A DECADE OF MOSQUITO SOURCE REDUCTION IN A LOCAL MOSQUITO ABATEMENT DISTRICT PROGRAM

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The Trustees of the Northern San Joaquin County Mosquito Abatement District initiated a sound program of mosquito source reduction at the start of the agency's operations in 1945, when the district was formed. It was recognized that only through a progressive reduction of the mosquito sources, could a desirable degree of control be accomplished, within economic limits, in this area of the central valley of California.

Surveys of the main control problems, by the first manager of the District, Mr. Ernest Campbell, indicated that the jungle-covered riverbottom of the Mokelumne River, which produced three *Aedes* species, *A. vexans, A. increpitus,* and *A. sticticus,* was the foremost problem; followed secondly by the irrigated pastures (both improved and unimproved) which produced *Aedes nigromaculis* and *A. melanimon* as well as *Culex tarsalis;* and thirdly, the various organic ponds associated with our grape and wine industry, in which three *Culex* species, *C. stigmatosoma, C. tarsalis* and *C. pipiens* were found in abundance. The vast majority of these organic ponds were also located along the Mokelumne riverbottom, and in most cases the outflows poured into the jungle-covered lowlands adjacent to the river.

In addition, the problems of irrigation on other crops—rice fields, duck clubs, and the usual domestic sources—contributed their share to the total of seventeen species of mosquitoes found in the 409 square miles of our District. Needless to say, the myriads of mosquitoes pretty well dictated the limits of human activity prior to the start of our control operations, and now—after a decade of effort—it is inter-

esting to evaluate the effect of applied mosquito source reduction over this period of time.

For all intents and purposes, our source reduction program began around the first of the year in 1946, and since that time we have utilized the following units of heavy equipment and tools to accomplish our objectives:

2—D-7 Cat. Tractors equipped with 13½' dozers
2—12 yd. Carryall Scrapers
1—P. & H. Dragline, ⅜ yd.
1—Ferguson tractor equipped with blade and mower
1—Pull grader
2—Ditchers
1—Transit level
24—#2 shovels

Our personnel in this division consists of two full-time heavy-equipment operators and such part-time assistants as are required for maintenance or shovel work from time to time. Most of the public relations work, surveying, and arranging have been done by the manager, and recently, a source reduction inspector.

Perhaps I should point out that most of our accomplishments have been realized through what we refer to as our cooperative program, which has been supported almost entirely from funds derived in payment for work done in accomplishing our objectives of mosquito source reduction while at the same time reclaiming land, or changing mosquito producing areas into usable land or water areas.

The philosophy which has been applied in our approach to mosquito source reduction is based primarily on the fact that there appears to be an economic justification which can absorb the cost of eliminating or reducing the areas where mosquitoes breed; secondly, that it is important to follow a complete plan of determining and recommending an effective solution of the problem to the responsible party or landowner; and finally, that only by supplying the necessary equipment, tools and know-how can we effectively accomplish our desired objective at the lowest possible cost. This is done by renting our equipment, along with operators and manpower, on a cost basis, which usually runs about one-half of commercial rates.

After more than a decade of applied mosquito source reduction, it is interesting to note that some rather sweeping and elaborate statements can be made and justified; such as, "Our tax rate is now lower than when our program started, in spite of the decreased value of the dollar." "Our insecticide costs along the Mokelumne bottomlands in recent years are only about one-seventh of previous years." "It is now difficult to collect specimens of our riverbottom mosquitoes." "One 300-acre pasture which averaged $500.00 per year in control costs did not have to be sprayed during the year of 1956." "Re-circulation systems planned and constructed by our Agency have reduced control costs on a number of pastures to only a fraction of previous amounts expended."

Just what these statements mean in terms of work accomplished can probably best be shown in the following quantitative summary of this program over the past decade:

No. of projects worked on	83
Area of land cleared and/or rough leveled	1,150 acres
Levees constructed or rebuilt	7½ miles (approx.)
Drainage ditches constructed or maintained	15½ miles (approx.)
Water storage ponds constructed or rebuilt	20
Acres of water storage ponds	105
Heavy equipment machine hours (total)	22,850

The scope of our source reduction activities has been broad and varied with projects resulting in everything from opening areas to agriculture; building levees; constructing ponds for sewage disposal, grape and cannery wastes; designing re-circulation systems for pastures; drainage sys-

tems; also assisting in the re-shaping and construction of recreation areas and small aquatic parks.

Our only requirement for participation in such activities is that an actual or potential mosquito problem must be involved to justify our assumption of the work aspects of a project. To this end we have successfully accomplished this program without measurable opposition from private enterprise in the heavy equipment field.

Although our agricultural source reduction program has only just begun we have, to date, eliminated or greatly reduced about three-fourths of our natural type sources located mainly along the Mokelumne riverbottom. This is particularly significant since California law places the responsibility on the control agency to assume the burden of mosquito control in natural locations, while the individual is responsible for artificial or man-made sources of mosquitoes. We have, in effect, through this cooperative program changed many sources from natural to artificial and for the most part without any cost to the taxpayers of our area—thereby, according to our law, actually reducing our total problem and switching the future legal responsibility to the individual owner in the same process.

With the ever-increasing expansion of irrigation and water use in California, there is no doubt in our minds that our applied mosquito source reduction program has been extremely effective in meeting this challenge, as well as in coping successfully with the insecticide resistance problem.

Our State Health Officer, at our recent California Mosquito Control Association Conference, terminated his talk by reminding us—through re-phrasing a "commercial"—that in California mosquito control, "progress is our most important product." It might also follow, to add a rephrased quote from another national "commercial": that "you can be *sure* if your program is based on *source reduction.*"