

Glenn D. Smith
FEDERAL SECURITY AGENCY *Ex. V*
U. S. PUBLIC HEALTH SERVICE *3*
Malaria Control in War Areas
FIELD BULLETIN
Return to Dr. G. M. Jeffery



THE ZONAL PROJECT WATERED AREA CENSUS

ATLANTA, GEORGIA

1945 JUN 7
MARCH, 1945



Table I

MCWA Larvicide, Minor And Major Drainage Work

February 1945

STATE	Areas in Operation	War Establishments Protected	LARVICIDAL WORK				DRAINAGE OPERATIONS										Total		
			Larvicide Used		Surfaces Treated		Clearing		Cleaning Hundred Sq. Ft.	New Ditching			Ditch Lining		Underground Drainage Lin.Ft.	Fill C.Y.	Water Surf. Eliminated Acres		
			Oil Gall.	Paris Green Lbs.	Oiled	Acres	Removal Surf.Veg. Acres	Stumping Acres		Lin.Ft.	Mach.	Dynamite Cu.Yds.	Total Cu.Yds.	Lin.Ft.				Sq.Ft.	
Alabama	5	92	---	---	---	---	1	---	5,005	2,000	---	---	---	---	---	---	8	4,755	Man Hours
Arkansas	15	92	---	---	---	---	106	---	2,624	21,047	800	7,237	382	2,869	---	---	11	31,738	
California	4	30	80	---	8	---	9	---	2,748	1,350	---	85	---	---	---	---	10	3,302	
Florida	15	111	627	---	33	---	15	3	5,733	33,826	---	4,477	2,668	4,342	90	4,622	29	24,926	
Georgia	14	103	---	11	---	7	31	4	3,886	13,578	---	---	---	---	75	1,611	6	19,884	
Louisiana	8	86	110	---	25	---	54	1	7,315	51,885	---	75	---	---	20	220	217	37,373	
Maryland	1	32	---	---	---	---	18	---	200	---	---	---	---	---	---	---	6	1,940	
Mississippi	13	58	30	---	1	---	65	1	4,250	24,820	---	4,191	125	887	---	37	50	19,025	
Missouri	3	22	---	---	---	---	1	---	---	---	---	---	---	---	---	---	---	2,206	
New Jersey	1	9	---	---	---	---	---	---	258	480	---	40	---	---	---	---	---	332	
North Carolina	9	80	---	---	---	---	17	5	23,644	49,716	3,000	15,256	---	---	---	786	170	22,836	
Oklahoma	5	62	---	---	---	---	70	3	27	2,190	---	1,063	---	---	---	---	14	10,409	
Puerto Rico	7	22	420	4,005	43	3,229	8	1	10,310	8,203	---	4,865	256	884	---	---	2	44,703	
South Carolina	19	114	---	---	---	---	138	18	9,356	38,698	---	8,692	410	1,640	383	140	15	55,744	
Tennessee	3	67	---	---	---	---	14	1	991	3,195	---	987	1,285	5,718	---	136	4	10,496	
Texas	13	178	264	---	11	---	100	9	4,169	48,718	3,070	5,839	485	3,259	---	413	69	32,899	
Virginia	4	93	---	---	---	---	10	18	49,269	19,806	---	1,503	---	---	---	72	---	11,479	
Total	139	1,251	1,531	4,016	121	3,236	657	64	129,785	319,512	6,870	59,884	5,611	19,599	568	8,037	611	334,047	
January Total	133	1,222	1,515	4,662	121	3,291	1,583	56	76,876	378,311	13,400	76,773	7,368	25,187	1,505	15,443	229	360,924	

THE ZONAL PROJECT WATERED AREA CENSUS



The Watered Area Census was undertaken to furnish basic, quantitative data on those watered areas included within the scope of present MCWA operations. The census was designed to obtain information on (1) the total watered acreage and linear footage existing within the mile control zone of MCWA projects, (2) the percentage of watered areas of malarial and non-malarial significance, (3) the total watered acreage and footage eliminated by drainage, and (4) the status of existing watered areas in regard to permanency.

These data were needed to describe more accurately the magnitude of the anopheline control problem, to evaluate more definitely the physical accomplishments of the MCWA program, and to demonstrate the value of species sanitation in terms of financial savings. Such data are invaluable — and in some cases, vital — in justifying MCWA expenditures, in requesting new appropriations, in planning and estimating the costs of new programs, and in the general administration of the entire MCWA program.

SPECIAL CENSUS NECESSARY

Since some of the desired information is non-recurrent in character and could not be collected through semi-monthly progress reporting procedures, a special census was necessary. The data discussed in this report were submitted on a special "Zonal Project Watered Area Census" (Form MCWA 217). The information was secured through direct measurements and estimates in the field, aided by available maps and other records whenever possible.

An arbitrary reporting date of October 1, 1944 was selected for recording the status of watered areas drained. This was necessary in order to have a common, nation-wide census date, to allow taking the census during the "off season", and to permit the collection of data from marginal states before the winter withdrawal of personnel from those areas. A final submission date was set at January 1, 1945 to give project personnel in the more southerly areas ample time to collect and to submit

data after their peak operations had been curtailed by the winter season.

EXTENT OF THE CENSUS

Census reports have been submitted from a majority of the zones in which MCWA larviciding, drainage, or surveillance has been carried on at any time between March 1942 and September 1944. A few zones were omitted for lack of sufficient data. These zones, being under occasional surveillance only, would probably not have contributed very greatly to the census totals, at least not to the most important category — *areas breeding malaria mosquitoes*. In some states, collection of data is still in progress and cannot be reported at the present time. Data from Louisiana and Illinois are not included in this discussion.

A check sheet, listing all zones for which control activities had been reported in 1944, was made available to each state before submission of the census reports. This was prepared from available information on the War Area list, from current M-7 reports, and from the Semi-Monthly Progress Reports. It enabled the states to insure a complete coverage of the more important zones.

No drainage work performed prior to July 1, 1940 has been included in the census, and non-MCWA drainage has been recorded only in special cases where a substantial amount of work was involved.

Where War Program drainage, performed under a national defense justification, was not undertaken principally or wholly at MCWA expense, the work was reported on a separate census form and marked "Supplementary." These drainage data have been included in the "basic" tabulation with the others.

Complete census reports were received from the following:

Alabama	Maryland	South Carolina
Arkansas	Michigan	Tennessee
California	Missouri	Texas
Florida	Mississippi	Utah
Georgia	North Carolina	Virginia
Indiana	Oklahoma	Puerto Rico
Kentucky	Oregon	Dist. of Columbia

PROBLEMS IN COLLECTING DATA

The problem of collecting and analyzing watered area data is not an easy one. Watered areas of malarious importance are continually changing in size throughout the season. Each significant rainfall causes existing ponds and swamps to spread over larger areas and reestablishes those that exist only during the wet season. With changes in size, there occur corresponding changes in character. In some, the extent of malaria mosquito breeding may increase, while in others, it may decline sharply. Such changes add to the difficulty when records for several years are analyzed and a single result must be decided upon. To add further to the problem, different interpretations of watered areas in which similar conditions actually exist may be made by different field representatives.

THE CENSUS FORM

To minimize the effects of this "personal equation" and to standardize as many of the debatable and uncertain conditions as possible, a detailed instruction sheet accompanied the request for census data. A copy of this census form is shown in the accompanying figure (Form MCWA 217).

It serves to illustrate the method of collecting data and shows what data are now available as a result of this study.

The various items of the census form were defined in the instruction sheet for purposes of the report as follows:

Column A. Items 1, 2 and 3. These items apply to drainage conditions as of October 1, 1944 and, in the absence of artificial drainage, to maximum waterholding conditions occurring in malaria seasons since the start of MCWA activities.

Permanently Watered: The estimated area or footage holding water continuously throughout the malaria season in years of normal rainfall.

Semi-permanently Watered: The estimated area or footage holding water more than four weeks during the malaria season,

or continuously watered in abnormal years, but not continuously wet in a year of normal rainfall.

Item 5. Drainage: Area or footage of watered area or parts of watered areas which have been converted in character as a result of War Program drainage. Drainage as considered here includes any water lowering or dewatering other than fluctuation.

Columns B, C, and D. Malaria mosquitoes: *Anopheles quadrimaculatus*, *A. albimanus*, *A. freeborni*.

Continuous: Estimated permanently watered area where larvae can always be found during the active breeding season and other areas where breeding continues as long as water lasts.

Frequent: Estimated permanently watered area where intermittent breeding occurs longer than 50% of the active breeding season, or other places where breeding occurs more than 50% of the time water is present.

Occasional: Estimated watered area where breeding is less frequent than above.

Column F. Any mosquito breeding other than the three species listed above.

Column G. Watered areas wholly free from mosquito breeding, and non-breeding portions of other areas. This does not include open water acreage of sea water or large lakes where mosquito breeding is obviously impossible.

Geographical Area Involved: All watered areas located outside of Army, Navy, or Coast Guard reservations and within a one mile control zone (two miles in Puerto Rico and Jamaica). Watered areas within military reservations may be included only if such areas have been drained by or are under larvicidal control by MCWA.

Acres and Linear Feet: Waterholding ditches, canals, brooks, and other minor

ITEM (A)	MOSQUITO BREEDING						NON-MOSQUITO BREEDING		TOTAL	
	Malaria Mosquitoes									
	(B)	(C)	(D)	(E)	(F)		(G)		(H)	
	Continuous	Frequent	Occasional	Total						
	Ac. or L. Ft.	Ac. or L. Ft.	Ac. or L. Ft.	Ac. L. Ft.	Ac. or L. Ft.	Ac. or L. Ft.	Ac. or L. Ft.	Ac. or L. Ft.	Ac. L. Ft.	
1. PERMANENTLY WATERED										
2. SEMI-PERMANENTLY WATERED										
3. TEMPORARILY WATERED										
4. TOTAL										
5. DRAINAGE										
(a) Converted from Permanent to Semi-Permanent Water Surface.										
(b) Converted from Permanent or Semi-Permanent to Temporary Water Surface.										
(c) Permanently and Completely Dewatered.										
(d) Total										
6. GRAND TOTAL (4 & 5 (C))										

7. Type of Breeding Places. Underline where applicable to project.
Ditches, canals, streams, marshes (large, medium, small), swamps (large, medium, small), lakes, reservoirs, wet pasture, seepage areas, ground pools, small artificial pools, lime sinks, lagoons, resacas, brakes, bayous.

8. Character of Breeding Places. Underline where applicable to project.
(1) Large, medium, small, mixed.
(2) Scattered, clumped, mixed.
(3) Easily accessible, moderately accessible, access difficult.

Fig. 1. The Watered Area Census Form

watercourses under 10 feet in width are reported in terms of linear footage. All other watered areas are reported on an acreage basis. (Note: This separation was also used in designing the graphs.)

As has been noted above, the data were collected by zones. All information was carefully checked by the Records and Statistics Section, and summaries were prepared by areas and by states. A summary has also been compiled of all states reporting. Corrections were made both for arithmetical errors and for inconsistencies in the reported data.

ANALYSIS OF DATA

An analysis of the several circle diagrams has been prepared to emphasize some of the more significant features of the summarized results. In figure 2, the total watered area acreage for all states reporting, exclusive of Puerto Rico, is broken down into various categories by means of a circle diagram. This diagram does not include the watered areas reported in linear measurements shown in a separate graph. Some significant features of this analysis are:

(1) Over one-half (52%) of the total watered area (120,646 acres) is permanent in nature, 28% semi-permanent, and 20% temporary.

(2) Approximately one-third of each class of watered areas breeds malaria mos-

quitoes (36% of the total watered area). This acreage (42,177 acres) probably represents the significant acreage of watered area for basing MCWA operations. Two-thirds of the permanent malaria breeding acreage and one-half of the semi-permanent and temporary malaria breeding acreage are breeding continuously during the breeding season - in all, 20% of the total watered area acreage.

(3) It is significant that a major portion (61%) of the permanently watered acreage is non-breeding. This is undoubtedly due to the inclusion of some fairly large bodies of water in which a considerable portion was open water. The instructions were specific in not including open areas of large lakes, but they did not exclude open areas of many of the smaller lakes.

Figure 3 is a similar diagram with the same type of breakdown showing the types of watered areas reported on a linear basis, exclusive of those areas shown in Fig. 2. Included in this category are waterholding ditches, canals, brooks, and other watercourses under 10 feet in width - a total of 54,921,072 linear feet. Some significant features in the analysis of these data are:

(1) Permanent, semi-permanent, and temporary waterholding footages are approximately equal in extent.

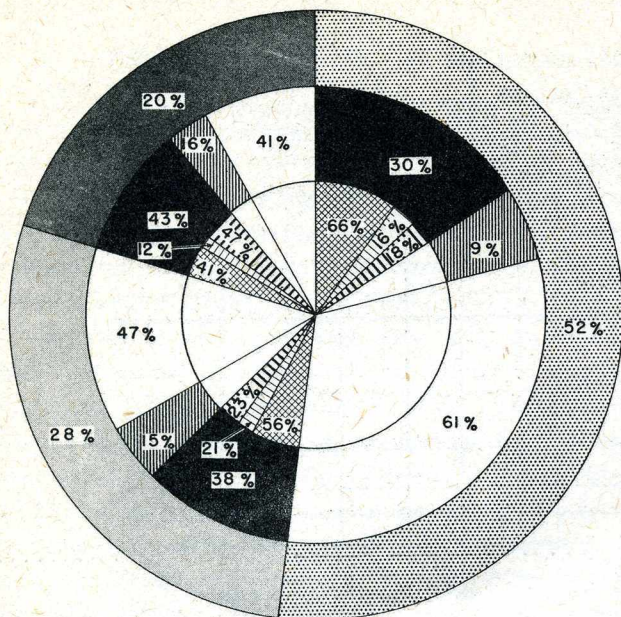


Fig. 2. Total Watered Acreage (120,646 acres)

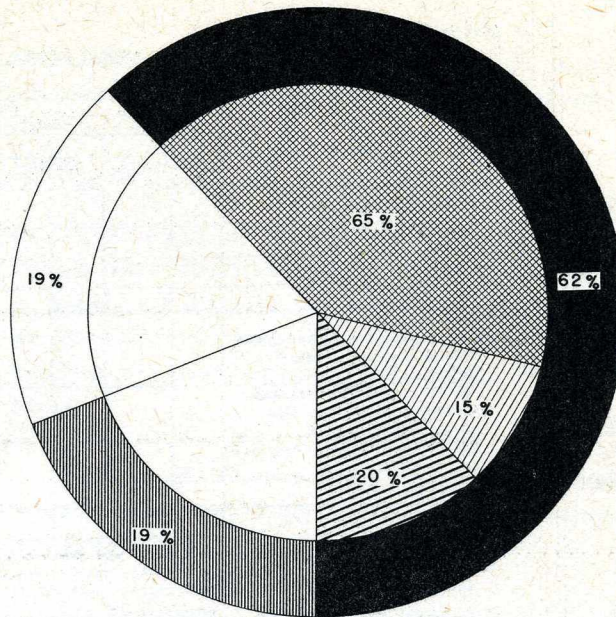


Fig. 4. Acres Eliminated by Drainage (14,911 acres)

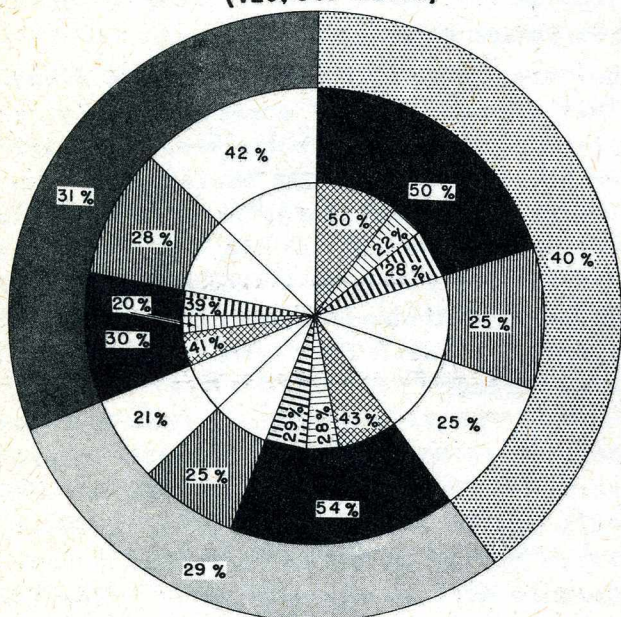


Fig. 3. Total Linear Watered-Area (54,921,072 linear feet)

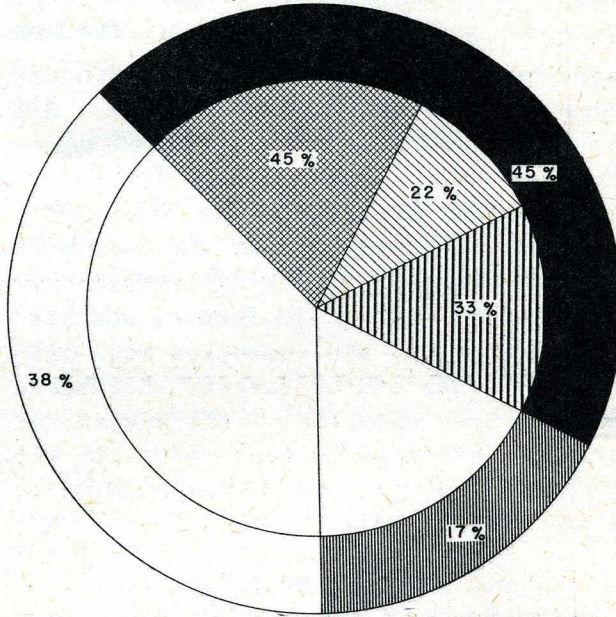


Fig. 5. Linear Feet Eliminated by Drainage (680,486 linear feet)

PERMANENTLY WATERED
SEMI-PERMANENTLY WATERED
TEMPORARILY WATERED

BREEDING MALARIA MOSQUITOES
BREEDING OTHER MOSQUITOES
NON-BREEDING

CONTINUOUSLY
FREQUENTLY
OCCASIONALLY

(2) About one-half of the permanent and semi-permanent and one-third of the temporary footage breed malaria mosquitoes (45% of the whole). The significant footage for MCWA operations would not only include this 45% but also a good portion of the remainder since it is only through ditch-cleaning and other related field activities that more footage is not included in the malaria mosquito breeding classification.

Figures 4 and 5 illustrate the amount of drainage reported by the states. 62% of the watered acreage and 45% of the

footage drained were formerly breeding malaria mosquitoes. In studying these diagrams it should be pointed out that mosquito breeding does not occur generally over an entire watered surface, and that much drainage for malaria control results in the elimination of non-breeding as well as breeding surfaces. Thus the drainage of non-breeding areas shown in the diagrams is incidental to the elimination of actual malaria mosquito breeding surfaces. Open areas of ponds are eliminated along with shoreline breeding when such ponds are drained.

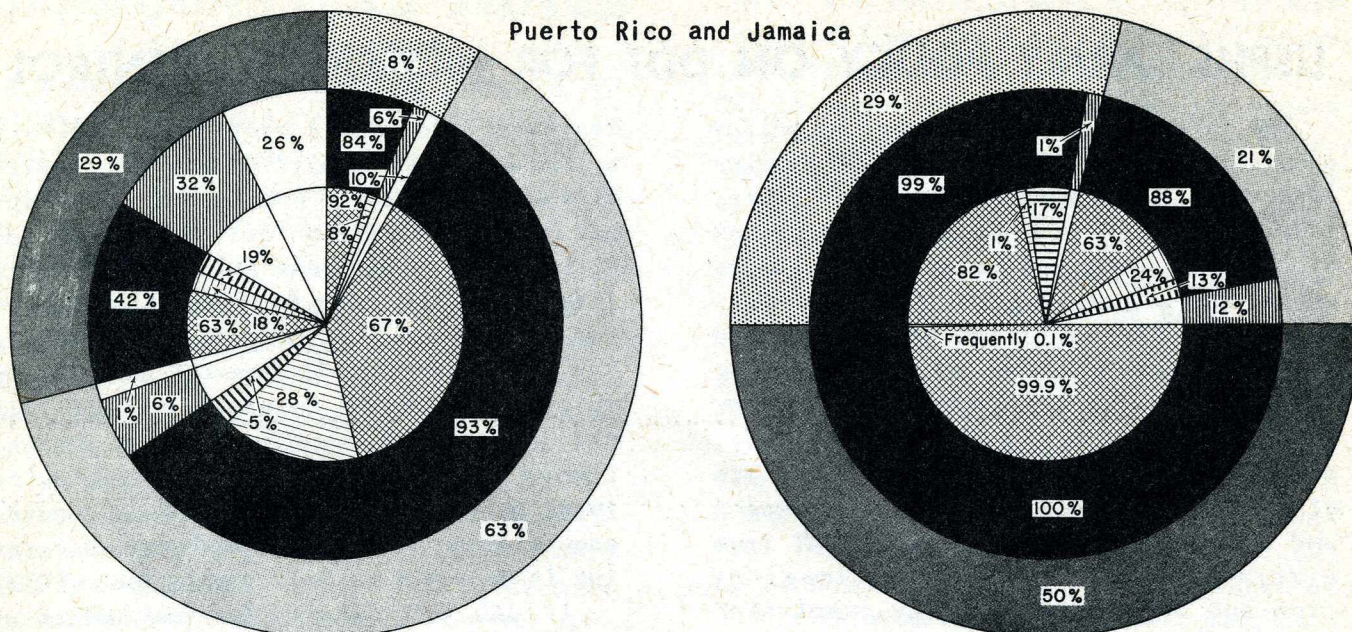
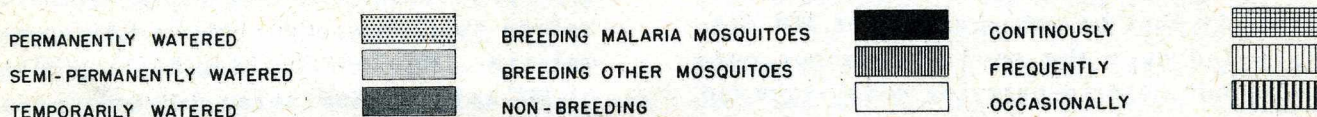


Fig. 6. Watered Acreage - (23,671 acres) - Fig. 7. Linear Watered Area - (2,876.358 feet)



In comparing the watered areas of Puerto Rico and Jamaica (figs. 6 and 7) with those in continental United States, several significant differences are noted:

(1) The percentages of permanently watered areas are greatly different - only a small percentage (8%) of the Puerto Rican watered acreage is described as permanent while approximately half of that in the United States is so classified. This means that the greater part of the Puerto Rican malaria problem is concerned with semi-permanently and temporarily watered areas. This is not true in continental United States.

(2) The percentage of watered acreages breeding malaria mosquitoes in Puerto Rico (77%) is much greater than that in this country (36%), emphasizing that the control problem is much more acute.

(3) Half the linear footage is temporarily watered, 21% semi-permanently; and 29% permanently watered.

(4) Almost all (97%) of these linear waters breed malaria mosquitoes in Puerto Rico.

SUMMARY OF CENSUS VALUES

The benefits derived from the watered area census can be summarized as follows:

(1) Zonal project personnel are considerably more familiar with their own watered areas and are probably more conscious of the use of and their need for more accurate maps.

(2) The information collected is a good estimate of the present condition of watered areas and can be used to good advantage in estimating future work.

(3) Considerable use can be made of these data when analyses of other reports are made. Entomological records and the engineering semi-monthly progress reports should relate directly to these figures.

(4) It should be pointed out that area of breeding surface alone is only one criterion by which work can be compared between states and regions, since a thousand acres of breeding surface in the North may require only one month of control a year as opposed to 5-6 months in the extreme Southern States, and 12 months in Puerto Rico and Jamaica.

(5) This is the first attempt to collect such data, and, therefore, it is the first time that a reliable estimate of the various watered areas has been available for purposes of the budget, for planning new programs, and for general administration of MCWA operations.

USPHS - ARMY POLICY ON DDT FOR MOSQUITO CONTROL

The following joint statement of policy, adopted by the U. S. Public Health Service and the U. S. Army at a meeting of representatives of these Services held on March 31, 1945, is presented here for the information and guidance of all MCWA personnel.

"Successful use of the new insecticide DDT to combat insect-borne disease among our troops overseas has brought sudden renown and notoriety to this potent war-developed insect killer. Dramatic reports of its large-scale use to control epidemics, and especially the spraying of DDT from aircraft, have fired public imagination and fostered the hasty conclusion that DDT is a complete solution to all of our insect-borne disease problems. However, it must be remembered that DDT distributed over the countryside not only wipes out malaria-carrying mosquitoes but also may kill other insects, many of which are beneficial. *Much still must be learned about the effect of DDT on the balance of nature, important to agriculture and wildlife, before general outdoor application of DDT can be safely employed in this country.* It may be necessary to ignore these considerations in war areas where the health of our fighting men is at stake, but in the United States such considerations cannot be neglected.

"Investigations are now being carried out by authorized agencies to determine the usefulness and possible hazards in the large-scale dissemination of DDT. *Until more information has been obtained from such investigations and until it has been evaluated by all interested parties, plans to employ DDT indiscriminately for outdoor area control of insect disease vectors in this country are not to be encouraged.*

"Since the beginning of mobilization, the Army has carried on an extensive antimosquito campaign inside of military reservations and the United States Public Health Service has maintained a cooperative program for the control of malaria in adjacent extramilitary areas. This joint effort has successfully prevented malaria from becoming a problem to troops in this country. To meet the hazard of possible spread of malaria by troops returning from

overseas, the Army's program in military areas has been intensified and the program of the United States Public Health Service has been extended to include certain additional selected areas in the South where risk of transmission is greatest. Representatives of the Army and the United States Public Health Service have given full consideration to ways in which this mosquito control program might be strengthened by employing DDT. The following joint policy has been agreed upon pending acquisition of further knowledge concerning large-scale outdoor application of DDT:

1. DDT will be used for residual spray application to houses and other buildings for the purpose of killing adult mosquitoes before they have opportunity to transmit malaria. The long-lasting killing effect of DDT as a residual spray provides a highly effective means to prevent the spread of the malaria parasite. This method of use is safe and economical, and, moreover, is welcomed by the householder because it provides freedom from insect annoyance.

2. The use of DDT as a mosquito larvicide will be limited to experimental investigations and to situations where DDT has definite advantage over other larvicides in saving materials and manpower, and where it presents no hazard to fish and other wildlife.

3. Distribution of DDT from aircraft for large-scale area control of mosquitoes in military and adjacent areas in the United States will be limited to projects conducted with due regard to the possible effects of DDT on beneficial insects and all forms of plant and animal life and in accordance with safeguards established by the Surgeons General of the Army and the United States Public Health Service."

This above policy is amended for MCWA regular and Extended programs, with respect to items 2 and 3, as follows:

"The application of DDT for mosquito control either from the air or ground as a larvicide or space adulticide (so called "area control") is not contemplated this season, in view of the critical shortage of DDT and the incomplete information on biological effects of DDT on useful animal and vegetable life."

HEADQUARTERS NOTES

EXTENDED PROGRAM PROGRESS

Seven thousand houses were sprayed in Arkansas' Extended Program operations in March. The Arkansas group plans to spray 25,000 in April and soon expects to reach a schedule of 1,000 houses per day in its residual spraying program.

TROPICAL DISEASE EDUCATIONAL PROGRAM

The Tropical Disease Educational Program of the U. S. Public Health Service was recently transferred to the Training and Education Division.

Present plans provide for (1) the establishment of a training and diagnostic laboratory in conjunction with the Emory University Medical School, (2) the procurement of all necessary equipment, specimens, and personnel needed for this laboratory, (3) the establishment of a unit in connection with this laboratory to cooperate with the Distribution Center for Parasitological Materials to distribute materials to State and local health departments and (4) to proceed with the development of film strips, instruction manuals, and other educational materials on tropical diseases as soon as personnel can be procured. The first class reporting for instruction under this new program will meet in Atlanta on October 1, 1945.

REORGANIZATION IN ADMINISTRATIVE DIVISION

In view of recent expansion in MCWA activities, it was necessary to reorganize and simplify the Administrative Division of this headquarters. At the present time the consolidation of the Payroll and Travel Units with the Voucher and Encumbrance Unit into the Budget and Fiscal Section has been affected. A Personnel Section has been established to handle the functions of recruitment, appointment, placement, classification, and in-service supervisory administrative training. As soon as the reorganization is completed, it is proposed to furnish field stations with an organizational chart showing details.

NEW JERSEY MOSQUITO ASSOCIATION MEETINGS

The 32nd Annual Meeting of the New Jersey Mosquito Extermination Association was held at Atlantic City, March 28 - 30,

1945. The meetings were of considerable interest from the MCWA standpoint, since nine different officers presented papers. Due to restrictions on travel, all papers were read by P. A. San. (R) H. L. Fellton. The papers presented by MCWA personnel were as follows: "Policies of the Malaria Control in War Areas program," by Sr. San. Eng. M. D. Hollis; "Entomological evaluations of control work in the Malaria Control in War Areas program," by Sr. Ent. (R) G. H. Bradley; "Operational planning for the Malaria Control in War Areas DDT residual house spraying program," by Sr. San. Eng. (R) J. M. Henderson; "Training and educational services in the Malaria Control in War Areas program," by Surg. (R) W. S. Boyd; "Notes on the occurrence of *Anopheles* mosquitoes in the salt marshes," by Asst. San. (R) Ralph C. Barnes; "Malarial mosquitoes in war areas in the Northeast," by P. A. San. (R) H. L. Fellton; "Mosquito work on a wartime basis: special problems and the manner in which they are being met, in Virginia," by Asst. State Director R. E. Dorer, "in Maryland," by Asst. San. G. B. Vogt, and "in Pennsylvania," by San. Eng. (R) R. W. Gies.

PROFESSIONAL PERSONNEL

Transfers include Asst. Eng. (R) Sam G. Segal from Dyersburg, Tenn. to Herrin, Ill.; P. A. San. (R) Leslie D. Beadle from Parsons, Kansas to Denison, Texas; Asst. San. (R) Charles Kohler from Moncks Corner, S. C. to Dyersburg, Tenn.; Asst. San. (R) Wilbur H. Duncan from Atlanta, Ga. to Paducah, Ky.; Asst. San. (R) Willis V. Mathis from Greenville, Miss. to Savannah, Ga.; Asst. Eng. (R) E. F. Coffin from Nashville, Tenn. to Jacksonville, Fla.; and Asst. San. Eng. (R) Russell G. Ludwig from Atlanta to Savannah, Ga.

The following new officers have been commissioned and have reported for active duty: Asst. Eng. (R) Marvin B. Scher from Hdqts. to Nashville, Tenn.; Asst. San. (R) Howard B. Hollander assigned to District #7; Asst. San. (R) Will S. DeLoach assigned to Savannah, Ga.; Asst. San. (R) Everett L. Bishop, Jr. assigned to Savannah, Ga.; Jr. Asst. Eng. (R) Vincent J. Roggeveen, Asst. Eng. (R) Verdon L. Dix, and Jr. Asst. Eng. (R) Wallace E. Frank unassigned.

DIVISION NOTES

STATE LISTS OF MOSQUITO DISTRIBUTION

The Entomology Division is emphasizing the importance of collecting more detailed information on the distribution and abundance of all the individual mosquito species in the United States -- even though our present information may indicate that the majority is not concerned in disease transmission.

The renewed interest and concern regarding the importance of mosquitoes in the epidemiology of certain diseases has shown a need for more reliable information regarding mosquito species other than the more well-known anophelines. This need has been stimulated by the possibility of present and post-war introduction of Japanese B encephalitis, filariasis, dengue, yellow fever, and possibly other mosquito-borne diseases.

Information on these non-anophelines will be gathered by MCWA personnel while in the field, incidental to anopheline survey work, and placed in State Health Department files where it will be readily available for reference whenever mosquito-borne disease problems come up for discussion.

The details regarding the collection and reporting of these data on mosquito abundance and distribution have been outlined in a recent Manual of Operations Letter (Entomology, No. 13, February, 1945) entitled "State Lists of Mosquito Distribution." Complete coverage is planned in those States with MCWA projects.

NEW ANOPHELINE DISTRIBUTION MAPS

Certain film strips now in preparation by the Training and Education Division will include distribution maps of the anophelines which occur in the United States. Preliminary drafts of the maps have been prepared, two of which are shown on the back cover of this bulletin. Subsequent Bulletins will contain similar maps dealing with the other species.

These maps are not intended to give spot records or to indicate population

densities, but rather to roughly define the known limits of distribution of each species. Spot maps will be prepared at a later date, as the data requested in Entomological Manual Letter #13 recently issued, are accumulated.

Data for these maps have been compiled mainly from various publications. Additional unpublished records have been supplied by the following MCWA officers: Ralph C. Barnes (District #1), Leslie D. Beadle (Kansas), Harold H. Dodge (District #5), H. Rodney Dodge (Georgia), Melvin H. Goodwin (New Mexico and Texas), Dale R. Lindsay (Texas), Louis J. Ogden (Texas), L. Edward Perry (District #8), John A. Rowe (Iowa), Curtis W. Sabrosky (Michigan), and Willis W. Wirth (Nebraska and Kansas).

Additional information on any further extension of the known distribution of any of these species should be reported promptly, so that it may be included in film strips to be prepared in the near future.

IN-SERVICE TRAINING

Six officers and five civil service employees completed the In-Service Training and Orientation Course during March. Two additional officers visited selected portions of the course. Visitors included Miss Evelyn Flook, of the States Relations Division, Nurse Officer (R) Mary B. Forbes, Mr. H. L. Calligan of the Mississippi State Board of Health, and Mr. Y. C. Mar, Chinese engineer under the sponsorship of UNRRA.

Representatives of the In-Service Training Section assisted the Health Departments of Oklahoma, Mississippi, Missouri, and Tennessee with certain aspects of decentralized training of field personnel in connection with operations on the Extended Malaria Control Program.

Seminars open to interested personnel have been initiated as a part of the course. On March 3rd, Dr. R. H. Daggy spoke on his experiences with malaria and dengue control in the New Hebrides; on March 30, a film on amoebiasis and its treatment was shown.

Table II
MCWA Expenditures And Liquidations By Major Items

February 1945

	Continental U. S.	Percentage of Total	Puerto Rico	Percentage of Total
.01 Personal Services	\$ 390,457.47	58.59	18,002.01	86.91
.02 Travel	23,698.79	3.56	358.75	1.73
.03 Transportation of Things	4,675.41	.70	-----	----
.04 Communication Services	1,269.19	.19	20.00	.09
.05 Rents and Utilities	2,432.06	.36	-----	----
.06 Printing and Binding	1,402.99	.21	-----	----
.07 Other Contractual Services	3,182.12	.48	13.30	.06
.08 Supplies and Materials	87,197.67	13.08	2,312.61	11.16
.09 Equipment	152,140.30	22.83	10.16	.05
Total	666,456.00	100.00	20,716.83	100.00
Expenses Other Than Personal Services	275,998.53	41.41	2,714.82	13.09

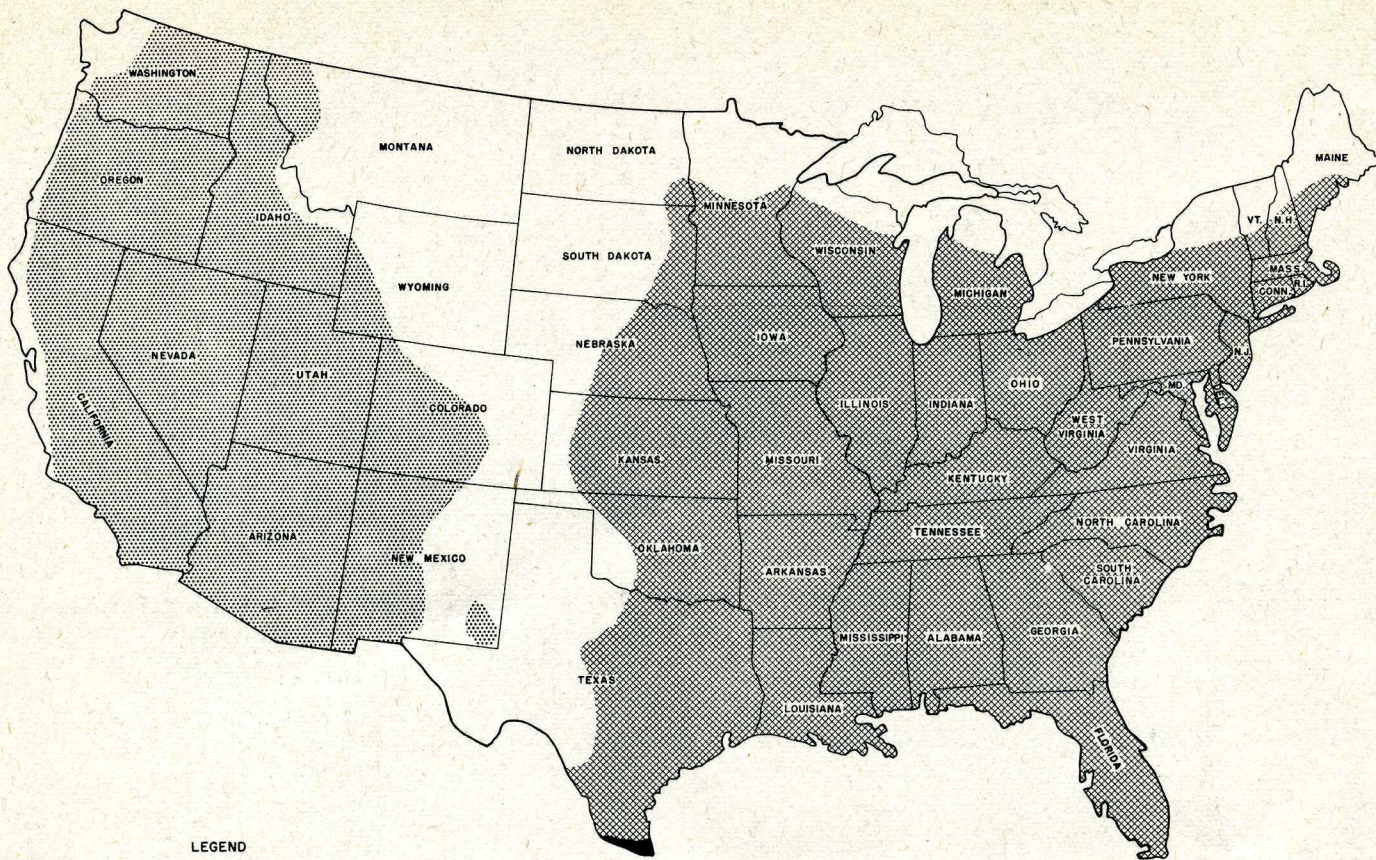
Table III
MCWA Personnel On Duty And Total Payroll

February - 1945

State	Commissioned		Prof. & Sci.		Sub-Prof. (1)		C. A. F.		Custodial and Per Hour		Total		Percent of Total	
	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay
Alabama	4	1,124	2	404	3	547	1	182	25	3,191	35	5,448	1.25	1.33
Arkansas	8	2,384	5	1,479	35	5,882	5	996	209	22,243	262	32,984	9.33	8.08
California	4	1,089	---	---	4	852	3	622	17	2,608	28	5,171	.99	1.27
Dist. of Columbia	1	329	---	---	---	---	1	233	---	---	2	562	.07	.14
Florida	9	2,683	7	2,016	32	6,229	7	1,127	137	17,925	192	29,980	6.84	7.34
Georgia	8	2,410	3	791	37	7,288	6	1,059	77	10,289	131	21,837	4.67	5.35
Illinois	4	1,151	1	128	---	---	1	164	---	---	6	1,443	.21	.35
Indiana	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Kentucky	2	562	2	547	2	416	1	164	3	405	10	2,094	.36	.51
Louisiana	10	2,835	4	1,246	44	8,938	6	1,060	194	25,957	258	40,036	9.19	9.80
Maryland	2	527	---	---	2	385	2	438	11	1,537	17	2,867	.61	.71
Mississippi	8	2,277	5	1,206	12	2,553	4	714	88	11,040	117	17,790	4.17	4.36
Missouri	1	329	---	---	9	1,849	1	158	27	3,034	38	5,370	1.35	1.31
North Carolina	5	1,501	5	1,561	7	1,446	4	732	132	17,181	153	22,421	5.45	5.49
Oklahoma	4	1,199	1	274	11	2,350	1	164	34	4,276	51	8,263	1.82	2.02
Oregon	---	---	---	---	1	203	---	---	---	---	1	203	.04	.05
Puerto Rico	8	2,443	1	347	3	566	5	1,150	300	13,496	317	18,002	11.29	4.41
South Carolina	6	1,925	6	1,719	29	6,129	5	872	317	40,146	363	50,791	12.93	12.43
Tennessee	4	1,172	2	638	9	1,618	3	584	69	7,370	87	11,382	3.10	2.79
Texas	8	1,694	4	1,316	27	5,642	6	1,071	179	22,792	224	32,515	7.98	7.96
Virginia	2	610	2	696	10	2,024	3	602	103	13,433	120	17,365	4.27	4.25
<u>AEDES AEGYPTI</u>														
Alabama	1	281	---	---	9	1,613	1	146	---	---	11	2,040	.39	.50
Florida	1	281	---	---	23	4,463	2	292	---	---	26	5,036	.93	1.23
Georgia	---	---	---	---	6	1,085	---	---	---	---	6	1,085	.21	.27
Louisiana	1	281	1	274	9	1,734	1	164	---	---	12	2,453	.42	.60
South Carolina	1	281	---	740	7	649	1	164	---	---	9	1,834	.32	.45
Texas	4	1,123	---	---	25	4,754	2	310	5	676	36	6,863	1.27	1.68
Hq. & Dist. (2)	75	23,892	8	2,237	33	6,226	131	22,031	32	4,570	279	58,956	9.93	14.43
Mobile Units	6	1,932	3	669	1	91	3	562	4	394	17	3,648	.61	.89
Total	187	56,315	62	18,288	390	75,532	206	35,761	1,963	222,563	2,808	408,459	100.00	100.00
Percent of Total	6.65	13.79	2.21	4.48	13.89	18.49	7.34	8.76	69.91	54.48	100.00	100.00		

(1) Includes Entomological Inspectors

(2) Includes Headquarters and District Offices, malaria survey, Imported malaria control, special investigations, and employees temporarily attached to Headquarters pending assignment to States.

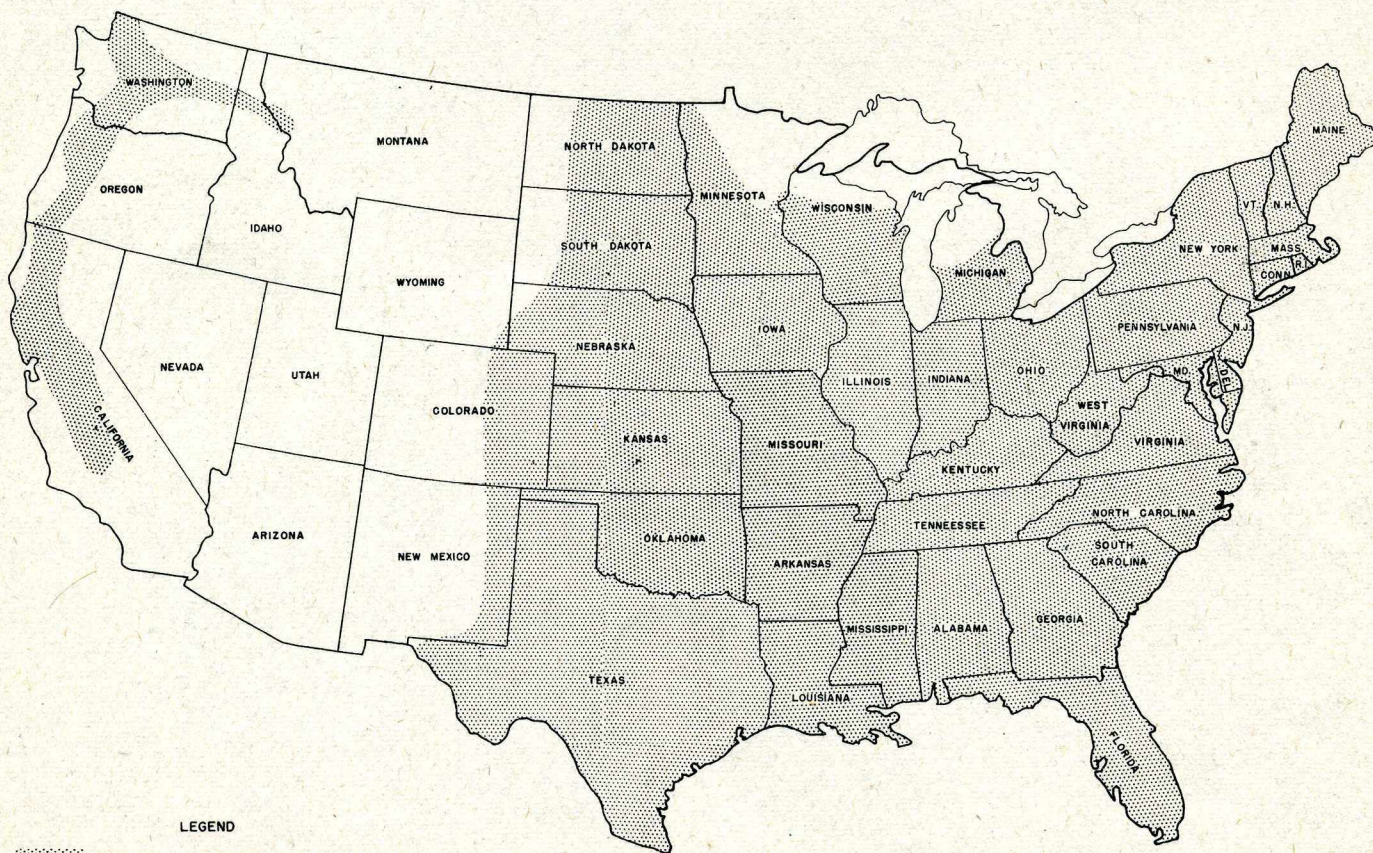


LEGEND

 ANOPHELES QUADRIMACULATUS

 ANOPHELES FREEBORNI

 ANOPHELES ALBIMANUS & A. QUADRIMACULATUS



LEGEND

 ANOPHELES PUNCTIPENNIS

ANOPHELINE DISTRIBUTION MAPS