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NYASALAND PROTECTORATE



**Annual Report**  
of the  
**Department**  
of  
**Game, Fish and Tsetse Control**  
for the  
**Year ended 31st December**  
**1958**

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# Annual Report of the Department of Game, Fish and Tsetse Control for the Year 1958

## (a) Staff and General

1. The staff position remained difficult for much of the year but eased towards the close. By the end of 1958 the Department was up to its established strength in Senior Staff, except for the Fishery Research Branch. Above all, the post of Fisheries Officer had at last been filled after a gap of some two years.

2. This position was taken by Dr. E. C. L. Birkenmeier, on transfer from Ghana. His arrival was extremely welcome, though as he did not arrive till mid-September there was scarcely time for the effect of his appointment to be felt before the end of the year.

3. Mr. Howard, the single Fish Ranger, proceeded on leave in March, after a three year tour, and did not return till September, more or less simultaneously with the arrival of the new Fisheries Officer; senior field staff on the fishery side, apart from the single Research Officer, was thus lacking for about half the year.

4. The vacancy amongst the Game Officers resulting from the retirement of Mr. Muldoon in February, 1957, was filled by Mr. C. S. W. Brown, who was appointed early in March, 1958. He took over at Kota Kota from Mr. Potous, who had been working in a temporary capacity since December, 1957.

5. Mr. Llewellyn, Game Control Officer, returned from leave in May and took over from Mr. Carey in the Southern Province station. Housing difficulties made it necessary to send Mr. Carey on leave forthwith and he returned in December so that the field staff on the game control side remained at an effective strength of two only for most of the year.

6. Dr. Steele, Tsetse Botanist, was on leave from the beginning of the year till June.

7. Notwithstanding the somewhat difficult staff position the general situation of the Department was a good deal improved by the move of Department Headquarters back to the Blantyre-Limbe area in April. This made administration, support of field staff with equipment, and contact with other Departments and with Government all very much easier.

8. Work proceeded as normally as possible despite staff shortages. There were encouraging developments on the game control and conservation side, fish farming continued to gain ground in the north, a fishing camp to serve trout fishermen on the North Rumpi and Kaziwiziwi was opened and the trout rearing pond on Zomba Mountain was brought into action. In the absence of field staff and with the fisheries launch out of action for hull repairs most of the year, not very much could be done in connection with the Lake fisheries, but records were maintained, some experimental work was done and the boat building scheme successfully continued.

9. The details of Senior Staff employed as at 31st December is shown at Appendix I.

## (b) Game

### CROP PROTECTION

10. Activities continued in the Central and Southern Provinces, though it proved very difficult to maintain the hunting staff at full strength in the latter Province. At the very end of the year a Game Control Officer was posted to the Northern Province but he was scarcely in position before the 31st December and had no time to produce results before the end of the year.

11. Action was perhaps a little more diffuse than in previous years. There was a tendency to dissipate the small hunting force available by trying to answer complaints of isolated cases of marauding in widely dispersed areas, often of little economic importance, instead of concentrating on some really valuable objective. This tendency has to be resisted, for, with the very small hunting force available, it is essential to concentrate on areas where there are important economic crops subject to frequent raiding if worthwhile results are to be achieved.

12. Nevertheless, in spite of the tendency to diffusion, the Districts of Kota Kota, Kasungu, Chikwawa, Fort Johnston and Dowa received more attention than most.

13. Attempts to revive the interest of the general public in the destruction of vermin, by raising the bounty rate and involving the local District Councils in the activity, met with most encouraging success, if numbers are any guide. Some forty thousand head of vermin were destroyed during the year by this means. Reports so far received suggest that Fort Johnston achieved the best results with more than eight thousand head, but some of the Northern Districts have yet to report.

14. Appendices II and III show the details of animals destroyed and revenue accruing from crop protection activities.

### CROCODILE HUNTING

15. There were three licensees during 1958, of which one was in sporadic action only. A total of 1,821 reptiles were reported as taken by the licensees, all from Lake Nyasa, the Upper Shire or Lake Chiuta, and exports were valued at £8,870.

16. The number of immature animals killed made up a rather larger proportion of the catch than previously and it seems unlikely that the Lake Nyasa crocodile population will support more than the present rate of hunting. On the other hand no ill effects directly traceable to the undoubtedly diminished crocodile population are yet discernable, other than the increase of otters in the Upper Shire, and damage to gill nets by crocodiles is still a prominent feature of the fishing industry.

### GAME CONSERVATION

17. The small observation camp at Lifupa in the Kasungu Reserve was open from July until the end of November. No great number of people visited it but virtually everyone who did saw a reasonable amount of game and, so far as can be ascertained, were pleased with their visits. The nature of the camp is not, of course, designed to attract great numbers and no particular publicity drive accompanied the opening as it is not yet known how the game will react to frequent visitors.

18. So far it seems to be reasonably undisturbed. Elephant formed, as usual, the major proportion of the game observed but a good herd of buffalo was present and rhino were also seen.

19. Some encouraging results were obtained with salt licks laid in the vicinity of the camp and it is intended to extend these trials during the coming season. A beginning was also made on a planned burning policy for the grassland section of the Reserve, instead of the universal early burning policy hitherto pursued.

20. Access roads were made from the main Kasungu-Kota Kota road to the eastern shoulder of Chipata Mountain in the Kota Kota Reserve, where a camp site was cleared overlooking Lake Nyasa and the lower levels of the Reserve. It is planned to erect another small self-service type observation camp on this site which, being within easy reach of the rain forest on Chipata Mountain, should be of interest to botanists as well as those who wish to observe game.

21. Similarly in the Mwabvi Reserve an access road was made to the banks of the Mwabvi River, not far from the rhino and nyala thickets. Another self-service camp is to be erected at this site.

22. The provision of the access roads made it possible to make a start on trying to interest young Africans with more urban backgrounds in Nyasaland wild life and the idea of Game Reserves. Parties were taken from Dedza Secondary School, Kongwe Secondary School, and from the Scout troops of the Blantyre-Limbe area for a long week-end in the Reserve, the Central Province parties going to Kasungu and the Scouts from the Southern Province to the Mwabvi.

23. All the visits went off quite successfully. A reasonable amount of game was seen; the southern party saw rhino and a great deal of interest was displayed, not only in the animals but in the countryside as a whole.

24. Turning to the actual game itself the position in the Reserves seemed much as usual. An attempt was made during the dry season to introduce a uniform method of reporting by Game Reserve Guards on patrol, with the idea of making it possible to make statistical comparisons. This, however, has not yet gone far enough to permit discussion of the results.

25. Kota Kota Reserve continued to show a fairly representative sample of Nyasaland game, elephant, buffalo and sable being seen frequently. Eland were observed while the Chipata camp site was being constructed. Elephant are very prominent in Kasungu, but hartebeest, roan and zebra were well represented. Nyala, though not so frequently seen as in 1957, were still to be found in the Mwabvi, and the Lengwe Guards saw them frequently. Buffalo moved into the Lengwe in small numbers towards the end of the year and a herd of twenty elephant visited for a short time in October. Sable were reported from all three Southern Province Reserves and hartebeest from Majete.

26. Chief Katumbi, Honorary Game Warden, reported most encouragingly concerning the situation in the Vwaza Marsh Controlled Area, which has been closed to shooting since August, 1956. Buffalo, eland and roan have all increased very considerably, particularly the former. Sable are present and elephant from Northern Rhodesia which normally return in November, in 1958 stayed on into the New Year and the Chief thinks they may well remain permanently. Rhino have also been in the area for a short time. The Chief is to be congratulated on these good results from his enforcement of the protective legislation.

27. At the end of the year the posting of a Game Control Officer to the Northern Province made it possible to take better steps to enforce the prohibition of hunting on the Nyika, though there was some poaching earlier in the year. A small force of Game Reserve Guards has now been established on the plateau and steps are being taken to define the boundaries of the non-shooting area more precisely. Elephant were observed on the plateau on one occasion during the year.

28. The question of some form of sanctuary on the Vipya was still under discussion at the end of the year and although a new Wild Birds Protection Ordinance was presented to the last meeting of Legislative Council in 1958, actual enactment was held over pending further discussion with the African unofficial members.

29. Game licences issued showed a slight increase over the 1957 figures. Details are given in Appendix IV.

### (c) Fishery

#### THE STATE OF THE FISH STOCKS

30. The *Tilapia lidole* catch per unit effort in the ring nets in the south-east arm continued to decline for two out of the three firms. It showed a very sharp fall from 1957 figures, and was, moreover, well below what it has been for some years previously. The total landings were approximately the same as 1957 but the ring net effort increased from 6,803 pulls in 1957 to 9,325 in 1958, indicating a very definite decline in density of stock.

31. This is a disquieting circumstance, very strongly suggesting that the present weight of open water *Tilapia* fishing is more than the stock can bear. Length frequency measurements made in November by the Fisheries Office from ring and gill net catches do not suggest an alarming proportion of immature fish, but the lengths from the gill nets do show some small decline from the "average" length shown in the Lowe report. This suggests that the stock tapped by the industry, though still mainly mature, is, on the average, younger than it was.

32. The fall in density of the *T. lidole* stocks, if fall there is, was not paralleled by a fall in the inshore *Tilapia* species. The position, of this species, judging by the records of African inshore fishing, remained much the same as in 1957 and immediately previous years.

33. *Labeo* and catfish catches per net in the non-African gill nets were poor in comparison with 1957, especially in the south-west arm. It is difficult, however, to get accurate figures of nets set in this type of fishing and the comparisons are tentative. The fall is not reflected in the records of African inshore fishing but none of these cover the south-west arm where the main difference occurred in the non-African fishery. Too little is yet known of the biology of these two species to make it possible to interpret the situation with any certainty, but inspection of the African records for some time back does not suggest that the present density is abnormally low.

34. Now that the increase in gill netting is bringing these two species under a stronger attack it will, however, be necessary to make a closer study of the trend of the fishery for them and intensive work on their biology is already being undertaken by the research unit at Nkata Bay.

35. Figures for the "utaka" fishery suggest a fairly steady stock position.

36. Statistical details are given in Appendices V and VI.

#### THE NON-AFRICAN FISHERY

37. Four commercial licensees were in action up to the end of August when a fifth joined in, his fishing being confined to the south-west arm.

38. Catches in the south-east arm arose from 3,984 short tons in 1957 to 4,311 short tons in 1958 but most of this came from increased tonnages of *Labeo* and catfish. *Tilapia* catches rose little in spite of a 37 per cent. rise in the ring net effort above that of 1957, itself an increase of 82 per cent. over that of 1956. It should, however, be realized that even though it showed little increase above 1957, the 1958 non-African catch was nevertheless still more than double that of 1954 and eight times that of 1948.

39. Unlike the 1957 catches the high *Tilapia* total in 1958 was mainly due to heavy catches in January to May. Cold season *Tilapia* catches were poor and the 1958/59 fishing season disappointingly late in starting.

40. As stated above, most of the increase above 1957 landings came from *Labeo* and catfish, which was a reflection of the considerably increased use of gill nets.

Most of the firms used gill nets on a large scale each month of the year, whereas in 1957 their use was in the main confined to the cold weather months.

41. Fishing in the south-west arm was very poor and one firm which had been endeavouring to establish itself there for some time ceased effort altogether for the closing months of the year, while another suspended operations there for the time being. Apart from indifferent catches the difficulty of getting the fish to market without road access proved too much for them, though the lifting of the export ban, which provides a market for cured fish, should have offset much of this disadvantage. The situation is most disappointing, more especially as it is becoming increasingly apparent that the south-east arm cannot carry any more *Tilapia* fishing.

42. One firm in the south-west arm commenced fishing with a small meshed ring net of shorter than normal length, in the hope of developing a non-African "utaka" fishery. The experiment continues, but judging by the high proportion of immature *Tilapia* landed so far it seems doubtful whether it will be safe to allow the method for long term use.

#### THE AFRICAN FISHERY

43. The general nature of the African effort seems to be changing, with further increases in the use of gill nets and decreased use of the large mesh seine, particularly in the Central Province. This may be a reflection of decreased catches of *Tilapia*, once the mainstay of the shore seine fishery, but is also probably a reflection of the increased difficulty of gathering together the large groups of semi-voluntary helpers, necessary to haul these large seines, and also of the increased efficiency of modern gill nets.

44. There was also increased use of the "Chilimila" net in the south-east arm for "utaka" and related species. This is a highly desirable development since this net catches virtually none of the immature *Tilapia* which are, on occasions, such a feature of the catches of the small meshed shore seines used for "utaka". An improved design of Chilimila net is being constructed at Nkata Bay, based on information gained by the Fishery Research Unit. If successful every effort will be made to popularize it in the southern end of the Lake also, in the hope of bringing about some abandonment of the small meshed shore seine.

45. The number of African "commercial" fishermen continued to increase slowly. They were generally fairly successful but many have still a great deal to learn on the management side, and often more than a little on the technical side as well. The commonest mistakes were to employ a size of labour force out of all proportion to the size of the fishing effort put out, and for the owner of the business to fail to take personal charge of it.

46. It was of course, only at the end of the year that a Fisheries Officer was available to advise these embryonic commercial fishermen and it will naturally take time before his advice begins to have effect. On the whole progress, though slow, continues to be encouraging.

47. Attempts at mass propaganda in favour of a fisherman's co-operative on Likoma Island met with a response which was individually lukewarm or non-committal and publicly extremely hostile. It is apparent that a good deal of patient explanation will be necessary before there is any hope of concrete action, and there is certainly no general demand for the formation of such a society on Likoma Island at present.

48. Unfortunately, although five out of the seven Councils whose Districts fringe Lake Nyasa have passed legislation requiring the registration of nets, only three out of the five were able to submit figures of what nets were in use in their Districts during 1958. Two of these were inaccurate. It is, therefore, still not possible to make any statistical appreciation of the trend or extent of the African fishery.

#### THE FISH TRADE

49. The important development in connection with trading during 1958 was the lifting of the ban on export to the rest of the Federation.

50. For the first six months of the year a quota system was imposed, the established fishing concerns, including some Africans, being permitted to export up to a certain tonnage each month. This was calculated in accordance with the expected catch of each concern.

51. The total amount permitted for export was 1,065 short tons out of an expected catch of 3,395 short tons to 30th June. In the event, total catch for this period reached 3,329 short tons but only 285 short tons were actually exported.

52. It transpired, in fact, that the Southern Rhodesian market was a much more competitive one, and the practical difficulties of export much larger, than had been supposed.

53. In view of the safeguards against deprivation of the home market which these factors provided, it was decided to permit free export by the established firms for a further indefinite period. This was coupled with a warning that undue attention to the export trade at the expense of the home market must necessarily lead to reconsideration of the whole question.

54. Taking the year as a whole the export trade accounted for no more than 8 per cent. of the actual catch of the non-African firms while considering the figures month by month it never accounted for more than 15 per cent.

55. There were, in fact, no extravagant exports and so far it seems that the export market is only such as will absorb what may be termed the overflow of the home market, not the bulk of the catch.

56. Details of the quantities and types exported are to be found at Appendix V, Table VI.

57. Meanwhile on the home market the oldest established firm continued to run its Limbe cold storage plant with fair success and an additional cold store was erected at Zomba. This is a small store, holding two tons only, and was designed to serve the Zomba retail trade. Unfortunately technical faults have interfered with its operation on some occasions and it is plain that the operation of these somewhat complicated plants in a country where technical assistance is difficult to obtain is no easy matter.

58. In addition to the above development a second firm introduced refrigerated trucks for the carriage of fish, though these were used more for taking fresh fish to Salisbury than for the Blantyre-Limbe trade.

#### DEVELOPMENT WORK

59. With the Fish Ranger on leave from early March till mid-September and the new Fisheries Officer not recruited till that month very little in the way of active development could be carried on.

60. The training school for prospective African commercial fishermen at Nkata Bay necessarily closed down from February till October but was then re-opened. Five trainees completed the course between then and the end of the year, all showing promise of becoming successful commercial operators. Unfortunately the model fishery side of the venture did not show to much advantage as catches were poor and did not form a very impressive background.

61. The main point of the course is, however, to teach the elements of management and care and use of new gear, especially boats and engines, so that the value of

the school is not dependent on high catches. Plans are, however, made to make the actual fishing side more impressive by the incorporation of a limited amount of Chilimila fishing into the course.

62. The production of boats at both Nkata Bay and Fort Johnston was kept going as well as it could be with the very scant supervision available. Four craft were completed and sold at Nkata Bay and five at Fort Johnston. The implementation of the loan scheme for Africans will undoubtedly increase the demand for these craft.

#### EXPERIMENTAL WORK

63. With no senior field staff available for the greater part of the year experimental work, like that on development, was very limited.

64. The experiment with coloured gill nets which was started at the end of 1957 was continued up to April, 1958. A total of 53 sets were made, the colours used being white, light green, dark green, light blue and dark blue.

65. The results are shown in the following tables:

#### (I) Whole Period—53 Sets

	Total No. Fish	Total Wt. Fish	Nos. of fish by genera				
			Tilapia	Labeo	Bagrus	Clarias	Others
Light Green .. ..	313	660 lb.	82	98	56	48	29
White .. ..	301	608 lb.	93	68	52	65	23
Dark Green .. ..	296	595 lb.	83	93	34	50	36
Light Blue .. ..	258	515 lb.	67	87	33	42	29
Dark Blue .. ..	256	500 lb.	68	52	43	59	34
TOTAL CATCH ..	1,424		393	398	218	264	151

#### (II) Sets in moonless period—33 sets

	Total No. Fish	Total Wt. Fish	Nos. of fish by genera				
			Tilapia	Labeo	Bagrus	Clarias	Others
Light Green .. ..	224	492 lb.	68	62	42	32	20
White .. ..	222	439 lb.	87	45	38	42	10
Dark Green .. ..	216	406 lb.	75	56	25	36	24
Light Blue .. ..	172	353 lb.	59	54	18	23	18
Dark Blue .. ..	179	341 lb.	65	34	26	40	14

#### (III) Sets for full moon and five days before and after—20 Sets

	Total No. Fish	Total Wt. Fish	Nos. of fish by genera				
			Tilapia	Labeo	Bagrus	Clarias	Others
Light Green .. ..	89	168 lb.	14	36	14	16	9
White .. ..	79	169 lb.	6	23	14	23	13
Dark Green .. ..	80	189 lb.	8	37	9	14	12
Light Blue .. ..	86	162 lb.	8	33	15	19	11
Dark Blue .. ..	77	159 lb.	3	18	17	19	20

66. The results do not give any clear indication that any of the first three nets on the table are generally more effective than the others but it seems that the blues may be less effective and the light green perhaps a little more effective than the white and dark green.



67. The sets do, however, bring out some considerable variation in the reactions of the various genera to the extra light of the moon. The Fishery Research Officer, Nkata Bay, has suggested an interesting method of showing this, namely by working out the ratio of non-moon to moon catches, after correcting the figures in the above table for the small difference in the number of sets in the two periods. The table of ratios works as follows, ignoring the catch of "others" which is of mixed genera:

	<i>Tilapia</i>	<i>Labeo</i>	<i>Bagrus</i>	<i>Clarias</i>
Light Green .. .. .	2.94	1.04	1.10	1.2
White .. .. .	8.26	1.18	1.64	1.10
Dark Green .. .. .	5.67	.91	1.67	1.55
Light Blue .. .. .	4.91	.99	.72	.73
Dark Blue .. .. .	13.1	1.14	.92	1.27

68. It will be appreciated that the nearer the ratio approaches to unity the less is the reaction of the fish to the extra lighting from the moon. It is to be noted that *Tilapia* appear to be markedly more percipient than the other genera, and least to light green nets. Since the *Labeo* also seem just slightly less sensitive to light green than white it seems that there might be some advantage in using light green nets where *Tilapia* and *Labeo* normally form the major part of the catch.

69. The experiment was repeated over the period May to October incorporating a brown net in the series. A total of 63 sets were made, 41 being in non-moon periods and 23 during the moon period as defined in Table (III) above.

70. The results of this period have been analysed for percentages, the figures being as follows:

	Percentage of total catch in each net	Percentage of total of each genera caught in each net				
		<i>Tilapia</i>	<i>Labeo</i>	<i>Bagrus</i>	<i>Clarias</i>	Others
Light Green .. .. .	18%	24%	21%	21%	17%	13%
White .. .. .	20%	15%	22%	27%	18%	20%
Dark Green .. .. .	12%	10%	6%	21%	12%	15%
Light Blue .. .. .	16%	15%	10%	10%	19%	17%
Dark Blue .. .. .	18%	23%	14%	6%	17%	15%
Brown .. .. .	16%	13%	27%	15%	17%	20%
TOTAL CATCH ..		141	144	79	251	178

71. These figures seem somewhat at variance with those in the previous experiment, with dark blue coming equal second to white with light green, and dark green bottom of the list instead of third. It will be noted, however, firstly that the numbers as a whole are smaller and differences less likely to show, secondly that *Tilapia* and *Labeo* which gave much of the advantage to light green nets in the first series make up a much smaller proportion of the total catch, and thirdly that the proportion of moon to non-moon sets is rather smaller. The last two factors in particular obviously affect the result.

72. The second experiment, incorporating the brown nets, is being repeated over the November-April period under closer supervision that was possible in May-October, 1958, and the results of all three will then be analysed statistically.

73. A further gill net experiment was begun at the close of the year, with 100 yard nets mounted to 50 yards, as is the common commercial practice, being fished against 100 yard nets mounted to 66 yards approximately, as recommended by J.F.R.O. for northern waters of the Lake. This is to determine how far the northern recommendations apply to the south-east arm.

FISHERIES RESEARCH ORGANIZATION

74. No housing could be provided for the second Research Officer at Nkata Bay, so no appointment could be made. The design for a house was, however, approved late in the year and it is hoped that actual building will begin in March, 1959.

75. The single Research Officer was further gravely hampered by the fact that the fisheries launch, on which work at any distance from the bay depends, was yet again laid up for major repairs to the hull from the end of January onwards.

76. In the meantime work has again been concerned mainly with biology of *Engraulicypris sardella* ("usipa") together with the collection of hydrological data and the study of plankton distribution. Further work has been done on the systematics of the *Cichlid* species in Lake Nyasa, which work revealed the possibility of the need for erection of several completely new genera.

77. Investigations have given important information in the feeding habits of *Engraulicypris* and some information on breeding cycles. A possible method of age determination was evolved and is in process of being tested.

78. In the hydrological field the transverse tilt of the thermocline was demonstrated clearly during a traverse of the Lake from Likoma Island to Nkata Bay. Data on the density of the faunal elements of the plankton were collected, but no seasonal trend was revealed.

TROUT FISHING

79. Figures for the 1957/58 season are shown in Appendix VII and it is pleasing to note the greatly increased co-operation of fishermen in sending in returns which has made the compilation of this table possible.

80. The figures for North Rumpi and Kaziwiziwi are remarkably similar to those of 1956/57 and the absence of small fish from the latter stream continued to be evident. Figures collected so far for the current season suggest no improvement and the stream clearly needs some investigation with respect to suitability for breeding.

81. The Mlunguzi results should be viewed in the light of the fact that fishing was again confined to the Reservoir and the extreme upper reaches of the stream.

82. Less fishing was done on Mlanje than in the previous season but 180 fish averaging 10.1 inches in 67 rod days seems a fair average. The proportion of 584 undersized fish returned also seems not unreasonable in comparison with the 187 on the Mlunguzi considering the much shorter length of legally fishable water in the latter. Possibly, however, the rearing pond system now being tried on Zomba Mountain might be used with advantage, though it would be considerably more difficult to organize on Mlanje.

83. Hope has now been abandoned for trout in the lower reaches of the Chelinda on the Nyika, and the Wamkurumadzi in the Kirk Range. Both appear to have too large a population of indigenous predatory fish to permit trout to establish themselves. Nevertheless trout have been successfully implanted in the upper reaches of the Chelinda and one very fine fish has been hooked this season. It may be possible to find a stretch of the Wamkurumadzi similarly protected by temperature or high falls from the incursion of indigenous fish, and it must be admitted that owing to failure of many of the ova in transit the original stocking of this stream was somewhat light.

84. The trout rearing pond on Zomba Mountain was kept in action during the year. The stock of 200 fish placed in the pond towards the end of 1957 was raised to 500 by mid-March with the kind help of a number of Zomba fishermen, chief of whom was Mr. Homer Cox. The fish were fed throughout the year at daily intervals on a diet of crumbled bread and minced fish and were released into the stream again at the beginning of December. Release was to the portion of the stream between Mandala Falls and the Reservoir.

85. With a succession of stockings at intervals it is not possible to estimate growth rates with any accuracy, but on release there appeared to be several fairly distinct size groups. One group at ten to eleven inches made up 30 per cent. of the total, a second at nine to nine and a half made up 50 per cent., a third at eight inches made up 10 per cent. and the other 10 per cent. was composed of miscellaneous sizes from two inches to seven.

86. The very small two-inch fish had certainly been bred in the pond or gained access from the river, and it seems probable that the ten to eleven inch group represented the survivors of the first stocking of 200 fish in November, 1957. These went in at approximately seven and a quarter giving an increment of about three inches under the artificial feeding of the past year.

87. During the year the small fishing camp on the bank of the Kaziwiziwi was opened to visitors. This is equipped with all necessities except food, bedding and fuel for lighting, and is on self-service lines. Four people can occupy the camp at a time.

88. A total of 25 persons used the camp between its opening in August and the end of the year, all but four being fishermen. The arrangements appear to have met with approval from those who visited and it is confidently expected that use will increase during the 1959/60 season.

#### FISH FARMING

89. The introduction of fish farming continued to make rapid strides in the Northern Province, and at the end of the year a total of 74 people were showing active interest. There were 52 ponds actually stocked with a total acreage of  $14\frac{7}{8}$  acres and a further 17 either under construction or constructed and awaiting stocking. An analysis by areas is given in Appendix VIII.

90. During the year 25 new people commenced work on fish farming and 16 lost interest at least temporarily. One of the failures was the result of a land dispute and another due to failure of the water supply. The remainder failed for lack of persistence but it is very possible that a proportion of them will make further efforts, especially now that a limited amount of equipment for pond construction is available for loan.

91. A total yield of approximately 2,000 pounds was recorded during the year from African farms but many more farmers could actually have cropped their ponds had they wished to do so.

92. Courses in fish farming have been continued with the Tipwiri ponds as a background. Six courses were held during the year and a total of 42 people attended, 11 of these being professional teachers on private study courses. Sleeping accommodation for students is in course of construction and should be completed by April, 1959.

93. The purchase of wheelbarrows and other pond construction equipment for loan to prospective fish farmers has proved very useful, as has the purchase of a tradesman's cycle for distribution of small quantities of stock. This is at once an economy in travelling expenditure and an example to African farmers who might set up as fish stock breeders.

94. Some experiments were conducted at Tipwiri in using the drained pond sites for an ordinary vegetable crop then following by flooding and stocking.

95. Two ponds were planted with beans and millet respectively and a third was left fallow. As soon as the vegetable crop was reasonably well developed the ponds were re-flooded and stocked at uniform rates with *T. melanopleura*, the water level being progressively raised as nearly as possible in relation to the grazing. All ponds were also fed with cuttings of perspalum grass from the banks. Stocking was at the rate of 1,500 *T. melanopleura* at 12 cm. and 25 at 16 cm. in each pond.

96. On simultaneous cropping of the ponds in March the larger fish in the millet pond exceeded those in the bean pond by about 17 per cent. in number and 20 per cent. by weight, while the fingerlings in the two ponds were approximately the same. Both planted ponds gave better results than the fallow control. Details are as follows:

	No. adult fish 15 cm. and over	Average size Column 1	Average Weight Column 1	Total Weight Column 1	No. young fish 7 cm. and under
Pond A. (Beans) .. ..	1,199	18.3 cm.	5.4 oz.	407 lb.	2,990
Pond B. (Millet) .. ..	1,428	18.6 cm.	5.7 oz.	509 lb.	3,003
Pond C. (Fallow) .. ..	1,072	16.6 cm.	4.4 oz.	298 lb.	1,497

97. Earlier experiments had suggested that *T. melanopleura* was a stronger growing and higher yielding fish than *T. shirana* and there has been a tendency to recommend the one in preference to the other accordingly. Since the two fish have slightly different feeding habits, however, at least in the adult forms, it seems that a mixed culture of *T. shirana* and *T. melanopleura* might still give a better yield than a culture of *T. melanopleura* alone, since they should be able to occupy the same water without competing.

98. Accordingly a trial was started in May, 1958, with the object of getting some information on this point. This is currently proceeding.

99. In connection with fish farming there has been a certain amount of movement of fish during the year.

100. Some 2,990 fingerlings of *T. melanopleura* were distributed to African fish farmers in the Northern Province. Approximately 100 fry of the same species were carried to Lilongwe from Tipwiri and successfully used to stock the new Khongo dam in that District. The Department co-operated with the management of Lujeri Tea Estate and the Imperial Tobacco Company to procure stocks of *T. melanopleura* from the Shire River at Fort Johnston, and these were successfully established in the Lujeri Estate ponds and in the Burn Dam at Limbe.

101. A small stock of *Serranochromis* was taken from that originally established in the Luwawa Dam by the Department some years ago and transported to Nchena-chena. It is hoped that this moderate predator, indigenous to the country, might be used in dams and ponds partly for sporting purposes and partly as a control of overstocking by the forage species.

### Tsetse Control

#### GENERAL

102. The Tsetse Botanist was on leave for the first half of the year, leaving the Tsetse Ranger to supervise work for this period.

103. Discussion of means of carrying out the accepted policy of tsetse eradication by settlement wherever possible was continued during the year, but a generally acceptable basis for planning a course of action on these lines continued to prove difficult to find.

104. As in the past, the low density of tsetse fly catches within accepted areas of infestation caused difficulty in study of both ecology and distribution. Although the present staff position does not permit experimental verification, it is strongly suspected that "availability" (the percentage of the total population which can actually be seen) is extremely low, particularly for *Glossina morsitans*. Recent work in other territories has shown that availability of this species may be considerably less than the classical estimate of 10 per cent.

105. No signs were observed during the year of any general resurgences of tsetse populations such as are now in progress in neighbouring territories. It was not possible, however, to examine during the year the tsetse areas of the Central and Northern Provinces which are closest to Northern Rhodesia. This will be done in 1959.

106. Training of Tsetse Scouts in independent surveying continued and an excellent course on mapping was arranged in April by the Principal, Dedza Secondary School, and conducted by Mr. J. Potter. This has considerably improved the surveying ability of the tsetse staff.

#### SURVEY WORK

107. Surveys were made of a number of areas in response to agricultural enquiries. These included Rivi Rivi, Namwera, the Bwanje Valley, Toleza and the Dedza Lake-shore, and revised maps of tsetse distribution for the first two areas were issued. That for Namwera clarifies the position on the Mozambique border in this area, which was not adequately covered in the original Tsetse Survey.

108. At Toleza a suspected isolated breeding site of *G. morsitans* was treated with a course of applications of insecticidal smoke produced by "Swingfog" machines from 4 per cent. gammexane. Although no subsequent catches were made, permanent eradication is not yet considered proved by reason of the low density of flies discussed above.

109. Further observations were made in March on trains arriving at Port Herald from Mozambique and suspected of carrying *G. pallidipes*. No tsetse flies were found. This further confirms the view that flies board the trains at night and leave at dawn since, during the period of examination, no night trains arrived at Port Herald until well after dawn.

110. Towards the end of the year attention was turned to the areas from which tsetse flies are carried to the Kasupe and Fort Johnston decontamination posts, and periodical picketing of the Liwonde ferry was begun to determine the origin of tsetse flies carried to this point. It is hoped to continue these investigations with the object of eradicating the sources of flies for Kasupe and relieving the pressure of flies at Fort Johnston.

111. A small trial was made in November at the Chiuzi Dambo, Fort Johnston, of the effectiveness of a hessian screen backed with black cloth in increasing catches of *G. morsitans* on survey patrols. Total catches of flies were doubled by use of the screen, but observations were not prolonged enough to show any conclusive alteration in the composition of the fly population caught (sex ratio, hunger, etc.).

#### DECONTAMINATION POSTS

112. Operation of the established posts continued during 1958. In February a new open-air trial post was started at Fungo on the road from Kota Kota to Kasungu via Malomo. The operation of this post showed, as was expected, that tsetse were being carried from the Kota Kota belt towards the Malomo area, which, previously tsetse infested itself, is now fly free and with a growing population of cattle. Means are now being sought of operating the Mbobo post so that it will protect the Malomo area in addition to Visanza, which it already covers.

113. The total catches of flies at posts other than Kasupe are about the same or slightly lower than 1957. There was a considerable drop in numbers at all posts at the beginning of the year which may have been connected with the delayed start of the rains. By April the previous general rise had been resumed and at Fort Johnston well over 700 per month were caught in September and October, figures which are higher than for many years past. There was, however, another rapid decline in numbers at all posts towards the end of the year, bringing several totals below that of 1957.

114. Fly catches at Kasupe showed a drop throughout the year. This was believed due to the considerable interference with vegetation consequent upon the construction of the new Liwonde-Kasupe road and the suspension of use of a track giving access to the nearby Forest Reserve. Both these effects are likely to be of a temporary nature.

115. Considerable dislocation of the work of the Kasupe post was caused by the construction of the tarmac road passing through Kasupe. The number of offences by vehicles by-passing the post continues to be high. The outcome of reported offences is also disappointing, only three out of 44 during 1958 having resulted in successful prosecutions.

#### KARONGA RECLAMATION SCHEME

116. The year's clearing programme carried out mainly in August and October consisted of final attacks on the small infestation sites persisting after major clearance in the Yembe Hill area. The clearances of the part of the fly infestation (*G. brevipalpis*) mainly affecting the cattle on the Lake-shore plain was thus completed.

117. In November, following the clearances, only one fly was captured by patrols during the month. In December there was some recovery to a total of 11, but eight of these were from the Kasantha and Nkavankhande sections, which involve special problems and where it was expected that further work, probably with insecticide, would be necessary. For comparison, the average catches in 1953, at the beginning of the present programme of clearing, were over 300 flies per month over the same area and with a similar patrolling programme.

118. In the Katumbi's graveyard sector, where local custom does not permit clearing, an insecticide treatment designed to give some residual effect was carried out and produced superior results to the previous treatment with a non-persistent smoke. This is encouraging in view of the intention to try to eliminate this and any other difficult persistent areas by use of fully residual insecticide applications in 1959.

119. Patrols were carried out in September of the Mwawembe area about 15 miles south of the present scene of action. It was in this area that the first successful clearings were made in 1950, but an outbreak of trypanosomiasis during 1958 led to a suspicion that *G. brevipalpis* might have become re-established. No flies were found and subsequent control of the outbreak with increased drug treatment of the cattle led to the conclusion that the disease had been introduced by infected beasts from the north and subsequently spread by mechanical transmission.

120. Towards the end of the year more detailed consideration was given to the plan to eliminate the whole of the Karonga infestation by attacking the Mweningorongo area in conjunction with a campaign by the Tanganyika authorities in the immediately adjacent Tanganyikan belt. No very firm plans appeared to have been made on the other side of the border and it was finally considered that the remoteness of the Mweningorongo area which implied the construction of access roads, combined with the very small numbers of cattle immediately affected, would render the project economically impracticable.

121. The remaining programme for this project consists of two years' minor clearings within a relatively fly-free area between Yembe Hill and Mweningorongo. These, it is hoped, will encourage occupation and so isolate the cleared area from possible sources of reinfestation. The very remarkable persistence of the fly in small numbers is still a matter for disquiet. Cases are known where only one or two flies per year are captured by intensive patrolling over five to six miles of patrol path. It is hoped to overcome this difficulty by a change of tactics and the use of residual insecticide, the cost of tackling limited areas by this method being very low.

H. J. H. BORLEY  
Director  
Game, Fish and Tsetse Control  
Limbe

## APPENDIX I

### Senior Staff as at 31st December, 1958

Director .. .. .	..	..	..	..	H. J. H. BORLEY, M.A.
Tsetse Botanist .. .. .	..	..	..	..	B. STEELE, B.SC., PH.D.
Fisheries Officer .. .. .	..	..	..	..	E. C. L. BIRKENMEIER, D.PHIL.
Fish Ranger .. .. .	..	..	..	..	K. T. HOWARD
Fish Ranger (Rivers) .. .. .	..	..	..	..	A. V. GIFKINS
Game Control Officers .. .. .	..	..	..	..	E. T. LLEWELLYN
					O. J. CAREY
					C. W. S. BROWN
Tsetse Ranger .. .. .	..	..	..	..	C. H. E. RICKMAN

#### FISHERY RESEARCH ORGANIZATION (Nkata Bay Station)

Fishery Research Officer .. .. .	..	..	..	..	T. D. ILES, B.SC.
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## APPENDIX II

### CROP PROTECTION SCHEME

#### Animals killed and staff employed 1st January, 1958 to 31st December, 1958

	<i>Totals</i>		<i>Northern</i>		<i>Central</i>		<i>Southern</i>		<i>Totals</i>
	1957		<i>Province</i>		<i>Province</i>		<i>Province</i>		
Average No. hunters .. .. .	22	..	—	..	16	..	8	..	24
Average No. netters .. .. .	4	..	—	..	1	..	—	..	1
Average total men per month	26	..	—	..	17	..	8	..	25

#### ANIMALS KILLED:

Elephant .. .. .	45	..	—	..	40	..	19	..	59
Hippo .. .. .	62	..	—	..	33	..	27	..	60
Buffalo .. .. .	1	..	—	..	—	..	—	..	—
Antelope .. .. .	—	..	—	..	1	..	—	..	1
Baboon .. .. .	829	..	—	..	53	..	118	..	171
Pig .. .. .	31	..	1	..	3	..	15	..	19
Vermin netted .. .. .	225	..	—	..	75	..	—	..	75
Vermin killed under bounty system:									
A.D.W. finance .. .. .	7,123	..	10,529	..	13,304	..	—	..	23,833
Local Treasury finance .. .. .	11,491	..	2,075	..	8,703	..	11,458	..	22,236
Carnivora .. .. .	24	..	—	..	12	..	6	..	18

## APPENDIX III

### Revenue accruing from Crop Protection Activities

Value of ivory .. .. .	£1,476
Value of meat and skin sales .. .. .	£128

## APPENDIX IV

### Game Licences issued during 1958

<i>Type</i>	<i>No.</i>		<i>Value</i>
	<i>issued</i>		<i>£</i>
Residents .. .. .	2,546	..	2,546
Protectorate Full .. .. .	168	..	840
Visitors Full .. .. .	3	..	60
Elephant .. .. .	16	..	160
Temporary .. .. .	20	..	63
Licences for sale and export of game meat	18	..	61
TOTAL .. .. .			£3,730

APPENDIX V

NON-AFRICAN FISHERY

Table I. Total hauls of each type per annum in south-east arm

Type of Net	1954	1955	1956	1957	1958
Ring-net	4,729	4,215	3,728	6,803	9,325
Gill-net	Presentation method not comparable			3,271,760	yards

Table II. Average catch per single haul of net

(Numbers represent dozens)

Firm and Net	Fish	1954	1955	1956	1957	1958
No. 1 Ring-net S.E. arm	Tilapia	52	88	121	113	35(59)*
No. 2 Ring-net S.E. arm	Tilapia	36	48	53	51	55
No. 3 Ring-net S.E. arm	Tilapia	Not fishing			41	38
** Gill-net S.E. arm	Tilapia	—	—	1	4	7
	Labeo	32	27	19	41	20
	Catfish	5	1	5	8	5
** Gill-net S.W. arm	Tilapia	—	2	5	3	1
	Labeo	—	7	20	19	6
	Catfish	—	11	9	10	2

\* Figure in brackets represents actual catch per single haul. Figure without brackets represents figure as adjusted to allow for alteration in size of net since previous years.

\*\* Figures corrected to 1,000 yards set length.

Table III. Total Catches of more important species

(Numbers represent dozens. Weight estimated in short tons)

Year	Tilapia		Labeo	Catfish	Other	Weight
S.E. Arm	Tilapia	(Immature)				
1954	210,710	—	41,015	8,071	18	2,147
1955	287,003	—	27,658	3,525	5	2,536
1956	304,660	—	23,094	6,192	—	2,680
1957	479,675	—	16,148	6,742	126	3,984
1958	482,730	—	41,229	10,654	1,226	4,311
S.W. Arm						
1955	1,261	—	2,508	5,612	322	135
1956	2,802	—	9,977	5,367	912	213
1957	3,725	—	22,757	10,135	3,105	421
1958	4,730	9,175	10,836	5,568	10,034	297

Table IV. Landings per month (Short tons)

Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
624	454	932	592	502	231	183	109	171	318	271	221

Table V. Number of nets registered by non-African firms

Type of net	Number	Fees paid
Ring-net	6	£60
Gill-net	18,200	£91



Table VI. Fish Exports

<i>Month</i>	<i>Weight fresh fish</i>	<i>Weight smoked fish</i>	<i>Weight salt fish</i>	<i>Estimate of original total landed wt.</i>	<i>Percentage total catch</i>
January ..	34,950 lb. ..	4,835 lb. ..	11,632 lb. ..	72,719 lb. ..	6%
February ..	17,330 lb. ..	15,599 lb. ..	16,217 lb. ..	96,561 lb. ..	11%
March ..	17,155 lb. ..	— ..	66,322 lb. ..	149,799 lb. ..	8%
April ..	8,211 lb. ..	15,235 lb. ..	23,367 lb. ..	100,650 lb. ..	8%
May ..	18,057 lb. ..	9,797 lb. ..	37,251 lb. ..	121,950 lb. ..	12%
June ..	1,148 lb. ..	— ..	17,314 lb. ..	35,776 lb. ..	8%
July ..	— ..	— ..	— ..	— ..	—
August ..	— ..	— ..	2,571 lb. ..	5,142 lb. ..	2%
September ..	— ..	— ..	— ..	— ..	—
October ..	— ..	7,195 lb. ..	18,482 lb. ..	58,549 lb. ..	9%
November ..	42,980 lb. ..	9,389 lb. ..	5,600 lb. ..	82,347 lb. ..	15%
December ..	— ..	12,351 lb. ..	9,780 lb. ..	56,613 lb. ..	13%
	<u>139,831 lb. ..</u>	<u>74,401 lb. ..</u>	<u>208,536 lb. ..</u>	<u>780,106 lb. ..</u>	<u>8%</u>

APPENDIX VI  
AFRICAN FISHERY

Table 1. Total number of hauls of main types of net observed at Recording Stations

Station	Large meshed Seines		Small meshed Seines		Gill-nets			Chilimita or Ring-Net		
	1956	1957	1956	1957	1956	1957	1958	1956	1957	1958
Malindi	..	..	..	..	..	..	..	..	..	..
Matewera	58	141	2,782	1,247	1,088	634	1,188	..	..	..
Shire River	912	576	323	244	296	28	53	..	..	..
Mpemba	55	23	220	325	135	2,400	2,986	662	747	1,237
Monkey Bay	17	15	47	67	471	57	70	495	280	316
Kota Kota	140	29	268	207	152	251	735	..	..	..
Salima	587	460	21	121	164	100	818	..	..	..
Domira Bay	95	169	198	158	117	147	100	..	..	..
Chia	251	..	..	..	..	450	648	..	..	..
Lake Chilwa	..	..	..	..	..	6,215	1,912	..	..	..
Lake Malombe	296	15	..	..	..	34	5,014	..	..	..
Mtundu	No records	37	No records	13	..	No records	1,050	..	No records	..

\* Gill-net used as a ring net.

Table II. Average catch per single haul at Recording Stations

(Figures represent actual number of fish)

A. Large Meshed Seines		Tilapia	Tilapia	Labeo	Catfish	Haplo-
Period and Station		(Adult)	(Immature)			chromids
Matewere	1956	42.67	—	0.39	0.84	—
	1957	33.54	—	1.30	0.55	—
	1958	114.32	—	0.44	1.96	—
Mpemba	1956	12.35	—	2.62	0.60	—
	1957	33.60	—	0.26	1.39	—
	1958	No hauls	—	—	—	—
Shire River	1956	40.14	—	0.93	0.58	—
	1957	29.26	—	1.28	0.65	—
	1958	56.46	—	1.18	1.09	—
Monkey Bay	1956	27.94	0.170	6.29	1.41	0.10
	1957	11.87	0.105	1.73	2.46	—
	1958	35.00	50	11.20	1.00	—
Kota Kota	1956	52.16	—	20.21	10.35	160
	1957	10.17	—	43.41	29.28	50
	1958	70.50	—	42.07	18.14	—
Salima	1956	79.30	—	22.78	6.03	—
	1957	81.40	—	17.15	6.03	—
	1958	54.43	—	19.88	4.16	—
Domira Bay	1956	167.10	—	49.16	9.06	55
	1957	123.07	—	36.74	4.17	20
	1958	70.63	—	57.28	4.31	—
Chia Lagoon	1956	15.61	—	0.50	1.78	—
	1957	No hauls	—	—	—	—
	1958	No hauls	—	—	—	—
Mpamba	1956	124.87	—	79.95	18.89	—
	1957	141.81	—	55.81	31.96	—
	1958	14.83	—	30.00	19.50	—
Lake Malombe	1956	93.28	—	1.37	0.68	—
	1957	20.27	—	0.60	0.60	—
	1958	123.69	—	0.74	1.96	—
Mtundu	1956/57	No records	—	—	—	—
	1958	283.29	—	9.59	2.81	—
B. Small Meshed Seines						
Malindi	1956	0.34	110.00	1.25	0.29	1,250
	1957	1.02	76	1.19	0.19	465
	1958	0.38	006	2.85	0.16	441
Matewere	1956	3.39	210	0.09	0.07	375
	1957	3.74	2,039	0.004	0.36	434
	1958	6.95	225	0.03	0.10	1,344
Mpemba	1956	0.64	70	0.05	1.92	685
	1957	0.30	85	—	0.007	540
	1958	0.20	100	6.05	0.13	475
Monkey Bay	1956	10.80	675	63.64	0.96	135
	1957	5.00	936	67.15	0.36	3.7
	1958	4.75	21	1.69	0.19	832
Kota Kota	1956	5.95	135	5.46	1.72	165
	1957	25.24	50	6.76	4.60	180
	1958	28.50	—	18.00	6.75	555
Salima	1956	46.05	—	1.76	3.67	1,205
	1957	43.53	—	43.09	5.06	520
	1958	22.06	—	29.47	3.75	1,710
Domira Bay	1956	87.39	230	24.68	4.80	465
	1957	79.76	10	19.41	9.24	2,850
	1958	51.56	95	20.82	3.30	405
Mtundu	1956/57	No records	—	—	—	—
	1958	8.23	—	—	0.92	825
C. Chilimila Nets						
Mpemba	1958	0.37	—	—	0.07	825
Monkey Bay	1958	—	—	—	—	688

Table III. Summary of catches by all methods observed at Recording Stations

(Actual numbers of fish)

Station	<i>Tilapia</i> (Adult)	<i>Tilapia</i> (Immature)	<i>Labeo</i>	Catfish	<i>Haplo-</i> <i>chromids</i>
Malindi .. .. .	6,546	675	16,490	4,699	495,375
Matewere .. .. .	23,994	77,700	2,106	870	411,450
Shire River .. .. .	65,171	—	1,836	3,130	—
Mpemba .. .. .	4,354	13,700	2,785	4,705	1,089,150
Monkey Bay .. .. .	3,496	11,343	1,964	4,712	602,853
Salima .. .. .	31,806	—	20,775	8,192	380,400
Domira Bay .. .. .	17,045	16,500	13,532	2,847	48,500
Chia Lagoon .. .. .	82,067	—	12,005	12,713	—
Lake Chilwa .. .. .	25,096	—	—	2,368	—
Mpamba .. .. .	784	—	2,210	4,611	—
Lake Malombe .. .. .	60,970	—	1,516	13,804	—
Kota Kota .. .. .	9,650	—	11,471	8,606	87,750
Mtundu .. .. .	10,589	—	355	116	10,750

APPENDIX VII

Trout Fishing 1957/58

Stream	<i>N. Rumpi</i>	<i>Kaziwiziwi</i>	<i>Mlunguzi</i>	<i>Mlanje streams</i>
No. Rod days .. .. .	71	11	82	67
No. fish kept .. .. .	87	3	140	180
Average size .. .. .	13.4"	15.5"	10.5"	10.1"
No. fish at 8"	—	—	21	—
8½"	—	—	—	29
9"	—	—	34	37
9½"	—	—	21	18
10"	—	—	14	31
10½"	—	—	2	8
11"	—	—	7	26
11½"	—	—	3	7
12"	21	—	8	9
12½"	11	—	—	2
13"	19	—	12	4
13½"	14	—	3	1
14"	4	—	6	4
14½"	7	1	—	1
15"	4	—	4	2
15½"	3	1	—	1
16"	3	—	2	—
16½"	1	1	—	—
17"	—	—	2	—
17½"	—	—	—	—
18"	—	—	1	—
No. undersized returned	29	—	187	584
TOTAL licences issued	33	—	46	27
Value .. .. .	£18-5s	—	£55-5s	£22-15s

APPENDIX VIII

Fish Farming progress in the Northern Province—Position as at 31-12-58

Area	No. stocked ponds	Acres of stocked ponds	No. ponds under construction or awaiting stock	Acres ponds under construction etc.	Average size of pond in area	Max. size pond	Min. size pond
Nchenachena	17	2½ acres	8	7½ acres	½ acre	2 acres	½ acre
Livingstonia	17	5½ acres	1	½ acre	½ acre	1½ acres	½ acre
Chikwina	10	2½ acres	5	2½ acres	½ acre	¾ acre	½ acre
Muhuju	5	3 acres	2	1½ acres	¾ acre	2 acres	½ acre
Njakwa	3	1 acre	1	1 acre	¾ acre	1 acre	¾ acre
	52	14½ acres	17	13½ acres			

APPENDIX IX

Summary of Traffic and Flies caught at Decontamination Posts, 1958 (G. morsitans)

Post	Position	Number of motor vehicles	Flies caught	Number of cycles	Flies caught	Number of pedestrians	Flies caught	Total flies
Kota Kota	Outskirts of Kota Kota township (N)	4,172	44	22,456	72	39,330	20	136
Chota	Outskirts of Kota Kota township (S)	—	—	11,128	8	26,644	5	13
Mbobo	Approach to C.P. Highlands, Kota Kota Rd.	1,450	98	2,810	49	2,794	17	164
Fort Johnston	Outskirts of Fort Johnston township East of Ferry Crossing	4,018	132	87,314	2,438	116,111	1,279	3,849
Kasupe	Approach to Zombahighlands, Liwonde-Zomba road	11,377	2	28,500	16	18,431	4	22
Fungo*	Approach to Malomo area, Kota Kota Road	98	3	231	26	150	0	29

\* New post opened in February, open air.

Long Term Records from Deflying Posts

Posts	1950	1951	1952	Total Flies 1953	1954	1955	1956	1957	1958
Kota Kota	96	113	47	34	16	28	105	181	136
Chota	69	34	12	16	12	7	5	10	13
Mbobo	110	179	26	45	24	50	205	266	164
Mvera	735	290	66	7	1	—	—	—	—
Fort Johnston	14,351	14,521	7,557	11,750	9,591	2,652	1,589	3,736	3,849
Lirangwe	21	93	42	32	11	0	—	—	—
Kasupe	29	207	84	88	96	46	63	104	22