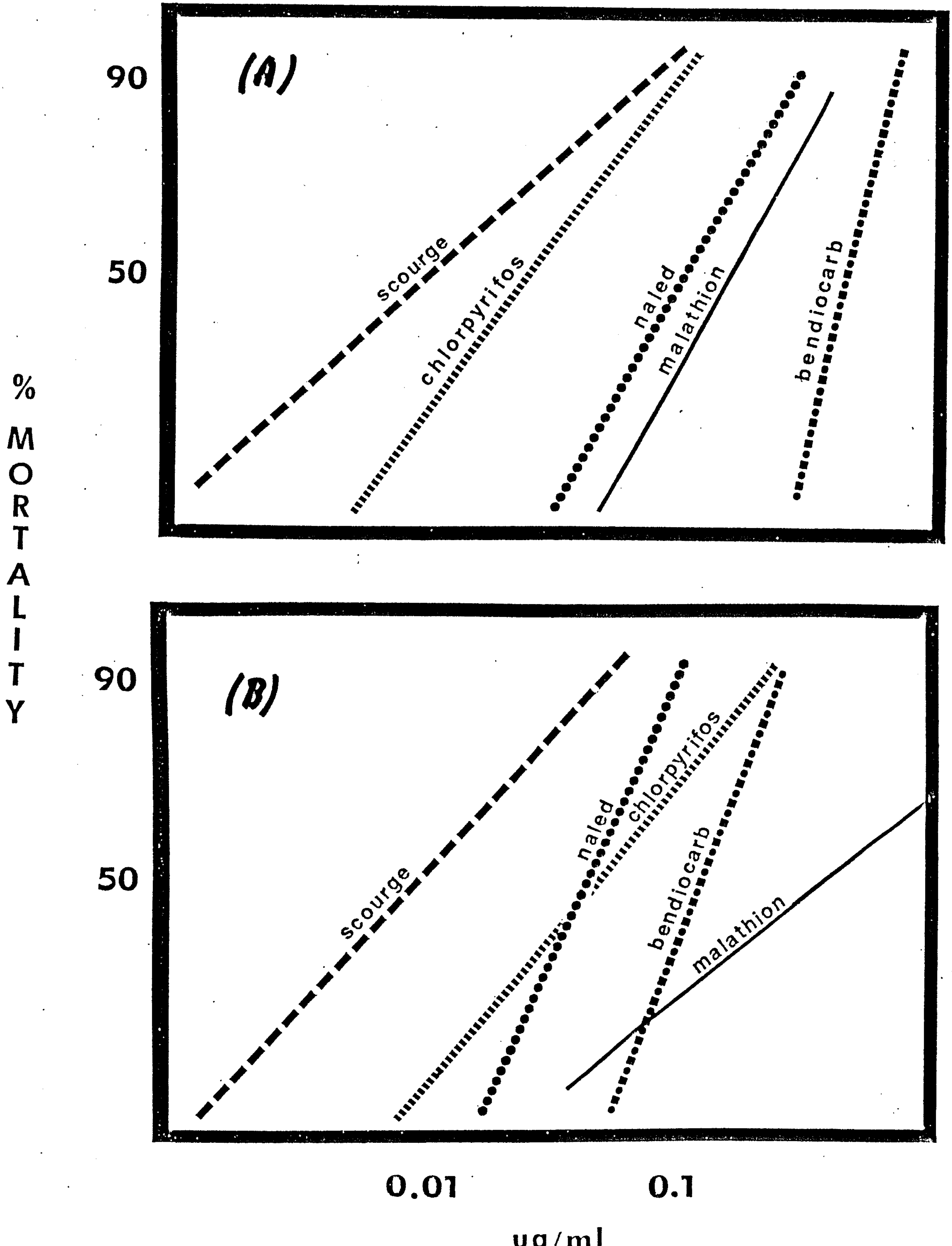


FIGURE 2: Dosage-mortality responses of (A) Ae. aegypti larvae and (B) Cx. quinquefasciatus larvae to insecticide exposure.

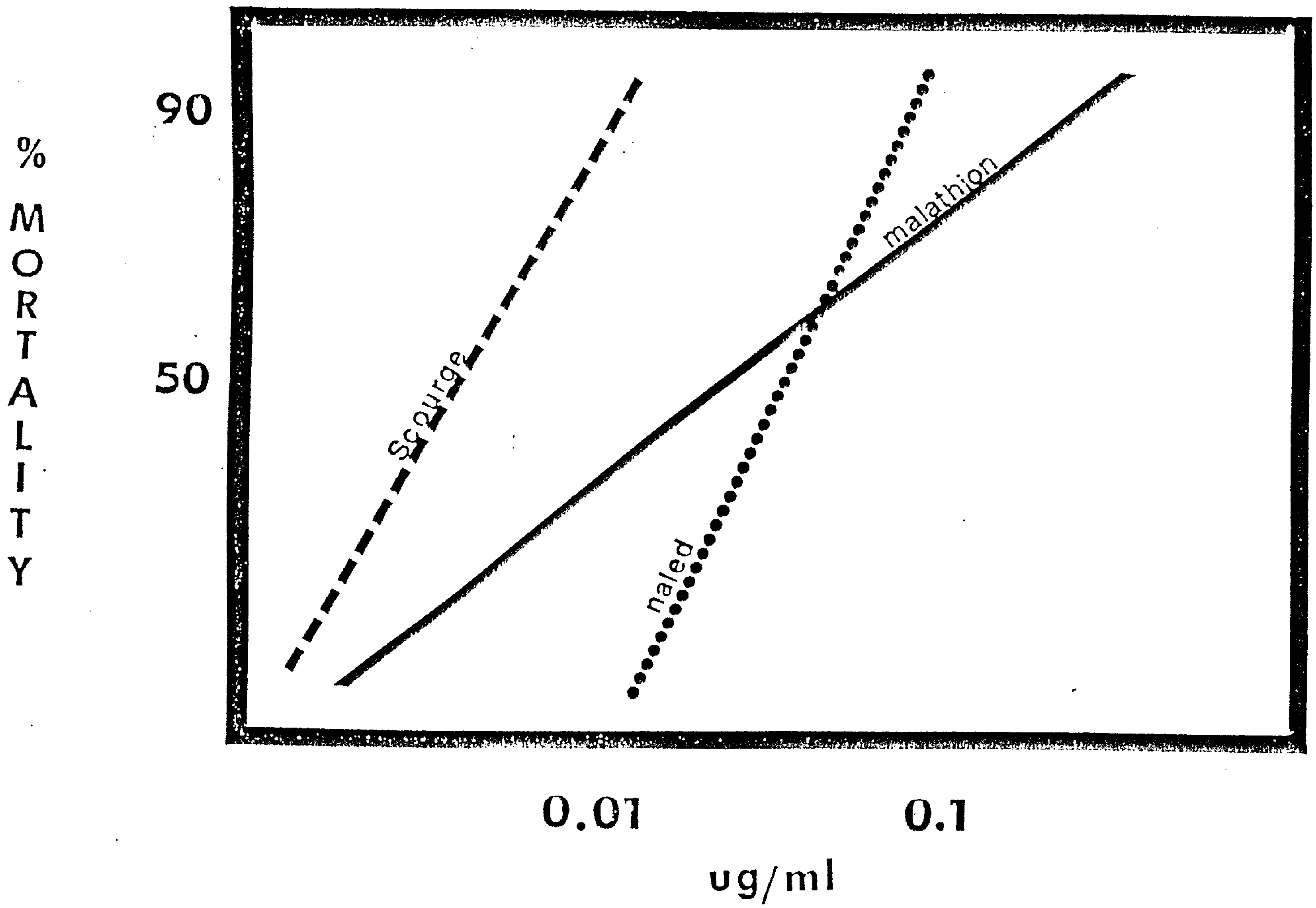


FIGURE 3: Dosage-mortality responses of <u>Ae. sollicitans</u> larvae to insecticide exposure.

malathion, and naled were significantly more toxic to Ae. sollicitans than to the other two species and the results suggest that effective control of this saltmarsh mosquito may be obtained at reduced rates of application. It is well known that differences in temperature and availability and type of food cause differences in the susceptibility of mosquito larvae to insecticides. Because of this and other factors, some larvae are naturally more difficult to kill than others. This natural variation or "vigor tolerance" may result in a lethal concentration of an insecticide for a particular mosquito species that may be considerably higher in one area than another or at one time of the year than another. One of the benefits of a continuing study of this type is to establish these differences. However, by testing larvae reared under controlled conditions of food, temperature, larval density, type of water, etc., it is hoped to reduce these field variations to a minimum, thereby making the results obtained more comparable. The many unknown causes of variations in larval susceptibility were further reduced by the use of a considerable number of replicates obtained over a relatively long period of time.

The effectiveness of bendiocarb as an adulticide, yet its ineffectiveness as a larvicide, is also of interest. It is an established fact that an insecticide used effectively against one stage of a mosquito, such as adults, would not necessarily be useful against the larvae. The toxicity of a given insecticide is greatly influenced by the rate at which the chemical reaches the site of action within the mosquito. Therefore, such factors as the chemical stability of the compound in water, air, sunlight, on plants or other surfaces, its rate of penetration through the integument of the mosquito, its application and metabolism within the insect, all influence the amount of toxic chemical that reaches the site of action. Thus, since mosquito larvae and adults live in distinctly different environments, it is not surprising that the performance of an insecticide might differ in these two situations. Low larvicidal activity is also a desirable characteristic for an effective and routinely applied adulticide.

The significant toxicity of Scourge to all species tested is of operational importance. This pyrethroid is the type of adulticide that the NOMCB hopes to incorporate into our integrated mosquito management program. It is a fast acting compound of low mammalian toxicity that is environmentally compatible and economically competitive. Based on laboratory susceptibility tests, minimum field application rates have been established. Field tests are being conducted to confirm the effectiveness of this compound and we anticipate switching from applications of malathion to ground ULV applications of resmethrin in 1986. Unfortunately, results from an emergency vector-borne disease control simulation suggest that the aerial application of resmethrin over urban areas is not operationally feasible (see Emergency Vector-Borne Disease Control report). However, investigations in cooperation with the manufacturer are currently underway to determine optimum droplet sizes and altitudes for effective aerial applications of Scourge.

In summary, the present susceptibility surveillance system can establish baseline levels of insecticide susceptibility, effectively monitor and predict the inevitable development of insecticide resistance, establish the minimum lethal doses required for effective kill, and determine the most biologically active and economically feasible mosquito control compounds. It is indisputable that the proper management of resources arising from a knowledge of resistance lore coupled with the information from our susceptibility surveillance will allow the chemical aspect of our program to continue its decisive contribution to the integrated control of mosquitoes in New Orleans.

AEDES AEGYPTI

Since its re-establishment in 1972, Aedes aegypti has spread throughout New Orleans and increased in abundance. During 1985, this domesticated mosquito continued to proliferate and, due to the obnoxious biting habits of the adult females, is now regarded as the primary hematophagous insect pest in the urban environment. It is also a know vector of the dengue viruses and a suspected vector of the dog heartworm and thus, the most important potential disease vector in the city.

The goal of the Ae. aegypti program is to develop better technologies that provide the required degree of control most effectively, efficiently, and economically. Such a goal implies that Ae. aegypti control should be based on the integrated management of total populations rather than the continual reduction of high density populations at times when the insect or disease becomes a problem. Mosquitoes that breed in artificial containers, i.e. Ae. aegypti, are among the most likely targets for the application of integrated management schemes. They have adapted themselves to habitats largely under the control of man and have become dependent upon man and his activities for their continued existence. However, the integrated control of Ae. aegypti requires quantitative data concerning the dynamics of populations as they exist in problem situations and adequate surveillance information is essential to the most effective control techniques, the development of new technologies, and the integration of technologies into pest or disease management schemes.

As in previous years, the NOMCB maintained a special vigilance in the area of Ae. aegypti surveillance and control during 1985. Monthly ovitrap data for Ae. aegypti are presented in Figure 1. Mean monthly temperatures are also illustrated since Ae. aegypti population growth and maintenance appears to be temperature driven. Ovipositional activity commenced in late March, when the mean daily temperatures reached the 70° threshold on an intermittent basis, and increased significantly in June and July when the mean daily temperatures remained about 80°. This year, as in 1984, peak ovipositional activity and adult abundance occurred in August and September. In November, temperatures dropped below the life cycle completion threshold for Ae. aegypti, and the population density of this mosquito subsequently decreased to a level where it was no longer a serious pest or potential vector. The vector potential of this species was undoubtedly high during the months of peak abundance since parous rates averaged 48 and 59% in August and September, respectively.

The trends seen this year in Ae. aegypti activity should emphasize to us

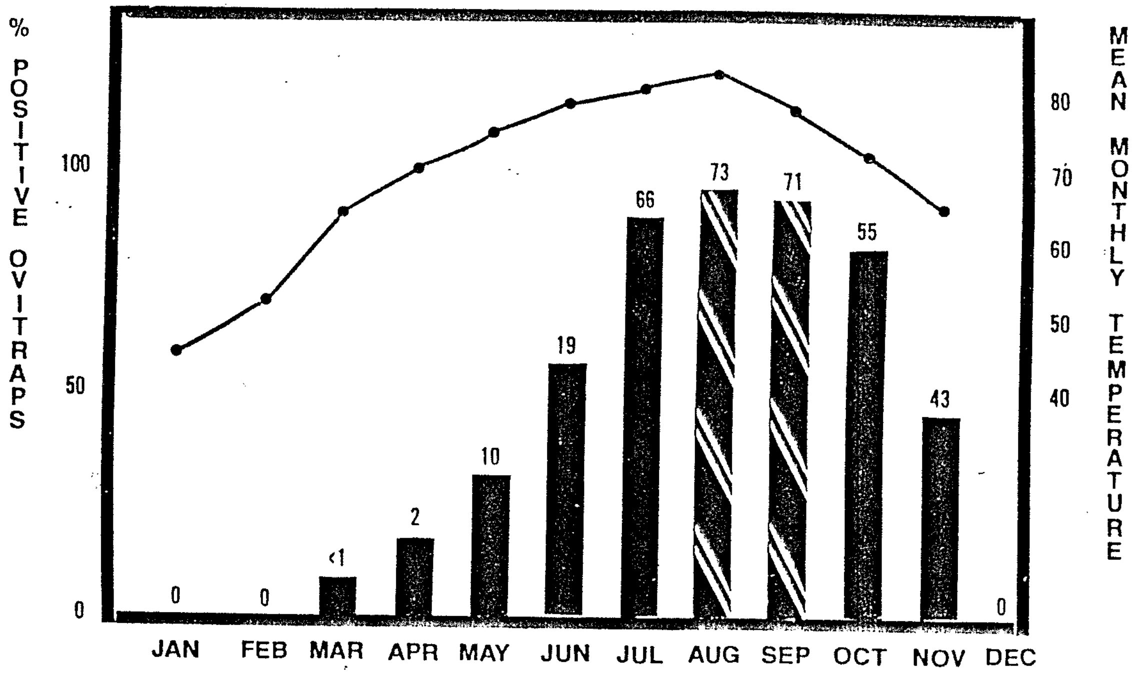


FIGURE 1. Percentage of ovitraps positive for <u>Ae. aegypti</u> eggs. The average number of eggs/ovitrap appears above each monthly bar. Cross-hatching indicates estimates based on daily surveillance.

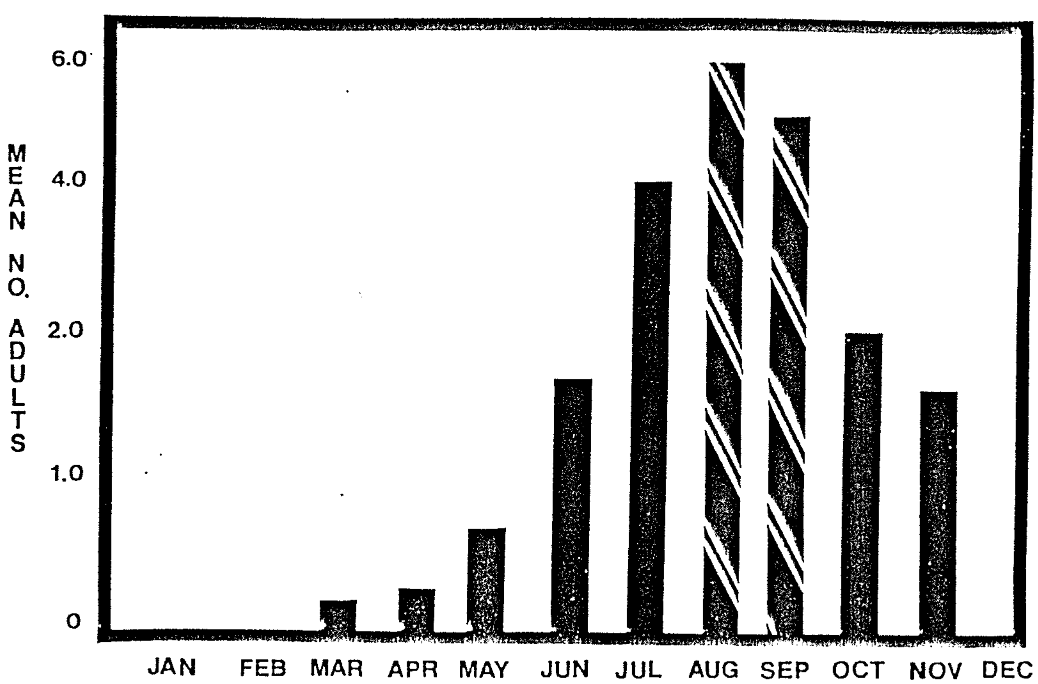


FIGURE 2. Average number of <u>Ae. aegypti</u> adults collected/UV-Fay trap in New Orleans, 1985.

all the explosive nature of this vector and make us thankful that the dengue virus was not also present. For example, in 1984, when peak mean temperatures never exceeded 80°, the average number of eggs deposited/ovitrap never exceeded 35. This year mean daily temperatures consistently exceeded 80° during July and August and the average numbers of eggs deposited/ovitrap were 66 and 73, respectively. Therefore, when comparing egg deposition from 1984 to 1985, it may be concluded that the potential adult *Ae. aegypti* standing crop was approximately 100% greater during its seasonal high in August and September 1985 than in the previous year. UV-Fay trap collections, illustrated in Figure 2, indicate the same trend in adult activity. Average adult captures in 1985 (2.9 *Ae. aegypti*/trap night) increased by 44% when compared with 1984 collections (1.9 *Ae. aegypti*/trap night).

Another factor that must be considered when measuring the success of *Ae. aegypti* in any given year is its interspecific competition with other container breeding mosquitoes. *Culex quinquefasciatus* is the principal competitor with *Ae. aegypti* in New Orleans because one of its larval habitats is also artificial containers. Although this species normally seeks blood meals from avian hosts, it will bite man, and it is this aspect of its behavior that makes it a vector of St. Louis encephalitis. Control operations are directed against *Cx. quinquefasciatus* mainly because of its implication in virus transmission to humans, since its populations rarely approach annoyance levels. It is interesting to note that, in 1984, adult *Cx. quinquefasciatus* captures in the UV-Fay traps increased by 25% while *Ae. aegypti* captures decreased by 23%. The reverse proved to be true for 1985. *Culex quinquefasciatus* captures decreased by 36% and *Ae. aegypti* increased by 44%, as compared with the previous year. The data suggests that when *Cx. quinquefasciatus* prospers in containers in any particular year, *Ae. aegypti* will not. The corollary also appears to be true. Interspecific competition may be the major factor maintaining both populations within manageable limits. One population established without the other could result in a substantial increase in abundance with a concomitant increase in the vector potential due solely to the sheer numbers of the dominant species.

The effectiveness of the NOMCB vector surveillance program and the success of our control activities is a dedication to the hard work which our inspectors performed. Since these individuals never receive proper recognition, I would like to say that Daniel Roussel, Chuck Spizale, Ralph Dominick, Jimmy Loupe, Gerald Lee, Wayne Arceneaux, Percy Stovall, and Doug Guthrie deserve the credit for the people of our city being able to enjoy outdoor activities this year. Without their efforts the citizens of New Orleans would have had much more to complain about.

	Hours	Cost
Surveillance	4889.5	$ 33,933.13
Miles Traveled & Cost	11939	1,790.85
Total Cost		$ 35,723.98

RESEARCH AND DEVELOPMENT

GENERAL

The 1985 season gave us an opportunity to undertake several experimental investigations. All studies were structured to be practical and have distinct applied value. Tests conducted this year ironed out many problems and should lead to a better understanding of our local mosquito problems in future years.

EMERGENCY VECTOR-BORNE DISEASE CONTROL

A project was initiated in August to evaluate the effectiveness of aerial ULV spraying for the control of *Ae. aegypti* and *Cx. quinquefasciatus* as an emergency anti-epidemic measure against dengue fever and St. Louis encephalitis. For more extensive information, refer to NOMCB monthly reports for August and September, 1985. Two consecutive aerially applied ULV applications of malathion suppressed vector abundance and altered the age structure of both populations for 5 - 8 days. These alterations in the dynamics of the target populations should have been adequate to interrupt virus transmission in the event of a mosquito-borne epidemic. However, laboratory tests indicated that *Ae. aegypti* and *Cx. quinquefasciatus* were significantly more susceptible to Scourge than to malathion. Consequently, field tests were initiated to evaluate the aerial ULV application of Scourge as an emergency anti-epidemic measure. Unfortunately, the results suggest that the aerial application of Scourge over urban areas is not operationally feasible. The number of insecticide droplets impinging on teflon-coated slides and oil sensitive dye cards was consistently 13 times less than that recorded for malathion. Consequently, the mortality of caged adult females was less than desired and no reduction in vector abundance or change in the age structure of the target populations was observed. Scourge is an effective adulticide for ground ULV application and possibly for aerial applications at low altitudes over non-urban areas. However, until Scourge is reformulated or a suitable cosolvent is found, malathion will undoubtedly remain the insecticide of choice for aerial ULV application over heavily populated areas. In the event we are faced with an arboviral epidemic in New Orleans, the treatment and evaluation protocol we have now developed will enable us to respond in a rapid, coordinated, and effective manner. We will increase vector surveillance, aerially adulticide high risk areas with malathion, continue to monitor insecticide susceptibilities, intensify our public information program, and it would be desirable to expand our source reduction, larval control, and biological control programs, but if resources are limited, these will be discontinued in favor of adulticiding efforts.

VECTOR SURVEILLANCE EVALUATIONS

Although ovitraps and UV-Fay traps have proven their value again as efficient and economical methods of monitoring *Ae. aegypti* activity, the present surveillance system is being evaluated. It is expected that statistical analysis of the 10 years of surveillance data will result in the development of predictive models. These models are biologically acceptable and economically justifiable since they will allow the NOMCB to reduce the cost of *Ae. aegypti* surveillance without a loss in benefits derived. Such analyses will allow the continued protection of the public from the threat of *aegypti* annoyance and disease transmission, at a reduced cost, and enable us to expand our vector surveillance program to include *Cx. quinquefasciatus*.

SEASONAL FLUCTUATIONS IN INSECTICIDE SUSCEPTIBILITY

A project to investigate seasonal changes in the susceptibility of *Ae. aegypti* to malathion was initiated in December. Larval susceptibility tests were conducted in an *Ae. aegypti* population that was subjected to the most insecticide pressure in the city. Preliminary results indicate that the slight decreases in susceptibility observed from May to November may be attributable to vigor tolerance.

CORRELATION OF DROPLET SIZE WITH MOSQUITO MORTALITY

The correlation of insecticide droplet size with mosquito mortality appears to be one of the most interesting areas of future research and it holds the promise of greatly improving and refining our chemical methods of mosquito control. For example, results from our emergency vector-borne disease control simulation indicated that significant mortality of sentinel larvae occurred following aerial adulticide applications of malathion (August, September 1985). The significance of the larval mortality is that it illustrates the tremendous selection pressure exerted on the target populations by aerial applications of this adulticide. This pressure on larvae and adults within a population could prevent the uninterrupted use of aerial ULV adulticide operations, on a routine basis, due to the likelihood of developing malathion resistance. Consequently, studies were conducted to determine the potential impact of aerial adulticide applications on larval populations. The LMD of malathion droplets during our simulation was 48.9 um (VMD=63.7 um). It was determined that the average volume of active ingredient was 0.985 nl. From the droplet dispersion data, it was estimated that 279 droplets or 0.275 ul of technical malathion were deposited in each sentinel cup, which resulted in the observed larval mortality rate of 98%. Laboratory applications of malathion to sentinel cups at rates equivalent to 2, 1, and 0.5 aerial applications resulted in 100, 91, and 20% larval mortality, respectively. Further investigations are planned which will allow the NOMCB to delineate the operational parameters that can be manipulated to prevent larval mortality yet provide adequate adult control.

Tests are also underway, in cooperation with Penick Corporation, to determine at what altitude and droplet size Scourge can be effectively applied for the control of adult Ae. aegypti. At an application rate of 0.0035 lb a.i./A and a droplet size of 50 um, 97, 78, and 25% mortality was observed at 50, 100 and 200 feet altitudes, respectively. Droplet size will now be varied, the applications repeated, and the results assessed. These studies will aid in the efficient application of minimum doses to save money and prevent unneeded environmental contamination.

ANCILLARY STUDIES

1) The Pesticide Research Lab at Penn State University requested our assistance in biological water quality determinations. Their laboratory is monitoring the effects of a pesticide spill on the water quality of a local stream. The NOMCB provided Ae. aegypti for use in bioassays for kepone contamination and are providing technical assistance.

2) In cooperation with scientists from the E.P.A. Research Laboratory in Gulf Breeze, Florida, efforts were made to seine previously stocked silverside fish, Menidia beryllina, from marsh impoundments. More refined sampling methodologies are being investigated in anticipation that these fish can be stocked as biological control agents of Culex salinarius.

3) The NOMCB assisted researchers with the Department of Biology at Tulane University in their search for Cx. quinquefasciatus attractants. Results from this study could improve survey efforts and control technologies for this important disease vector.

ENCEPHALITIS SURVEILLANCE

Encephalitis Surveillance in Orleans Parish is an early warning system to detect virus activity before humans are affected.

The encephalitis virus is harbored in wild and domestic birds. The disease is transmitted to man by mosquitoes. By testing bird blood for the presence of antibodies, virus activity can be detected in time to break the cycle of disease transmission by eliminating the mosquito vector.

Birds are captured in walk-in traps and mist nets. One half cc of blood is taken from a vein in the neck, the birds are then banded and released.

Trapping began in April when 20 traps were deployed in Orleans Parish. Walk-in traps made by Tomahawk Trap Company are used. The traps are attached to a plywood floor and elevated 5 feet above ground on a piece of 1/2 inch aluminum conduit. Further modification of the traps was carried out this year in order to reduce maintenance. The wire was removed from the floor of the traps so that the bird feed would not be caught under the wire. The traps are now self-cleaning and require little maintenance.

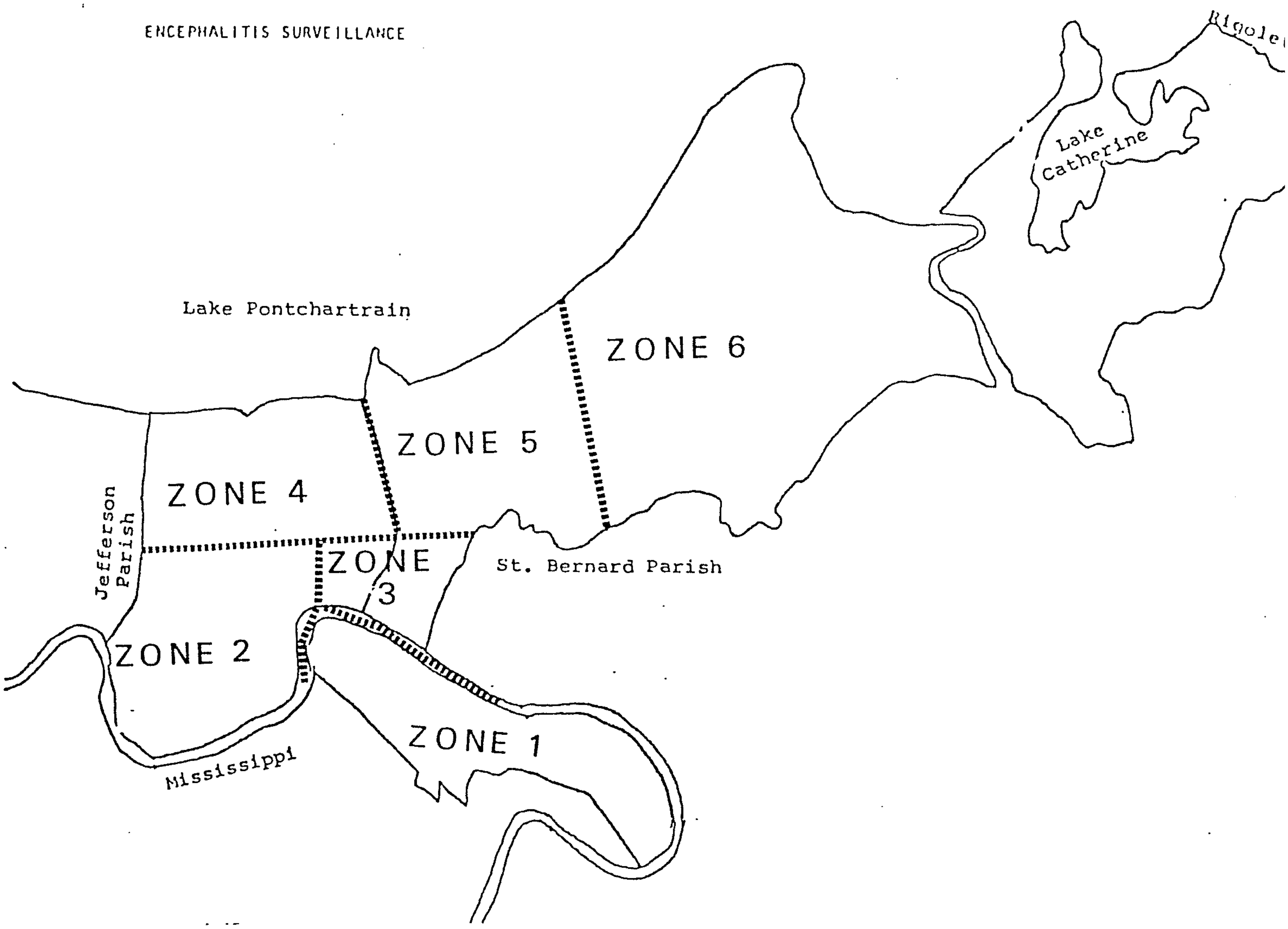
The feed used to bait the traps was also changed. Instead of cracked corn, we are now using a wild bird seed which seems to be more attractive.

1985 ENCEPHALITIS SURVEILLANCE

	TOTAL	SPARROWS ADULTS	SPARROWS IMMATURE	OTHERS ADULTS	OTHERS IMMATURE
ZONE-1	229	20	157	32	20
ZONE-2	326	31	270	19	6
ZONE-3	311	66	211	28	6
ZONE-4	234	23	186	13	12
ZONE-5	65	4	38	17	6
ZONE-6	425	14	183	169	59
TOTAL	1590	158	1045	278	109
# POS/ % POS	0/0%	0/0%	0/0%	0/0%	0/0%

NEW ORLEANS MOSQUITO CONTROL

ENCEPHALITIS SURVEILLANCE



Mist nets are used to sample birds in areas where walk-in traps cannot be used.

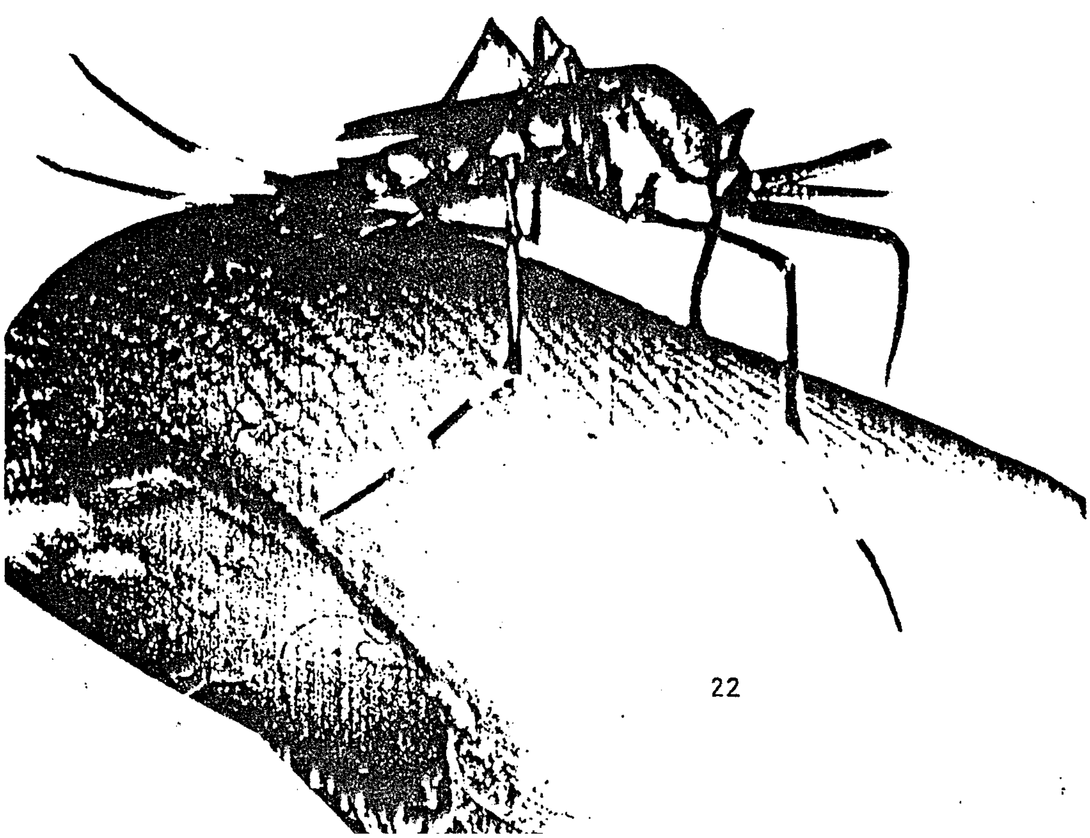
One thousand five hundred ninety (1590) birds were sampled this year. Seventy-six percent (76%) of these were common sparrows (*Passer domesticus*). None of the birds sampled were positive.

	Man Hours	Cost	Miles	Cost
Netting	301	$ 1795	4179	$ 626
Trapping	1750.5	10911	14637	2195
Migratory Bird Sampling	100	963	675	100
Blood Processing	105	681	990	148
Miscellaneous	7	52	36	5
Equipment Maintenance	-			
Administration	141	1340	734	110
Total:	2404.5	$ 15742	21251	$ 3184

TOXORHYNCHITES

Pilot studies conducted in New Orleans from 1979-84 demonstrated the potential of Toxorhynchites as a biological control agent against container-breeding mosquitoes such as Aedes aegypti and Culex quinquefasciatus. When integrated with ground ULV treatments, larval predation by Toxorhynchites was shown to reduce aegypti populations by 96% over a 6 week period (as compared to 29% for ULV alone). Unlike previous years in which personnel spent a high proportion of their time evaluating predator efficacy and studying mosquito ecosystems, a shift occurred in 1985 in which the primary goal was to develop a more efficient and cost-effective system for the mass production of predator mosquitoes. Such a shift required that two basic objectives be met: 1) the creation of a larger facility where rearing systems could be redesigned and 2) establishment of a larval food source for Toxorhynchites that could realistically be produced in large quantities.

The first objective was assisted through the generosity of the U.S.D.A. Southern Regional Research Center which allowed construction of a new insectary



adjacent to our existing building. It was decided that this facility would be constructed by "in-house" personnel, so inspectors and entomologists became the carpenters, plumbers, and electricians necessary to complete the task. After 7 months, the 600 square foot building is finished and ready to house prototype rearing systems (still to be designed) that may one day be expanded for operational use of Toxorhynchites in an integrated control program.

The second objective has been a major concern over the past few years. Although organisms such as Psychotids, Chironomids, and brine shrimp were evaluated as a predator larval food, none proved as valuable or easy to produce as Ae. aegypti. Blood feeding of aegypti, prior to 1985, was accomplished with living hosts (rabbits) which were suitable for small-scale demands, but large-scale predator releases were not feasible as ca. 1 rabbit was required for each city block treated with 100 female Tox per week.

Rearing trials for Ae. aegypti were initiated this year to evaluate membrane feeding techniques utilizing slaughter-house cattle blood. Through a series of 22 trials, each of ca. 30-day duration, it was obvious that bovine blood could replace rabbits as the protein source for aegypti egg production, and that large-scale production of Toxorhynchites was possible. Of the various methods tested, following proved to give the best results to date: Sausage casing is filled with 100 ml. of bovine blood (defibrinated with 6 gm. sodium citrate/gallon), placed atop a screened feeding slot on the aegypti cage, and heated to 98° F with a thermostatically controlled heat tape. Optimum stocking rate was ca. 50,000 adults (20 trays of pupae set at 0.04 ml of eggs/tray) in a 30" x 30" x 60" cage. Using this rate, volumetric measurements of eggs averaged 56 ml (3.8 million) per cage per month. Adults were fed daily for 6 hours/day; longer feeding times and higher adult stocking rates increased total egg production slightly. The use of frozen blood decreased egg production by 70%.

Two species of predators, Tx. amboinensis and Tx. splendens, were evaluated in the laboratory weekly for percent egg hatch, number produced per rearing tray, rate of female insemination, fecundity, and survival. In order to return predator production to rates similar to 1982 (ca. 500 pupae/tray), stocking and feeding rates were adjusted upwards as numbers had declined to less than 300/tray. Genetic selection and/or hybridization may have reduced this production over time. Field releases are planned for 1986 to see if wild strains should be added to the colony to increase vigor.

	Hours	Cost
Mosquito Rearing	2082	$ 14911
Field & Lab Evaluations	3266	23360
Equipment Construction & Maintenance	2302	16193
Other	1107	7928
Total Man Hours & Cost	8757	$ 62392
Miles Traveled & Cost	32461	4868
Total Cost:		$ 67260

SOURCE REDUCTION

During 1985, the Source Reduction Program was involved for most of the year in the W-1 and W-2 wetlands project, located east of Paris Road and is over 650 acres in size. This area is responsible for large mosquito populations in New Orleans East; 6450 feet of ditch have been completed.

The dragline moved directly to the W-2 area from the W-1 area which was completed just after the first of 1985. Special emphasis was made to the design of the ditches to conform with existing natural low points and natural bayou beds, no straight or grid ditching was used. Results were both functional and environmentally sound.

A Corp of Engineers' permit is being applied for, for area V-26 located between Bayou Bienvenue and the Intracoastal Waterway. Placement of our rotary ditcher marsh buggy in this area has been delayed because of pontoon and track