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## PLANNING FOR TSETSE CONTROL OPERATIONS

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Whether control of tsetse flies is to be effected by the selective reduction of game animals, or by the treatment of dry season resting and refuge sites with residual insecticides applied from the ground, called "ground spraying", or by ultra low volume (ULV) aerial application of insecticides, the need for detailed and exact planning of all aspects of each particular operation is paramount, if success is to be achieved. There are no short cuts as probably all glossinologists (the name we give to those entomologists in Rhodesia who specialize in tsetse work), involved in tsetse control have found out with experience, wherever they have worked in Africa. Certainly, it has been my personal experience and that of my close contemporaries.<sup>or</sup>

Planning requirements in tsetse control work centre firstly around the development of an access system, bearing in mind that the tsetse infested areas are generally remotely situated and virgin and, also that, in the final event, where "ground spraying" is to be used, one should never have to "porter" insecticide from the supply vehicle to the spraying team more than four km at the very most: then there is the need to acquire a knowledge of the distribution of tsetse flies within the area to be dealt with, although a start would have possibly been made on this aspect during preliminary ground surveys prior to initiating the planning of the access system: the planning and development of game fence lines is another requirement for selective game reduction operations closely related to access development, which is usually linked in with that aspect in any particular operation: and, then, there is that most important task in the case of "ground spraying" of

delimiting the habitat to be treated with residual insecticide on aerial photographs in order to guide the spraying teams in their work. No mention has, of course, been made of the planning requirements for the ULV aerial application of insecticide, because this method of control is still in the course of development in Rhodesia, but it is reasonably certain that a basic access system, a knowledge of the distribution of tsetse flies in the area to be treated and possibly even the delimitation of habitat on aerial photographs, where the terrain is broken and in other special situations, will be required.

The basic "tool" of all tsetse control planning is the aerial photograph. There is no doubt that the advent of aerial photography revolutionized tsetse control work, making it possible to plan precisely. Prior to this the glossinologist had generally to make his own maps, which was a tedious and prolonged exercise and frequently ~~the~~ the final product left much to be desired from the point of view of accuracy. Where mapping existed this was for the greater part inaccurate and sadly lacking in detail. For instance when I worked in the Sebungwe district (now Binga and Gokwe districts) during the period June 1951 - May 1952 and the Urungwe district, June 1952 - April 1955, the existing mapping bore little resemblance to the situation on the ground and it might be of interest to relate a conversation with that veteran of trigonometrical survey in Rhodesia, the late J. E. S. Bradford, when I met up with him near my camp at Kariangwe in August 1951. His reply to my enquiry as to how the mapping of remote areas such as we were in at the time was accomplished, was that after marking on the approximate route of the main drainage in the area, in that case the Mbelele-Lubu-Sebungwe river, the probable tributaries were then drawn on to the map according to information

gleaned from local tribespeople, Department of Native Affairs staff and hunters. There was literally no other way without embarking on detailed ground survey, which was not practical under the circumstances. Such then was the dilemma of the glossinologist at the time.

As has already been <sup>stated</sup> ~~implied~~ the advent of the aerial photograph marked the turning point in tsetse control planning. During the period 1952 to 1958 we used aerial photography to advantage as this became available, but the preparation of maps from the photographs was a slow and tedious undertaking with our limited knowledge of mapping and although we succeeded in mapping relatively large areas of country, notably the western half of the Urungwe district, the final product was still insufficiently precise to give absolute confidence in our planning.

The preciseness desired became a reality in 1959 when the late R.D. Pilson joined our tsetse control organisation. He came from East Africa bringing with him a sound knowledge of mapping from aerial photographs using the Slotted Templet Lay-down system. The organisation purchased a templet slotting machine and during the next few years he mapped a large area of what we call the Sebungwe Operations Area (Binga district, the northern third of the Lupane district and the western quarter of the Gokwe district) at a scale of 1 : 40 000, which was the scale of the aerial photography available to us at the time. A notable achievement was the production of a reasonably accurate 1 : 250 000 Kamativi Sheet in 1962. Our mapping endeavours were, however, rapidly overtaken by the rapid coverage achieved in Rhodesia by first the Department of Federal Surveys, Federation of Rhodesia and Nyasaland and then the Department of the Surveyor General <sup>Rhodesia</sup> using sophisticated equipment, until the position which has been reached today where all the tsetse infested areas have been accurately mapped at a scale

of 1 : 50 000.

With the development of accurate mapping and the availability of up-to-date photography (the country has been completely photographed three times since 1963 when the Blanket photography programme was commenced), our tsetse control organisation has been able to undertake large scale control operations, often over areas in excess of 2 600 km<sup>2</sup>, entailing, initially, the development of extensive access systems (see Map 1), relating precisely to the essential tsetse habitat situations on the ground as delimited on the aerial photographs (see Fig. ), followed by the application of the residual insecticide to the dry season resting and refuge sites of the tsetse fly by the spraying teams following closely the marked photographs. Similarly, it has become possible to develop access systems to precisely meet the requirements of selective game reduction operations, where it is important to ensure that the hunters work in those particular vegetation associates most attractive to the tsetse fly, or to erect game fences along the most advantageous routes in relation to minimizing known game movement, to ensuring wherever possible all the year travel along the game fence maintenance tracks and to traversing the easiest terrain, in each case.

The planning of the access systems or fence lines is done by studying the aerial photographs under a stereoscope and marking the most suitable route or routes on with a wax pencil or other marker generally on a point to point basis. This information is then transferred on to a 1:50 000 map using a Map o Graph machine (the photographs are usually of a different scale to the map), again on a point to point basis. The next step is to link the points to give a series of straight "legs", which are then converted into a series of bearings and distances. With this information the trace cutter, as our field "surveyors" are called,

locates the route on the ground, but it is important to stress that he also constantly refers to the aerial photographs to ensure his position. That the system works has been clearly demonstrated many times by subsequent aerial photography. Senior staff of the Surveyor General have told me that they seldom have had to relocate the access tracks and fence lines which they have marked on to their maps from information supplied to them by ourselves on the completion of the development of the various access systems and fence lines, when new photography has come to hand. This is very gratifying and without any doubt, all the credit for this belongs to the late R. D. Pilson, who developed the technique on the ground and trained our nucleus of trace cutters personally.

The delimitation of the situations in which the dry season resting and refuge sites of tsetse flies in Rhodesia can be expected to occur, on aerial photographs, for the purpose of "ground spraying" operations, is a long and tedious task and one calling for considerable care, bearing in mind that one cannot afford to leave any gaps in the area to be covered by a "ground spraying" operation, if this is to be successful. Experience on the ground is also particularly essential in this work if one is going to be in a position to interpret the vegetation associates occurring correctly, a fact that has been clearly demonstrated by the results of several "ground spraying" operations which have been planned by insufficiently experienced glossinologists. It is noteworthy that the basic principles of "ground spraying" planning on aerial photographs in Rhodesia were developed by the late R. D. Pilson in an operation called the "Maseme Experiment", which was carried out in August and September 1960 (the Maseme river lies to the west of Kariangwe in the Binga district). This operation was very successful and encouraged us to pursue the method with maximum vigour.

Subsequently many of the findings from the studies of the resting and ~~refuge~~ site and diurnal behaviour of Glossina morsitans Westw. and G. pallidipes Aust. carried out during the period 1961 - 1964 by the late R. D. Pilson and his wife (previously Miss B. M. Leggate) were incorporated into the planning principles referred to above.

In conclusion I must mention that I foresee colour aerial photography assuming a position of importance in the tsetse control planner's range of "tools". It is possible that mid to late dry season colour aerial photography would produce photographs which would clearly show the habitat requiring treatment without any additional work by the planner. Certainly, this is the impression which I have obtained from the few colour aerial photographs <sup>that</sup> which I have seen. Colour aerial photography is, of course, a lot more expensive than black and white, but weighed against the total cost of "ground spraying" operations and most important the human effort which is required to apply the insecticide, the cost would be negligible.

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