

TRENDS IN MOSQUITO POPULATIONS IN SALT LAKE COUNTY

JAY E. GRAHAM

South Salt Lake County Mosquito Abatement District

DON M. REES AND LEWIS T. NIELSEN

University of Utah

During 1956 and 1957 the South Salt Lake County Mosquito Abatement District collected and identified larvae from every mosquito source found, and attempted to determine the relative abundance of each species. The results of this investigation were compared, so far as possible, with the data obtained by Chamberlin and Rees in random larval surveys conducted for the Salt Lake City Mosquito Abatement District in the same and adjoining areas in 1930, 1931 and 1932. The comparison showed that some changes in population had taken place in the mosquito fauna of the area. Information contained in the annual reports of the Salt Lake City District, from light trap collections and reports in the literature confirmed these changes.

Chemical control procedures of abatement districts in Salt Lake County generally have reduced adult populations below nuisance levels, but have produced only temporary reductions in larval populations. For this reason trends in mosquito populations reported here are based on larval populations, which indicate more accurately than adult populations, how well a species is maintaining its numbers under abatement pressures.

Permanent control procedures have materially reduced mosquito habitats in Salt Lake County and have reduced the populations of many species. Unfortunately, quantitative data are not sufficient to demonstrate this reduction for some species; i.e., *Aedes dorsalis* and *Aedes campestris*.

Anopheles freeborni was collected in early surveys in most of Salt Lake County, both as larvae and adults, but was most abundant in the southeast portion of the county where more favorable larval hab-

itats were present. During 1956 only 11 small breeding areas were found in this part of the county and in 1957 only 3 of these remained. In addition, 7 small pools that had not been inspected in 1956 were found to contain *A. freeborni* larvae in 1957. The nature and distribution of the present larval habitats of this species is such that virtual eradication in Salt Lake County appears possible. Since suitable habitats for this species are not close to existing populations, re-establishment of this species from other counties in the state is not probable if effective inspection and control are continued. The reduction of *Anopheles freeborni* is due primarily to a reduction of habitat through drainage, filling, construction of suburban housing and water pollution, and secondarily to chemical control measures. Since drainage of the remaining larval habitats is not presently possible, chemical control will be the means by which final eradication is attempted.

Aedes vexans has decreased materially in Salt Lake County. This species was collected commonly as larvae in early surveys and was a serious pest for many years. In August 1938 a severe migration of *A. vexans* moved into Salt Lake City from areas south of the city and caused considerable annoyance. The migration of this mosquito into Salt Lake City in 1938 was from areas in which detailed surveys were made in 1956 and 1957. These surveys showed *A. vexans* to be restricted now to a few small pools. If the larvae in these pools had been allowed to emerge as adults, they would have caused only minor, localized annoyances. In Salt Lake County larvae of this species are found primarily in ponds formed from the over-

flow of streams. Permanent control measures such as dredging the streams and filling the low areas along the banks have considerably reduced the larval habitat of *A. vexans* and it is no longer an important control problem in Salt Lake County. The removal of streamside vegetation also has apparently contributed to the reduction of the species.

Culiseta incidens was collected commonly in Salt Lake County when the first surveys were made in the early thirties. At the present time this species is still found in the canyons of the mountains that border the Salt Lake valley on the east but no specimens were taken in the valley in Salt Lake County in 1956 and 1957. The reasons for the reduction in numbers of this species in the valley are not definitely known, but control measures, particularly source reduction, undoubtedly have been a major factor.

Aedes flavescens was never common in Salt Lake County but specimens have been taken and are in the collection at the University of Utah. This species has not been collected in the Salt Lake Valley since 1931. In all probability the small population of this species was unable to withstand the pressures of mosquito control measures.

Culex pipiens has increased in numbers in Salt Lake County. It was not reported at all when the first surveys were made. Rees (1942) reported this species as rather rare in Utah and stated that only a few specimens had been taken in light traps in Salt Lake County. At the present time *Culex pipiens* is a common species in the county and is taken frequently in light trap and larval collections. Over 200 bodies of water were found containing larvae of this mosquito in South Salt Lake County in both 1956 and 1957. Increasing amounts of polluted water, which this species prefers as a larval habitat, and an increasing number of suitable habitats which have arisen in new residential districts have probably contributed to the increase of this species but other factors, as yet unknown, have possibly influenced this increase.

Aedes nigromaculis may be increasing in Salt Lake County. Rees (1954) reported that *A. nigromaculis* was present when the first larval surveys were made in the vicinity of Salt Lake City but that the species gradually had disappeared and could not be found after several years of control operations. He reported a large brood appearing in a limited area in 1953 and asks: "Is this a remnant of a species disappearing from the area under mosquito abatement pressures or is it a recent revival of the species which may develop into a major control problem?" In 1956 twelve spots were found with larvae of *A. nigromaculis* and 18 spots were found in 1957. The distribution of these areas apparently does not coincide with available habitat. Of the 30 localities from which *A. nigromaculis* larvae were reported in 1956 and 1957, 29 of them were either in an area that had been subjected to control for many years or were less than $\frac{1}{4}$ mile away from controlled areas. The remaining larval producing area was found in 1956 about 6 miles south of the others. So far as can be determined, suitable larval habitats for this species extend 15 miles beyond the actual known distribution of the larvae in the Salt Lake Valley. The possibility that control operations have influenced the distribution of this species in the county must at least be considered in future investigations. The question asked by Rees in 1954 can not yet be answered with certainty but the available evidence indicates that an increase may be occurring. This is particularly interesting in view of the increase of *A. nigromaculis* that has occurred in California (Husbands 1955).

SUMMARY AND CONCLUSIONS. The composition of mosquito larval populations in terms of both relative and absolute numbers of each species has shown several changes since records were first kept by mosquito abatement districts in Salt Lake County. Permanent control measures probably have significantly reduced local populations of *Aedes campestris* and *Aedes dorsalis* but quantitative data are not adequate to fully substantiate this. *Anopheles*

freeborni has been reduced in numbers by the elimination of its larval habitats to a point where complete eradication may be possible. Source reduction procedures of mosquito abatement districts also have reduced populations of *Aedes vexans* until they are no longer an important control problem in the Salt Lake Valley. *Aedes flavescens* apparently has disappeared from Salt Lake County and *Culiseta incidens* has become extremely rare in the valley portion of the county. The reasons for the disappearance or reduction in numbers of these two species is not known but control operations probably have been responsible.

Culex pipiens has increased greatly in numbers probably due to increased water pollution and the development of suburban housing areas.

Aedes nigromaculis appears to be increasing in numbers and the distribution of the larvae show that the increases have occurred in areas where control practices have been in operation for many years. Reasons for this increase have not yet been determined.

Chemical control procedures generally have reduced adult populations of mosquitoes in Salt Lake County to below nuisance level but appear to have had little inhibitory effect on the ability of a species to produce succeeding generations. Source reduction procedures have been the only effective means of permanently reducing the numbers of the well established species in Salt Lake County.

References

- CHAMBERLIN, R. V. and REES, D. M. 1930. Survey of the mosquitoes of Salt Lake City for 1929. 95 pp. Issued (mimeographed) by Salt Lake City Mosquito Abatement District.
- . 1931. Survey of the mosquitoes of Salt Lake City for 1930 presented by Department of Zoology, University of Utah, to the Board of Trustees of Salt Lake City Mosquito Abatement District. 99 pp. Issued (mimeographed) by the Salt Lake City Mosquito Abatement District.
- . 1932. Survey of the mosquitoes of Salt Lake City for 1931 presented by Department

of Zoology, University of Utah, to the Board of Trustees of Salt Lake City Mosquito Abatement District. 55 pp. Supervisor's report, 37 pp. Issued (mimeographed) by Salt Lake City Mosquito Abatement District.

———. 1933. Survey of the mosquitoes of Salt Lake City for 1932 presented by Department of Zoology, University of Utah, to the Board of Trustees of the Salt Lake City Mosquito Abatement District. Supervisor's report, 18 pp. Issued (mimeographed) by Salt Lake City Mosquito Abatement District.

———. 1934. Survey of the mosquitoes of Salt Lake City for 1933, presented by the Department of Zoology, University of Utah, to the Board of Trustees of the Salt Lake City Mosquito Abatement District. Supervisor's report, 25 pp. Issued (mimeographed) by Salt Lake City Mosquito Abatement District.

———. 1935. Survey of mosquitoes and mosquito abatement work of Salt Lake City, 1934, presented by the Department of Zoology, University of Utah, to the Board of Trustees of the Salt Lake City Mosquito Abatement District. Supervisor's report, pp. 58-100. Issued (mimeographed) by Salt Lake City Mosquito Abatement District.

———. 1937. Supervisor's report for 1936. Part I, pp. 8-38 in Report of the Salt Lake City Mosquito Abatement District 1936. (Mimeographed 1937). An investigation of mosquito control problems in the district conducted for the Board of Trustees by the Department of Zoology, University of Utah. Ibid. Part II, pp. 39-114. (Mimeographed 1937.)

———. 1938. (Ninth) Survey of mosquitoes and mosquito abatement work of Salt Lake City, 1937, conducted by the Department of Zoology, University of Utah, for the Board of Trustees of the Salt Lake City Mosquito Abatement District. pp. 18-88. Report of the Salt Lake City Mosquito Abatement District 1937.

HUSBANDS, R. C. 1955. Ecological interrelationships in irrigated pastures. Proc. and papers of the 23rd Ann. Conf. of the Calif. Mosq. Cont. Assoc. and the 11th Ann. Meeting of the Amer. Mosq. Cont. Assoc., pp. 104-105.

REES, DON M. 1939. (Tenth) Survey of mosquitoes and mosquito abatement work of Salt Lake City 1938, conducted by the Department of Zoology, University of Utah for the Board of Trustees of the Salt Lake City Mosquito Abatement District. pp. 24-104. The ninth annual report of the Salt Lake City Mosquito Abatement District 1938.

———. 1942. Supplementary list of mosquito records from Utah. Pan-Pacific Entomologist, Vol. 18, No. 2, pp. 77-82.

———. 1954. The *Aedes nigromaculis* mosquito situation in Utah. Abstracts and proceedings of the 7th Ann. Meeting of the Utah Mosq. Abate. Assoc., pp. 23-24.