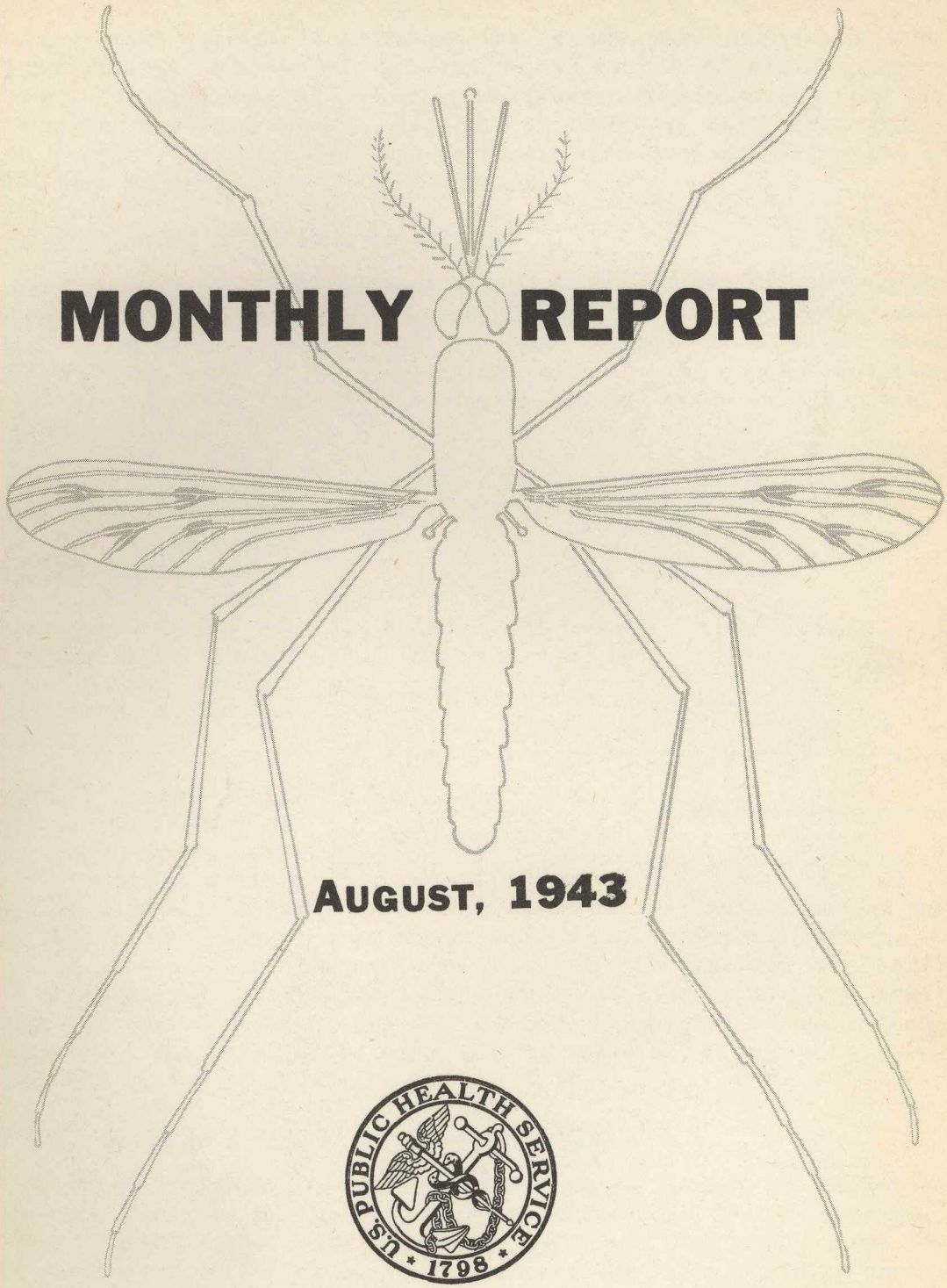
MALARIA CONTROL IN WAR AREAS



MONTHLY REPORT

AUGUST, 1943

FEDERAL SECURITY AGENCY
U. S. PUBLIC HEALTH SERVICE
ATLANTA, GEORGIA

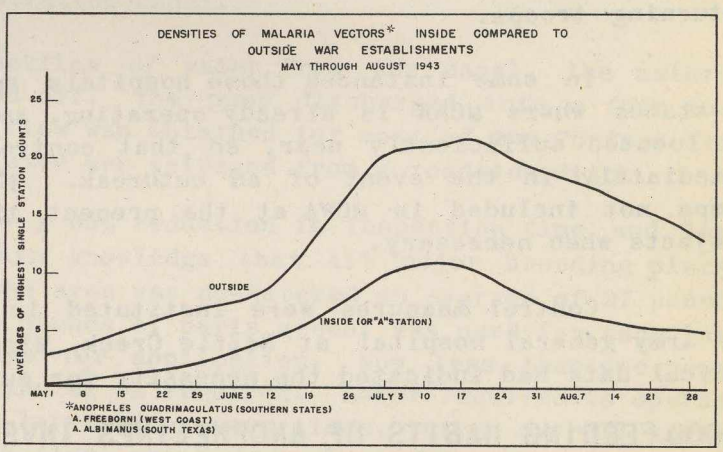
MONTHLY REPORT
MALARIA CONTROL IN WAR AREAS
AUGUST, 1943

Larvicidal operations continued to be the main function of MCWA in August, with 241,399 gallons of oil and 23,456 pounds of paris green being used to treat 30,041 acres of breeding surfaces. Considerable minor drainage and clearing was also done, as is shown in Table 1. Airplane dusting was carried on in six areas, and two such projects were dropped during the month due to reduction of breeding by natural causes.

AUGUST GRAPH SHOWS DECREASE IN QUADS

As indicated by the accompanying graph, *Anopheles quadrimaculatus* densities generally declined during August in most of the cooperating states. Entomological reports (M-7) were received from approximately 80 per cent of the established MCWA zones, a substantial increase in the number reporting in any one month, and accounting for nearly all except those on occasional inspection status.

For the entire month of August a total of 47 zones, or 9.2 per cent of the zones reporting, exceeded the "satisfactory control" limitation of 10 female *quads* in any one "A" station for three consecutive weeks. During the last week only 33 zones, or 7.7 exceeded this limit.



The omnipresent threat that exotic species of mosquitoes might be introduced into the United States as a result of intensified air travel was brought sharply into focus in August with the finding of a specimen of the *Anopheles (Nyssorhynchus)* group. Discovered in an area adjacent to a Florida Airport, the specimen was dead when taken, and was hanging in a spider web beneath a bridge. Although positive determination of the specimen could not be made because of its condition, it closely resembled *Anopheles albimanus*, and is believed to be that species. *Albimanus* is not native to Florida.

DYNAMITE PROJECTS IN OPERATION IN FIVE STATES

Dynamite projects were in operation during August at Tallahassee, Florida; Macon, Georgia; Montgomery, Alabama; Walterboro, South Carolina, and at Fort Bragg and Elizabeth City, North Carolina. The project at Macon, Georgia is considered to be of great importance, for it is believed that when the project is completed it will eliminate a large *anopheline* breeding place which has caused station counts to remain high in this area.

During the month purchase orders were placed for 26,400 pounds of

dynamite totaling $3559.00.

A Public Health Service owned dragline began work on a large major drainage project at Helena, Arkansas on August 20. Draglines were also in operation during the month at Walterboro, South Carolina; Fort Bragg and Wilmington, North Carolina.

Three drainage project proposals were submitted in August, all of which were approved.

MALARIA CONTROL PROGRAM TO BE EXPANDED

It is expected that the magnitude of the MCWA program will be greatly expanded in the near future due to the inclusion in the program of Army general hospitals, and prisoner-of-war internment camps. Heretofore, the program was confined principally to the 19 malarious states, Puerto Rico, and the District of Columbia. With the return to this country of troops and prisoners of war from foreign malarious areas, close entomological and medical surveillance has become necessary in additional states. Control measures will be instituted at general hospitals and prisoner-of-war camps in which malaria is present, and where entomological inspection indicates *quad* breeding, as well as at other stations indicated by the Army as centers of returning troops.

In some instances those hospitals and internment camps are located in states where MCWA is already operating, and are either in control zones, or located sufficiently near, so that control measures could be instituted immediately in the event of an outbreak. Those hospitals and internment camps not included in MCWA at the present time will be operated as special projects when necessary.

Control measures were instituted in August for the protection of the Army general hospital at Battle Creek, Michigan, after entomological and medical data had indicated the necessity for such measures.

BLOOD FEEDING HABITS OF ANOPHELINES INVESTIGATED AT SAVANNAH

In an effort to determine the blood feeding habits of *anopheline* mosquitoes, plans have been made to conduct a series of tests on mosquito specimens from all sections of the United States.

It has been found in the past that mosquitoes known to be malaria vectors in some areas of the world are of little importance in malaria transmission in other areas. Extensive research has in several instances shown that a sub-specific or racial segregation has occurred insofar as they demonstrate a predilection for animal blood rather than human. Similar vagaries are believed to be existent in the United States, and it is for this reason that the projected tests are to be made.

Freshly engorged mosquitoes are to be gathered in all sections of the country, and shipped to the Savannah laboratory, where the Barber-Rice precipitin test technique will be used. Collection of specimens will be made during the early morning hours while the blood is relatively undigested, and the females crushed in a small folded piece of filter paper.

Using this technique it is possible to determine which of five animals, including man, was the blood donor to the mosquito. The five hosts, man, horse, cow, pig, and chicken, may be tested for in any one crushed mosquito sample.

State MCWA entomologists will be responsible for making arrangements with the area inspectors to collect the necessary specimens. From the data accumulated it is hoped to obtain some needed information concerning the epidemiology of malaria in the United States.

UNIQUE DRAINAGE METHOD USED IN GEORGIA

Using a two inch, portable, centrifugal pump, driven by a gasoline engine, Georgia MCWA engineers recently performed a unique drainage project on a partly vegetated section of Stratton Swamp in the Macon area. Approximately three acres were de-watered in about eight hours.

A large portion of the watered area was in sunlight, and was fed by local seepage and storm run-off. Gravity drainage was impossible due to the higher elevation of nearby Stratton Canal.

To guard against a backflow of water from the canal, the natural drain into the area was blocked off. The pump discharged into a four inch pipe, elevated so that gravity flow was obtained for most of the 75 feet from the pump to the canal. The pipe used was salvaged from a roadside ditch.

Principal benefits are a 95% reduction in inspection time and larvicidal material, and the certain knowledge that all major breeding places have been eliminated. Before the area was de-watered an average of 27 pounds of mixed dust (approximately 2½ pounds of paris green) was used for each larviciding, requiring six man hours for application. Now less than one pound of mixed dust and only a few minutes is required. Labor required to operate the pump offsets labor saved in larviciding operations, but an overall saving has been obtained in inspection time, which has almost been eliminated, and *A. quadrimaculatus* breeding in the main portion of the area formerly impounded is now impossible.

SAVANNAH COMPLETES FIRST CITY-WIDE *AEGYPTI* SURVEY

The *Aedes aegypti* breeding index in Savannah, Georgia showed a sharp decrease in August, but is still relatively high, and the danger of a dengue outbreak continues to be very real. During the month the first inspection of the entire city was completed, and the second started, so it is expected that future indexes will be lower. Action is being taken to increase immediately the inspector personnel, bringing the Savannah project up to quota, and making possible a more complete coverage of the city.

In Key West the index remained at roughly three per cent, the level which has been maintained since about the middle of June.

As was expected at this time of the year, breeding rose in New Orleans, and finally exceeded the five per cent value. A much greater rise is not expected because of continuing subnormal rainfall. Efforts are being made to develop a plan for increasing efficiency in routine inspections.

Miami *aegypti* workers emphasized improving cooperative work with the military bases in the Miami area, and increasing efficiency of inspection in the industrial area.

All Texas indexes were below the five per cent limit for the period August 15 - 31, but for the period August 1 - 15 were considerably above this limit in Houston and San Antonio. Charleston, S.C. continued at the two per cent level.

PLANS MADE FOR ADDITIONAL PROJECTS IN PUERTO RICO

Malaria control operations have progressed favorably in Puerto Rico in the past several months. A new drainage project was recently initiated at Losey Field to expedite the rate of progress on a MCWA sponsored FWA project, and malaria control mapping was begun around the new Army base under construction, preparatory to the performance of a joint malaria control field study by both the MCWA and Army Department Laboratory.

In the Ft. Buchanan - San Patricio area airplane dusting was continued under a cooperative agreement between the Navy, which furnished the pilot, and the Public Health Service which furnished the mixed paris green dust and technical supervision. Larviciding by MCWA ground forces was continued in the 20,000 acre intra and extra - reservation project area. Plans were released for the construction of a 90,000 gallon per minute pumphouse and concrete bridge for the Ft. Buchanan outfall canal.

Considerable work was completed on the Camp Tortuguero project. Construction of a canal inlet into Lake Tortuguero was completed to the shore line of the lake. Further extension of the canal through the shallow margins of the lake proper will be performed in the future by combined hand labor and dynamite propagation methods.

In July, 1943 the WPA in Puerto Rico was changed in name to FWA and operating projects with unexpended plans will continue without interruption.

CLOSER LIAISON WITH MILITARY AUTHORITIES PLANNED

The establishment of many new general hospitals and prisoner-of-war camps is expected to result in a marked increase in the exchange of correspondence with military authorities. In order to eliminate possible confusion that would result from several MCWA offices communicating with the various military offices, and particularly the Service Commands, a general policy has been formulated for use by Malaria Control in War Areas.

The headquarters office will be responsible for furnishing to the Service Commands through the Public Health Service Liaison Officers all official reports and information concerning MCWA activities. All such material for transmission to Service Commands and other military offices should be forwarded to the headquarters office with appropriate supplemental information. Copies of correspondence to the Liaison Officers will be furnished to the District and State Offices as indicated.

If, in emergency or other special cases, it is necessary to effect direct official exchange of information between the District or State offices and the Service Commands or other military offices, the headquarters office should be furnished with complete information immediately subsequent to such action. In cases of this nature, above the area level, the exchange should be made through the Public Health Service Liaison Officers.

Liaison with military establishments at the local area level is, of course, in accordance with the policies and procedures established by the respective State Health Departments, and should be encouraged so that there may be complete cooperation. Public Health Service Liaison Officers are urged to expedite transmittal of all material forwarded to them to the Service Commands.

A map showing the States included in the various Public Health Service Districts and Army Service Commands will be found on the back cover of this report.

BRIGADIER COVELL, INDIAN ARMY, VISITS MCWA

Of special interest to the MCWA headquarters staff was the visit of Brigadier Gordon Covell, Indian Army, on August eleventh. Dr. L.L. Williams, Jr. spent some time in India with Dr. Covell, who is Director of the Malaria Institute of India.

Speaking informally to the staff, Dr. Covell stated that there are from one hundred to two hundred million cases of malaria in India every year with over one and a quarter million deaths, resulting in a loss of about $130,000,000. He pointed out that most of India malaria is endemic or hyper-endemic except for a few hilly areas, and that there is active transmission in the eastern portion during a period of eight months of the year.

MALARIA CONTROL IN WAR AREAS OFFICE ESTABLISHED IN DISTRICT NO. 1

As a result of an exchange of correspondence between the Surgeon Generals of the Army and the Public Health Service, MCWA has been directed to exercise extreme vigilance and to undertake malaria mosquito control wherever necessary to avoid the possibility of malaria transmission between returning troops and the civilian population. Particular emphasis was placed in this directive on the Army General Hospitals and prisoner-of-war camps but reference was made to "other" stations where the circumstances were such that transmission might be possible.

A MCWA office is, therefore, being established in District No. 1 to conduct surveys and inspections of all military and naval establishments that might qualify as mentioned above and to initiate and carry on control procedures wherever they are deemed necessary. Mr. Herman L. Fellton has been designated as Officer in Charge of this office. Because of its distance from Atlanta and the special problems presented in what is normally considered to be a non-malarious area, it is intended that this office shall be as nearly autonomous as is practicable. It will be self-directing on technical and administrative matters relating to malaria control operations, but in all matters of public relations the office will be subject to direction of the District Director or his representative.

It is anticipated that during the winter months the personnel of this office will consist of an engineer, and entomologist, and a clerk stenographer. Additional technical and administrative personnel will be added as necessary when control operations are instituted.

SPRAY KILLING OF ADULT MOSQUITOES USED AT STUTTGART, ARKANSAS

Where very extensive breeding areas are involved and the human population is low, so that the cost of malaria control by means of drainage or larviciding would be excessively high, other methods of preventing the transmission of malaria in the area must be utilized.

After a mosquito bites a person with malaria parasites in his blood, a certain period of time must elapse before that mosquito can transmit the disease to another person. This period is the time required for the malaria parasite to undergo its various transformations and migrations within the mosquito and reach the salivary glands from where it could be introduced into the blood stream of a person being bitten. This parasite development period usually occupies about seven days, and it is apparent that if the infected mosquito should be killed before the end of this period it will not have been able to transmit malaria, even though it has bitten one or more people during that time.

Utilizing this information, a project for the spray killing of adult malaria mosquitoes has been instituted at Stuttgart, Arkansas, and may also be utilized in other war areas as required. All places where adults engorged with human blood are likely to rest while digesting their blood meal should be sprayed with an effective insecticide about twice each week, thereby preventing completion of the parasite development period. Since no attempt is made to control the production of malaria mosquitoes, there will be no reduction in the number of adult mosquitoes in the area and the mosquito population may increase or decrease just as it would were no malaria control measures conducted. It is important that this be clearly understood and explained to the military and civilian authorities concerned where such a project is undertaken, otherwise these individuals may judge the effectiveness of the program in terms of the prevalence of mosquitoes.

DRAINAGE PROJECTS TO BE STRESSED DURING WINTER SEASON

With an acute labor shortage already facing the MCWA program, and the prospect of an even greater shortage during the next mosquito breeding season the importance of effective drainage projects has increased. The elimination of a number of major breeding areas by drainage will naturally result in a reduction of the demands for manpower next year.

The MCWA program has built its policy of effective control in the production of malaria mosquitoes around a minimum expenditure of manpower and materials. This year it is more than ever necessary that the coordination of drainage and larvicidal operations be based on consideration of the manpower question.

Funds will be available at the end of the mosquito breeding season for Class A and B drainage operations in areas where such work is economically

feasible, and manpower and equipment can be secured without serious competition with other essential war work. In many of the southern states ample agricultural labor will be available for major drainage operations during the winter.

It is expected that project proposals including plan-profile and other necessary data will be submitted to the Headquarters office in the near future. The District MCWA engineers and additional engineering personnel from the Headquarters Office have been directed to assist in the selection of projects in order to facilitate early approval and inauguration.

TABLE IV
MCWA ENCUMBRANCES AND LIQUIDATIONS BY MAJOR ITEMS
AUGUST 1943

	Continental U.S.	Puerto Rico
.01 Personal Services	$475,273	$33,803
.02 Travel	9,493	342
.03 Transportation	277	---
.04 Communications Service	844	50
.05 Rent	1,757	---
.06 Printing and Binding	---	---
.07 Other Contractual Services	18,839	32
.08 Supplies and Materials	86,307	1,432
.09 Equipment	14,560	885
Sub-total other than Personal Services	132,077	2,741
Total	607,350	36,544

AIRPLANE DUSTING PROGRAM
AUGUST 1 - AUGUST 31

STATE	NO. OF AREAS DUSTED	ACREAGE DUSTED	PARIS GREEN USED LBS.	DILUENT USED LBS.	PARIS GREEN PER ACRE	DUSTING TIME HOURS	TOTAL MAN HOURS
Arkansas	2	5,760	4,620	22,090	0.8	24:50	512
Louisiana	3	5,348	9,367	21,233	1.7	13:10	756
Potomac River	1	13,430	18,033	60,472	1.3	104:57	3,348
TOTAL	6	24,538	32,020	103,795	1.3	142:17	3,506

MALARIA CONTROL IN WAR AREAS

STANDINGS OF STATES AS OF AUGUST 31, 1943 IN

PURCHASE OF WAR SAVING BONDS

BY PAYROLL SAVING PLAN

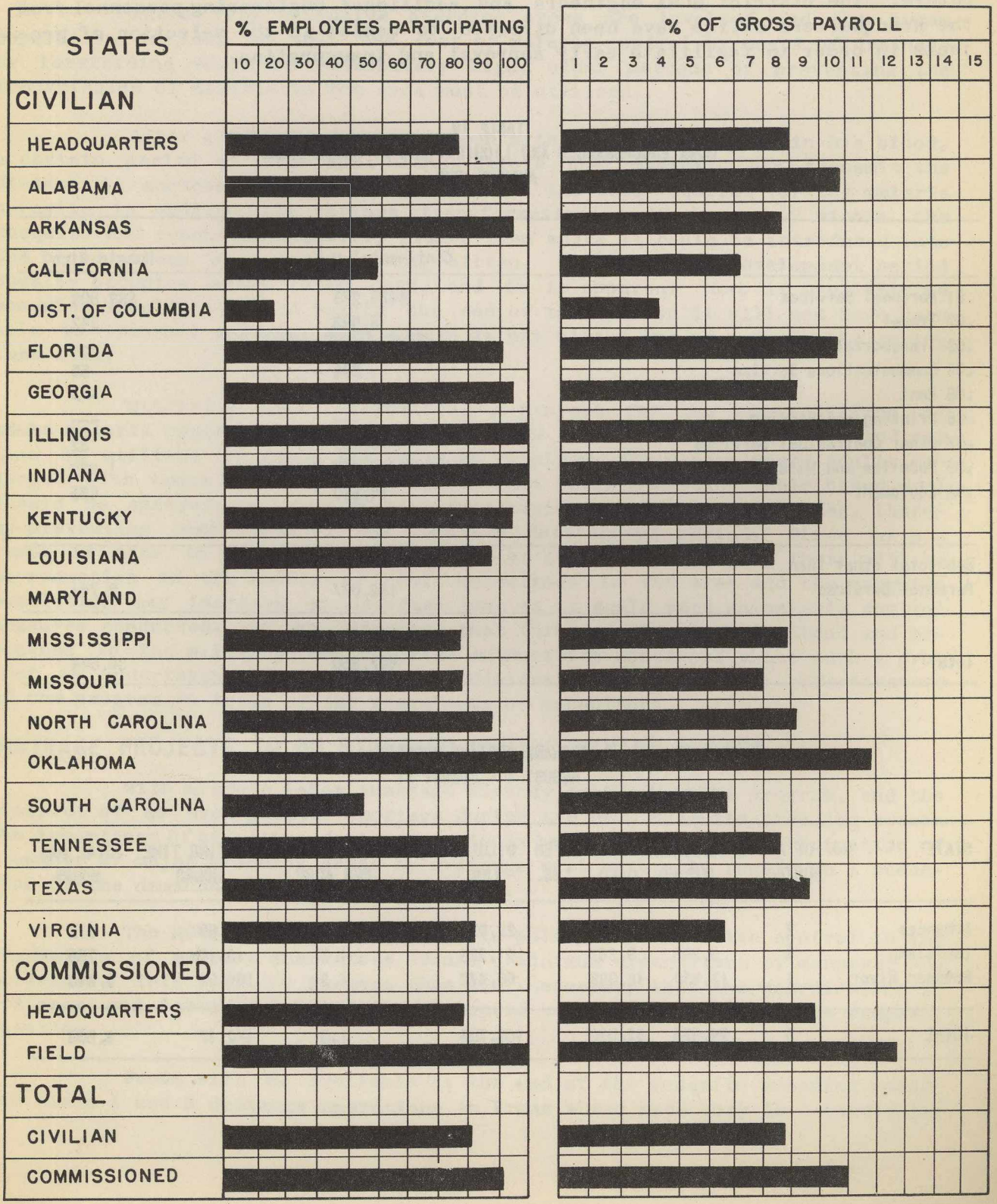


TABLE I — MCWA LARVICIDE AND MINOR DRAINAGE PROJECTS — AUGUST 1 - 31, 1943

STATE	Areas in Operation	War Establishments Protected	LARVICIDAL WORK			OTHER WORK					Total Man Hours	Total Men Employed
			Larvicide Used		Surfaces Treated	Ditching		Cleaning	Clearing	Water Surf. Eliminated		
			Oil Gals.	Paris Green Lbs.	Acres	Cu.Yds.	Lin.Ft.	Lin.Ft.	Acres	Acres		
Alabama	8	64	1,295	30	85.4	363	1,327	12,500	7.1	5.3	6,710	45
Arkansas	14	63	16,045	858	1,561.7	1,151	18,070	239,157	72.6	10.5	29,273	160
California	3	11	7,479	---	811.8	*	12,441	---	1.0	43.0	4,038	18
D. C.	1	23	---	---	0.7	670	11,600	405	0.4	3.9	3,060	19
Florida	16	91	5,686	169	378.3	7,079	45,485	431,792	39.8	83.5	43,028	209
Georgia	13	93	78	3,468	3,849.1	166	1,666	126,983	27.6	17.9	28,575	148
Illinois	2	54	3,530	1,520	1,370.6	---	---	24,126	---	1.1	6,337	31
Indiana	1	40	1,079	92	255.3	10	400	---	0.5	---	1,936	9
Kentucky	5	48	793	178	199.8	---	---	73,650	8.6	---	7,720	39
Louisiana	8	71	85,791	7,139	10,343.9	1,669	20,735	76,830	108.3	8.8	72,626	398
Maryland	2	21	209	16	21.1	240	1,150	31,850	3.1	1.9	4,896	18
Michigan	1	--	---	12	11.3	---	---	---	0.6	---	352	3
Mississippi	12	50	9,184	35	447.2	431	4,960	258,388	73.6	1.5	20,346	113
Missouri	5	24	4,957	1,509	1,351.6	63	195	48,050	9.4	0.6	10,779	55
North Carolina	11	69	11,682	61	614.5	1,299	13,573	452,172	182.1	22.5	46,668	221
Oklahoma	5	21	5,626	246	486.7	176	4,011	8,585	18.4	1.4	9,394	42
Puerto Rico	5	22	1,245	6,298	3,302.5	*	51,993	113,709	16.7	3.6	59,866	394
South Carolina	20	101	18,562	1,207	2,314.3	1,416	9,827	480,357	229.3	12.8	50,268	252
Tennessee	7	69	27,309	338	1,005.8	175	750	22,857	1.6	3.6	14,409	67
Texas	14	140	22,017	191	1,030.3	896	87,537(1)	234,799	168.6	16.1	46,862	239
Virginia	4	83	18,765	98	599.2	*	25,454	22,269	60.8	---	30,661	174
Total	157	1,158	241,399	23,465	30,041.1	15,804	311,174	2,658,479	1,030.1	238.0	497,804	2,654
July Total	155	1,158	279,308	18,364	28,488.9	19,890	478,448	4,851,430	844.8	254.3	504,848	2,637

* Figures not available
(1) Most ditching figures given in lineal feet only

TABLE II — MCWA MAJOR DRAINAGE PROJECTS — AUGUST 1 - 31, 1943

STATE	No. of Projects	Clearing Brushing Acres	Channel or Ditch Cleaning Lin.Ft.	New Ditching				Fill Cu.Yds.	Ditch Lining Placed		Underground Drains Lin.Ft.	Water Surf. Eliminated Acres	Total Man Hours
				Hand	Lin.Ft. Mach.	Dynamite	Total Cu.Yds.		Sq.Ft.	Lin.Ft.			
Alabama	2	9.0	2,700	450	---	5,300	5,042	---	---	---	---	95	4,545
Arkansas	1	2.0	---	600	1,090	---	3,487	---	---	---	---	---	712
Florida	1	8.0	11,600	---	---	---	---	---	---	---	---	---	1,978
North Carolina	4	29.2	22,762	15,214	1,310	2,100	8,340	123	---	---	---	16	10,708
Puerto Rico	3	5.6	2,300	2,500	---	400	4,736	33	1,194	---	---	32	38,676
South Carolina	2	1.0	981	1,472	600	8,175	5,148	406	1,880	815	---	---	3,879
Texas	1	0.2	2,200	2,100	---	---	224	---	---	---	---	360	2,356
Virginia	1	0.9	8,791	---	---	---	---	---	---	2,118	---	---	3,730
Total	15	55.9	51,334	22,336	3,000	15,975	26,977	562	3,074	2,933	---	503	66,584
July Total	17	46.2	61,997	12,781	4,410	36,422	50,867	584	2,034	4,378	---	440	78,731

TABLE III — MCWA PERSONNEL ON DUTY ON AUGUST 31, 1943 AND TOTAL PAYROLL FOR MONTH OF AUGUST — AUGUST 1 - 31, 1943

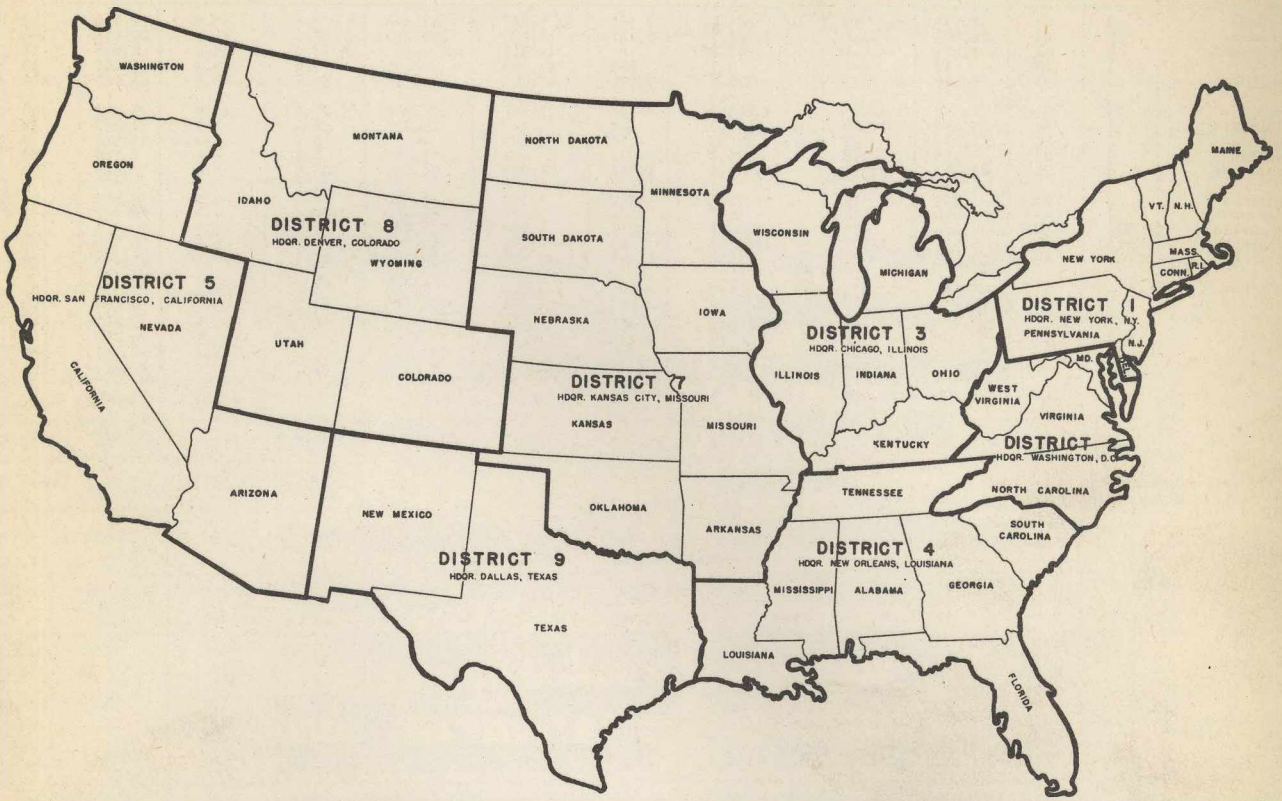
STATE	Commissioned		Prof. & Sci.		Sub-Prof. (1)		C. A. F.		Custodial		Total		Percent of Total	
	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay	No.	Pay
Alabama	3	855	3	791	2	338	2	410	58	7,145	68	9,539	1.9	2.0
Arkansas	5	1,442	2	633	24	4,504	5	829	133	16,670	169	24,078	4.6	5.1
California *														
D. C.	2	677	1	326	3	550	3	367	15	2,253	24	4,173	0.7	0.9
Florida	2	570	6	1,658	18	3,670	5	792	204	26,729	235	33,419	6.4	7.0
Georgia	3	855	5	1,241	36	6,634	7	901	101	13,142	152	22,773	4.1	4.8
Illinois	1	333	4	1,004	5	1,149	4	696	17	2,196	31	5,378	0.8	1.1
Indiana	2	570	--	---	1	183	--	---	7	983	10	1,736	0.3	0.4
Kentucky	3	855	4	1,110	13	2,183	3	556	27	3,926	50	8,630	1.4	1.8
Louisiana	7	2,033	9	2,463	42	7,557	4	822	356	45,301	418	58,176	11.4	12.2
Maryland	--	---	--	---	2	446	2	410	19	2,531	23	3,387	0.6	0.7
Mississippi	3	904	1	387	14	2,977	3	556	100	12,946	121	17,770	3.3	3.7
Missouri	2	570	5	1,313	16	2,567	5	872	45	5,473	73	10,795	2.0	2.3
N. Carolina	6	1,719	8	2,245	14	2,763	3	574	274	34,787	305	42,088	8.3	8.9
Oklahoma	2	578	--	---	4	973	--	---	38	4,890	44	6,441	1.2	1.4
Puerto Rico	6	2,014	--	---	12	1,902	5	875	661	29,011	684	33,802	18.7	7.1
S. Carolina	3	904	5	1,313	25	5,284	3	621	274	35,589	310	43,711	8.5	9.2
Tennessee	4	1,140	2	477	7	1,541	2	410	66	8,327	81	11,895	2.2	2.5
Texas	5	1,379	6	1,807	31	6,201	4	738	240	29,821	286	39,946	7.8	8.4
Virginia	2	570	2	688	16	3,329	2	428	169	21,827	191	26,842	5.2	5.6
AEDES AEGYPTI														
Florida	1	285	1	319	36	6,499	2	310	22	3,092	62	10,505	1.7	2.2
Georgia	--	---	1	319	9	1,683	1	164	--	---	11	2,166	0.3	0.5
Louisiana	--	---	--	---	18	3,254	1	146	--	---	19	3,400	0.5	0.7
S. Carolina	1	285	--	---	12	1,988	1	112	2	246	16	2,631	0.4	0.6
Texas	4	874	1	127	7	1,541	1	180	24	3,409	37	6,131	1.0	1.3
H.Q. & Dist. (2)	43	13,048	12	2,429	95	15,152	87	14,407	7	825	244	45,861	6.7	9.6
Total	110	32,460	78	20,650	462	84,868	155	26,176	2,859	311,119	3,664	475,273		
Percent of Total	3.0	6.8	2.1	4.3	12.7	17.9	4.2	5.5	78.0	65.5	100.0	100.0	100.0	100.0

* No figures available
(1) Includes Entomological Inspectors
(2) Includes Headquarters and District Offices, malaria survey, special investigations and employees temporarily attached to Headquarters pending assignment to States

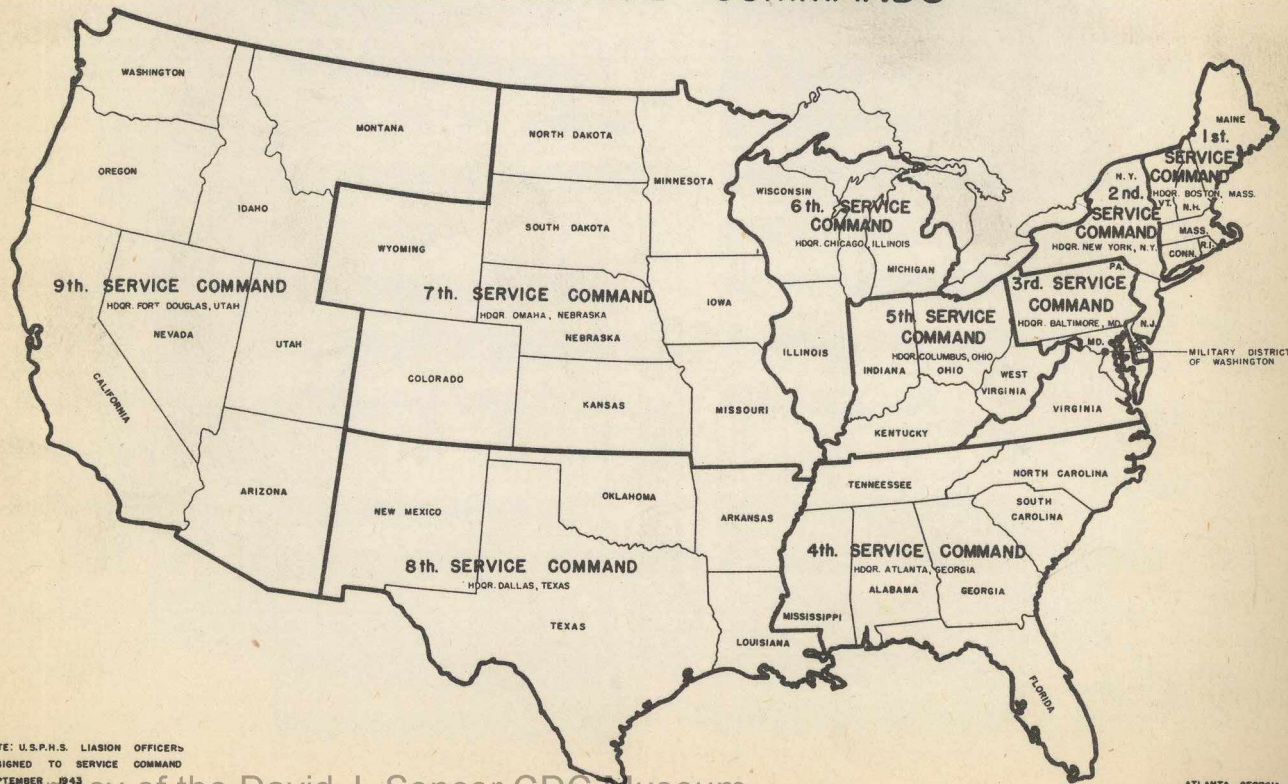
UNITED STATES PUBLIC HEALTH SERVICE

MALARIA CONTROL IN WAR AREAS

UNITED STATES PUBLIC HEALTH SERVICE DISTRICTS



ARMY SERVICE COMMANDS



NOTE: U.S.P.H.S. LIASION OFFICERS ASSIGNED TO SERVICE COMMAND SEPTEMBER 1943

ATLANTA, GEORGIA