

CSc 35

NYASALAND PROTECTORATE



Annual Report
of the
Department
of
Game, Fish and Tsetse Control
for the
Year ended 31st December
1955

PRICE 2s-0d

1956

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Annual Report of the Department of Game, Fish and Tsetse Control for the year, 1955

(a) Staff and General

1. The staff was increased during the year by the addition of Mr. K. T. Howard, Fish Ranger, who arrived on 5th April. After a few weeks at Fort Johnston he was posted to Nkata Bay, where he carried on extension work related to the findings of the Fishery Research Organization. He also started on a programme of boat building for Africans in the northern part of the Lake, similar to that which has been in action in the south for some time.
2. Mr. Carey, Game Control Officer, returned from leave in August and took the place of Mr. Muldoon in the Southern Province. Mr. Muldoon went on leave on 27th August.
3. In recognition of the extended scope of Mr. Gifkin's work his title was changed during the year from Trout Warden to Fish Ranger (Rivers).
4. The greater part of the Fisheries Research team left Nyasaland at the beginning of November, to start work at Samfya in Northern Rhodesia. Nyasaland retained its connection with this joint organization, however, Mr. Iles remaining behind at Nkata Bay to continue that station as a sub-station of the main laboratory at Samfya.
5. During the year Dr. C. F. Hickling, Fisheries Adviser to the Secretary of State, visited the Protectorate and inspected the Fisheries station at Fort Johnston and the Fisheries Laboratory at Nkata Bay, travelling between the two in the Fisheries launch *Gigipat*.
6. Professor T. H. Davey of the Colonial Office Tsetse and Trypanosomiasis Committee visited Departmental Headquarters during his tour of the Federation.
7. The staff position at 31st December is set out at Appendix I.

(b) Game

CROP PROTECTION

8. Activities continued much as in 1955, with the emphasis of the armed teams being directed against heavy game in selected areas. Vermin were again mainly left to local effort in the shape of netting teams and private individuals encouraged by bounty payments. Neither produced such good results as in 1954.
9. The two armed teams were employed in the Northern Province as previously, one at Karonga under the District Commissioner, and one at Rumpi. The latter came under the charge of the Tsetse Ranger after the first quarter of the year. The Karonga team continued to work in a broadcast manner and its effect was probably little more than psychological. The policy in respect of the Rumpi team has laid rather more emphasis on concerted efforts by the team as a whole, and on the decisive clearing of defined areas, than on attempting to attend to each and every complaint. It is probably not as popular as the method used at Karonga, but is more likely to produce an economic effect.
10. In the absence of one officer on leave the two Central Province teams were slightly reduced in size and combined under the Game Control Officer, Kota-Kota. In the main they were employed on cordon work round the two Reserves, and in strikes against hippo in the rice areas during the cropping season. In the dry season, and subject to calls to deal with heavy game, they made some concentrated attacks



on vermin up and down the Lake-shore of Kota-Kota District. In general, heavy game, such as elephant and buffalo, is keeping much more to the Reserves as a result of the maintenance of the defensive cordons over the last few years, and it has not been necessary to shoot so many animals.

11. The local effort against vermin, consisting of locally directed netting teams in Kasungu and Dowa Districts, and private effort encouraged by bounty in some districts, was not so successful as in 1954 but made a useful contribution. In addition some districts paid for a bounty system from their own resources and the results of this are not known.

12. The Southern Province armed team was maintained at the same average strength as previously. The results of previous years' work appear to have considerably reduced elephant damage in the Kirk Range wheat and in the central Shire Valley, and it was not necessary to take action in these areas. The team was mainly employed on cordon work in relation to the Majete Area, elephant again being successfully kept from the Mwanza cotton, and in action against hippo in the rice areas of Fort Johnston District. Two efforts were also made to dislodge buffalo from the Lengwe Game Reserve, which these animals are using seasonally as a base from which to raid surrounding *dimba* crops.

13. No ponderable action against vermin was taken by the Department in the Southern Province, it having been understood that local Treasuries would finance bounty systems and netting teams. One netting team was in fact started in Port Herald but the introduction of the bounty system was delayed till 1956.

14. Details of staff employed, animals shot, etc. are set out in Appendices II and III.

CROCODILE HUNTING

15. The four licensees continued in action during the year, a total of 2,565 reptiles being killed. Value of skins actually sent out of the country during the year was some £12,000. There seems little sign of development of much interest by African trappers, as the number from this source was 275 only, as against 943 in the previous year.

16. A comparison with the figures for previous years suggests that the crocodile population has declined considerably as a result of commercial activities. This is to be expected when a virgin stock is first exploited, but, judging by the returns of sizes of crocodiles caught which have so far been received from licensees, there is no startling rise in the percentage of immature specimens, such as one might expect if the stock was being seriously over-hunted. The returns, however, are not yet complete enough to permit of definite conclusions.

GAME CONSERVATION

17. The Game Control Officers devoted the greater part of the dry season to work in connection with the Game Reserves.

18. The clear demarcation of the boundaries of Kota-Kota and Mwabvi Reserves was completed, and detailed proposals were submitted for a revision of the boundaries of Kasungu Reserve, based on natural features. This Reserve has, of course, been in existence for many years but the gazetted boundaries are quite unrecognizable on the ground.

19. The access road, constructed during 1953-54 to the Lifupa-Lingadzi junction in the Kasungu Reserve, was further improved and a start made on the erection of a small Rest Camp at the road end. It is hoped to have this open for visitors by the end of the 1956 dry season.

20. During the year the area centring on Majete Hill in Chikwawa District, hitherto partly preserved as an area where hunting was prohibited, was proclaimed a full Game Reserve. It is about 100 square miles in extent and largely consists of broken stony hills mostly clothed in a very light woodland of poor *Brachystegia* scrub, but it holds a fair population of elephant, zebra, eland, sable and kudu. Mr. G. D. Hayes has recently also observed what he believes to be specimens of the Nyala klipspringer within its confines. The area, though by no means ideal from the game observers point of view, provides a convenient no-man's-land to which game from the extensively cultivated Mwanza Valley may, it is hoped, be persuaded to withdraw.

21. The game populations of Kota-Kota and Kasungu Reserves appeared to continue much as usual, with game fairly readily observable at the major watering points during the dry season. The concentration of elephant and other game near the Lifupa-Lingadzi junction in Kasungu, which began to be observed in the dry season of 1953, was maintained during the year under review and it seems fairly plain that this was no chance observation. In Kota-Kota, buffalo and elephant predominated, a total of over 300 of the latter being seen during the month of September, accordingly to an analysis of the Game Reserve Guards reports. Elephant and sable are also now occasionally seen near the main road through the Reserve, an area in which very little has been observable in previous years.

22. The Mwabvi Reserve in Port Herald District continues to build up its population slowly and offers some possibilities of development. In spite of further search, which was considerable without being actually exhaustive, no trace of Nyala has yet been found. The habitat is undoubtedly suitable, and it seems certain that they were there in the past, but it now seems likely that they ceased to exist several years ago. Nevertheless the Reserve remains of considerable value because of its large and apparently increasing rhinoceros population, and as an area to which it may be possible to re-introduce Nyala.

23. The absence of Nyala from the Mwabvi is the more disappointing in that the position of this species in the Lengwe is now causing some concern. Numbers do not seem quite what they were and the animals rather more wild. Depredations by wild-dog and disturbance caused by the noise of heavy road-making machinery on the neighbouring Chikwawa-Ngabu Road, would seem to be the chief causes. These are moderately temporary circumstances, but it is obvious that the tide of general settlement is now lapping very closely round this Reserve and it will be necessary to concentrate a great deal of protective attention on it if the Nyala are to be preserved. It will also be advisable to investigate the possibility of transporting some of the Nyala from the Lengwe to the Mwabvi in the near future.

24. The new Game Ordinance, brought into force during 1954, has not yet made much difference to the situation outside the Game Reserves. The total number of Game Licences taken out shows a slight increase, but it is still some way short of the number of firearm owners.

25. Details of licences taken out during 1955 are given in Appendix IV.

(c) Fishery

STATE OF THE FISH STOCKS

26. The suggestion of a slight fall in the level of open water *Tilapia* stocks, which was shown by the 1953 and 1954 figures for non-African ring-netting in the South-East Arm, is not borne out by an analysis of the 1955 figures. These show a rise in catch per single haul of net of 53 per cent., and in spite of a decrease in the number of hauls from 4,729 in 1954 to 4,214 in 1955 the total *Tilapia* catch of the ring nets increased by 36 per cent. to reach a figure of 287,003 dozens.

27. The figures of catch per single haul, have in fact shown a general tendency to rise since about 1948, and with fully adult fish still forming the great majority of the catch, there seems no reason to doubt that the South-East Arm stock is in a very satisfactory condition.

28. A start was made with ring netting in the South-West Arm but the data are not in any way comparable with that from the South-East Arm, owing to differences in the size of net and experience of the operators. No proper conclusions can therefore yet be drawn concerning the stock levels of open water *Tilapia* in this Arm.

29. The position with respect to inshore *Tilapia* stocks, as reflected in the figures for inshore fishing by African nets, shows little overall change from previous years. The catch per single haul is up at some recording stations and down at others, and one receives an overall impression that stocks have achieved a reasonably balanced state, though the level still seems a good deal lower than it was 15 years or so ago.

30. "*Nchila*" (Labeo) stocks, judging from an analysis of the non-African gill net catches seem to have declined somewhat and although this suggestion is not fully borne out by inspection of the African seine net catches, it is thought that there probably is a slight but real decline in level of this species.

31. Catfish or "barbel" stocks, again judging by the non-African gill net figures, seem to have dropped quite considerably in the South-East Arm at least. Such decline as may have taken place, is not greatly to be deplored as it should theoretically be, and in fact has been, accompanied by some rise in the commercially preferable *Tilapia* on which the barbel prey. Gill netting has been strongly encouraged over the last three or four years, partly with the avowed object of bringing about some decline in these predator stocks. It is to be noted that the "barbel" catches in the comparatively virgin gill net fishery of the South-West Arm are considerably higher than those of the South-east.

32. Data on catches etc. are to be found in Appendices V and VI.

THE NON-AFRICAN FISHERY

33. Four commercial licences were in force during the year.

34. One of the two South-West arm operators ceased fishing in August, mainly because of difficulties of transport from his shore base during the rains. Nevertheless, this operator applied for a further licence at the end of the year. The other, although his fishing is still on a small scale and largely confined to one method, is slowly consolidating his position.

35. The two older established firms, working in the South-East arm, made considerable progress in developing the fishing side of their businesses. Both made improvements in their shore installations and one initiated ship to shore radio-telephony with a view to achieving closer control and better adjustment of catch. The extension of the Post Office telephone facilities should also be of great benefit to the two firms. New fishing boats are on order and the picture generally is of two well-established fisheries.

36. It must be remarked, however, that apart from the establishment of a small cold store, not deep-freeze, in Limbe by one firm, little progress was made in connection with the organization of distribution.

THE AFRICAN FISHERY

37. The main part of the African fishery continues more or less on a "subsistence" level though there seems to be a fairly steady increase in the use of imported gear.

38. As usual the effort varied from place to place with variations in abundance of the fish and also with the whims of the fishermen. Few of these depend entirely on fishing for a livelihood and seldom think of putting aside the profits of a good season against replacements of nets, etc.

39. The result is that the African effort tends to proceed by fits and starts. This situation has its advantages from the stock conservation aspect. Over-fishing, with a depression in stock level both accentuated and masked by a compensatory increase in effort, such as commonly occurs in a truly commercial fishery, is not likely to develop in these circumstances. On the other hand it is difficult to visualize the development of a well-organized marketing and distribution system with this uncertain background.

40. In spite of the general position, however, a few truly commercial African enterprises are gradually developing, as noted in the 1954 Report. One of these, operating gill nets, is working on a rather larger scale than one of the non-African firms. One of these "commercial" Africans averaged some nine tons of fish per month over the year and another four tons a month.

41. One or two of these commercial enterprises seem quite well established but most are having a rather hard struggle in the difficult marketing conditions now pertaining.

THE FISH TRADE

42. There was depressingly little change from the rather complex and chaotic situation pertaining in 1954.

43. The difficulty of disposing of the heavy catches of the wet season still persists, and a good deal of non-African caught fish was wasted, either because the major markets were temporarily very heavily supplied, or because the main road from the Lake became impassable from floods or washaways while the fish lorries were actually *en route*.

44. Losses from this last cause, are in reality a reflection of the marketing difficulty, for if there was a more ready market for cured-fish the fishing firms would not be so insistent in their attempts to sell fresh, even during the wet season when transport is so uncertain. In this connection it is to be noted that several of the potential bulk purchasers have indicated their lack of interest in dried fish as sufficient is already circulating by the agency of African traders. The unsatisfied demand is for fresh fish.

45. The fact is that the regular supply of fresh fish in considerable quantities over uncertain roads in hot weather is difficult if not impossible without the use of ice, cold storage, and proper packing arrangements.

46. The distribution through the medium of African traders continued much as usual, though there is a steady increase in the number of African-owned lorries engaged in the business. Some of these carry fresh fish, usually to Lilongwe and the other Central Province markets, but most continue to deal in the cured products.

47. Prices at these smaller markets remain high on the whole, and turnover correspondingly slow. It is alleged that occasionally a minor "price war" develops on the Lilongwe market, when several lorries are in together, and that the various traders do reduce prices considerably in the attempt undersell each other. It does not appear, however, that any trader has yet seen fit to make a permanent reduction in his prices, irrespective of immediate competition, in order to build up a regular clientele and to follow a policy of small profits and quick returns. The effect of this certainly needs to be tried but the uncertainty of supply from all but a very few sources probably discourages those who might otherwise attempt it. Small profits depend on a big turnover and this, in turn, implies a reliable supply.

DEVELOPMENTAL WORK

48. The Fish Ranger at Nkata Bay commenced boat-building shortly after his arrival there, using a V-bottomed design as distinct from the flat-bottomed design which is being built at Fort Johnston. It is thought that this design may be more suitable for the rougher waters of the Northern Lake. After building a 12-foot boat as a trial, he produced an 18-foot version which was sold to a Likoma Island fisherman shortly after launching. Much interest was taken in these boats and there are several other fishermen who are anxious to acquire one.

49. In the Southern Province, building of the flat-bottomed scows continued as previously. Six craft were built and repairs carried out on three previously constructed. Only four of the six new boats were sold, however, though there are three buyers who have deposited nearly the full amount of the purchase price. Many enquiries were also received but the number of fishermen with ready cash seems to be on the decrease.

50. The last boat built was built to a slightly modified design and improved standard of construction.

51. One local carpenter has built his own boat, with the advice of the Fisheries Officer, to a design approximating to that built by the Department, and it is possible he may undertake more work of this nature.

52. Efforts continued to encourage the progressive African fishermen to increase their activities and especially to maintain proper records and accounts. Full success was only achieved in one case, but this now serves as an example to others.

EXPERIMENTAL WORK

53. Work continued in discovering the finer points of gill-netting.

54. A study was made on the effect of moonlight on gill-net fishing, the basis of comparison being:—

(a) the dark nights of the period between the last quarter and the first quarter against the light nights of the middle of the lunar month.

(b) the seven nights around new moon against the seven nights around full moon.

(c) the three nights at new moon against the three nights at full moon.

(d) the night of new moon against the night of full moon.

55. A typical month's results were as follows:—

(a) Period last quarter to first quarter, catch 50 per cent. greater than during the period first quarter to last quarter.

(b) Seven nights around new moon, catch 125 per cent. greater than seven nights around full moon.

(c) Three nights at new moon, catch 145 per cent. greater than three nights at full moon.

(d) Catch on night of new moon 300 per cent. greater than catch on night of full moon.

56. Further experiments were conducted with two objects:—

(a) to test a new Terylene net (Trade mark "Property to Imperial Chemical Industries).

(b) to endeavour to evaluate the relative efficiency of deep and shallow gill nets.

57. In the first experiment a 4-inch mesh Terylene net was fished against a 4-inch 36/6 cotton net. Unfortunately, supplies did not permit its being fished against a nylon net. Ten sets were made in Lake Malombe, with the following results.

	<i>Tilapia</i>	<i>Labeo</i>	<i>Kampango</i>	<i>Clarias</i>	<i>Other</i>	<i>Wt.</i> <i>lbs.</i>
36/6 Cotton	88	11	20	9	66	258
Terylene	501	22	33	14	125	903

58. After the ten sets the cotton net became unserviceable. The Terylene net was also showing signs of wear and it would appear that these nets have a short life in these waters, compared with nylon nets.

59. In the second experiment:—

(a) A 54 mesh nylon net was set eight times and the fish from the top and bottom half counted. The top half took 38 fish weighing 40,220 gm. and the bottom 91 fish weighing 89,390 gm. This net was set with its foot rope on the bottom.

(b) Simultaneously an identical net was set beside that referred to at (a) with its foot rope level with the middle of (a). Once more the bottom half caught more than the top, the catch being 62 fish in the top half, weighing 61,340 gm. and 100 fish in the bottom half, weighing 109,000 gm. It is to be noted here that although the bottom half of (b) net was at precisely the same depth as the top half of (a) it caught considerably more fish.

(c) A 54 mesh net was cut in half, joined end to end and fished along side a 54 inch mesh net, so that the effect was of fishing a 27 mesh \times 200 yard net against a 54 mesh \times 100 yard net. In 30 sets of this nature the 200 yard \times 27 mesh net caught 1,069 fish weighing 809,345 gm. and the 100 yard \times 54 mesh caught 911 fish weighing 674,372 gm. a not very significant difference.

60. The results suggest that the heavier catch of the bottom half of the net is not solely due to the fact that fish are swimming close to the bottom. It appears that while the bottom half of the net does do most of the catching the top half tends to function as a barrier, driving the fish downwards and is not, as at first sight might be supposed, simply waste netting.

61. Possibly a compromise depth of 36 meshes might prove the best economic proposition.

62. Towards the end of the year work was started on the construction of a simple fish meal plant of the cottage industry type and scale, in an attempt to find a way of utilizing the very varied catch of the gill nets, not always entirely suitable for marketing as whole fish, and of finding an alternative means of preserving the glut catches of the rainy months against the shortages of the dry weather.

63. Nine-tenths of the plant was constructed by the end of the year.

FISHERIES RESEARCH ORGANIZATION

64. The team completed the main part of its survey, during the year, and the majority left for Northern Rhodesia during November. Mr. Iles, Scientific Officer, remained at Nkata Bay to collect final data and put the finishing touches on his work on the "Utaka" before the full report is prepared.

65. The general conclusions reached by the survey are as follows:—

(1) A potential fishery exists in the northern third of Lake Nyasa which could be exploited to a considerably greater extent than it is at present.

(2) Potential exploitation in this northern third, is more or less limited to the littoral zone and no potential fishery appears to exist in the deep open water of this area.

(3) In most places, due to the precipitous nature of the shore in this part of the Lake, the littoral waters which are fishable are limited to distances of less than half a mile from shore.

(4) These waters, although they are traditional African fishing grounds, are not nearly fully exploited at present, few Africans seeing their way to fish more than a few hundred yards from shore.

66. Several recommendations are made concerning the procedure for development and the structure of the fishery which the team thinks should be aimed at.

67. A formal report is in course of preparation.

TROUT FISHING

68. Further hatchings were made from ova stripped and fertilized locally, and also from a supply imported from South Africa.

69. Results were sadly interfered with by the breaking of an irrigation furrow feeding the Nehenachena Agricultural Station, which precipitated heavy quantities of silt into the hatchery stream when the ova were in a very vulnerable state. Some 6,900 alevins were nevertheless successfully reared, 2,400 of these were sold to the Northern Rhodesian Game Department for stocking the main stream on the Northern Rhodesian portion of the Nyika, and the remainder were divided between the Kaziwiziwi and Southern Rumpi or Chelinda Stream.

70. This latter water, though now the most heavily stocked of the Northern Streams as far as introductions are concerned, continued to yield little result. Late in the year, however, investigations made by Mr. Gifkins, the Fish Ranger, showed that the bulk of the fish were very high up indeed, and had moved up far above their point of introduction. The heavy silt which the water of this stream holds during so much of the year would seem to be the cause. Some fine adult fish were observed and an adequacy of yearlings.

71. The stream was therefore opened to fishing, but it proved very difficult to get the fish to take standard size flies. It seems that some relaxation of the existing regulations will have to be made in respect of this water, but there now seems no reason to doubt its long term potential.

72. The Northern Rumpi again yielded some excellent trout but was not extensively fished. It is hoped to build a fishing camp at road level during 1956, which will make it more practicable to fish this stream.

73. Mlunguzi fishing appears to have been very much as usual with some excellent fish being taken in the dam. His Excellency the Governor, Sir Geoffrey Colby, signalled his last season's fishing on this water by catching a three and a half pounder. Little of moment came from the stream itself, however, and the popular Hatchery Bridge-Flat Falls stretch now seems to contain much fewer fish than formerly. It seems that the "weeding out" process initiated by the change of regulations in 1952 may now have gone far enough, and that it might be sound to follow a more restrictive policy for a while.

74. Unfortunately, a very small percentage of those who took out licences for the 1954/55 season, which finished in March 1955, submitted their statutory returns of fish caught, and it is impossible to make any detailed analysis of the fishing for that season.

75. The two main streams on Mlanje, the Chapeluka and Malembe, remained closed throughout the year, but an inspection, carried out towards the end of the dry season, revealed a very considerable recovery in the stock. It is hoped that these streams will be opened to fishing again during 1956.

FISH FARMING

76. Excellent progress was made with the work at Nchenachena.

77. The small trial ponds, stocked in April, 1954, with 161 fish, none of which were fully adult, were fished occasionally during 1955 and were drained and cleared in November, 1955. From first to last, a total of 28,240 fish were removed, at an estimated weight of 2,883 lbs. against the 2 lbs. 11 ozs. stocking weight. Unfortunately, as is at present common with in this sort of farm, nearly all the fish were under half a lb. in weight, though this may not matter for the African market.

78. In parallel with the rough preliminary trials at Nchenachena itself, the more orthodox ponds in the neighbouring valley of Tiuwiri were completed during the year. In all, three one-acre ponds were completed and each stocked with 6,000 mixed *Tilapia shirana* and *T. melanopleura* fry. Three tenth-acre ponds were also built and stocked with the same mixture at a variety of rates.

79. The object of this miniature farm is to serve as a training ground and demonstration for would-be fish-farmers. It is hoped to begin training courses towards the close of 1956 when the efforts of the various treatments and varying stocking rates have become observable.

(d) Tsetse Control

80. Publication of the 1950-53 Tsetse Survey Report was approved during the year and printing put in hand. It is hoped that the Report may be published early in 1956. Mr. Rickman's survey of the Northern Province was completed early in the year and his findings have been included as an Appendix to the main survey Report so that, as published, this will include the whole Protectorate.

81. Soon after the rains, work was started on the insecticidal fogging of the North Yembe Sector of the Karonga fly belt, as decided on last year. In the event however, it was found that the difficulties of the terrain, coupled with the sensitivity of the insecticidal fog to thermal currents, made it impossible to be sure that absolutely complete coverage was being given. Fully complete coverage was an absolutely necessary feature of the experiment and unless it could be guaranteed no real conclusions could be drawn. It was therefore decided that there was no point in proceeding with it.

82. A smaller experiment, aimed at eliminating fly from the limited extent of a burial ground, where complete coverage could be assured, produced inconclusive results. The individual treatments of the area undoubtedly killed the fly present, but re-infestation was unexpectedly rapid and the course of treatment, as a whole, did not achieve elimination.

83. Small scale bush clearings, at individual sites of persistence in the otherwise cleared areas of Ngerenge and Yembe South sectors, showed considerable promise. Up to the end of the year the treated sections were giving nil returns, which largely removes the fear that the low populations remaining after initial clearing would be resistant to subsequent attack.

84. Regular fly patrols have been maintained and have shown that, apart from the results mentioned above, there has been a natural decline of fly within the whole of the belt so far attacked. This decline does not appear in the Mweningorongo and Ndenga Sectors which have never been worked on, so that there is some reason to believe that the cumulative effect of past clearings may only now be beginning to show.

85. From November the flies caught on some of the North Yembe rounds have been marked. So far there has been one recapture of a fly, which had moved across the Kawale Valley on to Mpetela Fly round, a minimum distance of one-third of a mile.

86. In spite of the undoubted decrease in fly, the incidence of trypanosomiasis increased during the year. This suggests that mechanical transmission may be very much involved and that the intensive inoculation campaigns, conducted by the Veterinary Department in 1953-54, may now be losing their effect.

87. The Tsetse and Trypanosomiasis Committee, having suggested that the Lower River Area as an important area for potential development, should receive priority consideration for action to remove fly, the Tsetse Botanist made a series of observations there. These were made with a view to confirming and amplifying the findings of the Tsetse Survey and to the making of plans for elimination of tsetse by directed settlement.

88. Investigations into sources of trypanosomiasis have included a visit to the Portuguese side of the Shire, opposite Port Herald and Chiromo, where the Portuguese authorities kindly arranged a check on the present tsetse position. No serious source of trypanosomiasis infection directly from tsetse flies has been found, though one specimen of *Glossina brevipalpis* was captured in a healthy state on a train arriving at Port Herald from Beira, indicating that infection may occasionally be initially introduced in this way. The conclusion has been drawn that mechanical transmission probably accounts for the widespread incidence and prevalence of trypanosomiasis, and this has led to the formulation of a plan by the Veterinary Department for mass inoculation. This would eliminate mechanical transmission as a factor and reveal the true incidence of infection through tsetse flies alone.

89. The main centre of interest for eradication of tsetse by settlement has been in the Mkombedzi-Mwanza area of Chikwawa Districts. The necessary ecological observations are continuing.

90. Advantage was taken of Mr. Rickman's presence in the Northern Province in connection with the Karonga Scheme, to begin to investigate the ecology of the fly in the vicinity of the middle reaches of the South Rukuru or Runyina, in Mzimba District, again with a view to eradication by settlement. This is the only *G. morsitans* area occurring in the Northern Province, it appears suitable for settlement if water supplies could be made available, and, as a source of tsetse, it exercises some influence on the surrounding cattle areas. Planned settlement might therefore be both practicable and valuable if it could be arranged.

91. The decontamination sheds on the main traffic routes were maintained as usual, the efficiency of the Southern Province sheds being improved by the installation of sliding light tight doors.

92. The number of fly caught (*G. morsitans*) continued to decline at most posts presumably reflecting a decline in fly populations, and the Mvera Post was closed in October, after 18 months of negative records.

93. In spite of this general tendency, however, the posts at Mbobo and Kota-Kota caught increased fly with no significant change in traffic frequency. It is also believed that a few fly have reappeared in the vicinity of Chitala, which has been free for some years. This may be the first sign of a general resurgence of *G. morsitans*, such as is reputed to be taking place in neighbouring territories.

94. A new open-air post was established near Ndakwera Village, in Chikwawa District, to cover a road recently made into the sleeping sickness area of the Sumbu. Traffic was much lighter than expected but flies, which would otherwise have been carried to Chikwawa, have been trapped.

95. The incidence of fly at the decontamination posts is shown in tabular form at Appendix VII.

96. Regular reports have been received from the Veterinary Department during the year, showing the distribution of trypanosomiasis cases. These are of great assistance in working out the practical effects of tsetse distribution.

97. Several enquiries have been received from cattle-owners or potential owners, and advice given, but investigation of individual cases is restricted by shortage of staff.

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

APPENDIX I

Staff as at 31st December, 1955

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

FISHERY RESEARCH ORGANIZATION

(Nkata Bay Sub-Station)

Scientific Officers	T. D. ILES, B.SC.
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APPENDIX II

CROP PROTECTION SCHEME

Animals Killed and Staff employed 1st January, 1955, to 31st December, 1955

	<i>Totals</i> <i>1954</i>	<i>Northern</i> <i>Province</i>	<i>Central</i> <i>Province</i>	<i>Southern</i> <i>Province</i>	<i>Totals</i>
Average No. of armed hunters per month ..	30	7.	10.	8	25
Average No. of Netters ..	10	—	4	—	4
Average total men per month	<u>40</u>	<u>7</u>	<u>14</u>	<u>8</u>	<u>29</u>
ANIMALS KILLED:					
Elephant	110	1	14	5	20
Hippo	48	—	57	80	137
Buffalo	31	23	1	8	32
Waterbuck	—	—	—	—	—
Roan, eland, kudu	4	—	—	3	3
Other buck	31	18	—	—	18
Baboon shot	3,995	555	1,088	23	1,666
Pig shot	227	181	1	2	184
Vermin netted	1,035	No teams	340	No teams	340
Vermin killed for bounty by private effort ..	10,550	2,426	5,732	—	8,158
Carnivora	26	1	7	7	15
Rounds per beast	?	1.2	1.7	4.	..
Beasts killed per men employed	137	18	107	15	83

APPENDIX III

Revenue accruing from Crop Protection Activities

Value of ivory	£514
Value of meat sold	£70
	£584

APPENDIX IV

Game Licences issued during 1955

<i>Type</i>	<i>No. Issued</i>	<i>Value</i>
Residents'	2,270	£2,270
Protectorate Full	98	490
Visitors' Full	17	170
Temporary	12	34
Elephant	10	100
Licences to export meat	4	40
		£3,104

APPENDIX V

NON-AFRICAN FISHERY

Table I. Table Hauls of each type of net per annum. S.E. Arm

<i>Type of Net</i>	1952	1953	1954	1955
Ring Net	3,926	3,755	4,729	4,214
Gill Net	560	600	814	649

Table II. Average Catch per Single Haul of Net
(Numbers Represent Dozens)

<i>Firm Type of Net</i>	1952	1953	1954	1955
No. 1 Ring Net S.E. Arm	Tilapia	66	60	52
	Labeo	0.3	0.7	0.2
	Catfish	—	—	—
No. 2 Ring Net S.E. Arm	Tilapia	42	62	36
	Labeo	—	0.9	0.2
	Catfish	—	—	0.02
Gill Net S.E. Arm +	Tilapia	2	2	—
	Labeo	40	36	52
	Catfish	6	6	8
Gill Net S.W. Arm +	Tilapia	—	—	—
	Labeo	—	—	—
	Catfish	—	—	—

+ Figures corrected to average length of 1,600 yards.

Table III. Total Catches of more Important Species
(Numbers Represent Dozens. Weight estimated as Short Tons)

<i>Year</i>	<i>Tilapia (Adult)</i>	<i>Tilapia (Immature)</i>	<i>Labeo</i>	<i>Catfish</i>	<i>Other</i>	<i>Wt.</i>
S.E. Arm						
1952	214,854	—	25,418	4,659	36	1,978
1953	228,820	—	28,818	5,044	5	2,118
1954	210,710	—	41,015	8,071	18	2,147
1955	287,003	—	27,658	3,525	5	2,536
S.W. Arm						
1955	1,261	—	2,508	5,612	322	135

Table IV. Landings per Month. (Short Tons)

Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
320	360	424	355	352	200	112	65	76	118	205	85

Table V.—Number of Nets registered by Non-African Firms

Type of Net	Number	Average Length	Average Depth	Fees paid
Ring Net	5	400 yds.	120 ft.	£50
Gill Net	8,500 yds.	—	16 ft.	£43

APPENDIX VI

African Fishery

Table I. Total Number of Hauls of main Types of Net observed at Recording Stations

	Large Meshed Seines		Small Meshed Seines		Gill Nets		Chilimila or Ring Net	
	1954	1955	1954	1955	1954	1955	1954	1955
Malindi	—	—	2,535	1,424	11	209	—	—
Matewari	145	189	124	147	133	46	—	—
Shire River	1,733	1,271	—	—	—	—	—	—
Mpemba	66	5	263	554	68	212	719	703
Monkey Bay	64	16	87	145	14	20	—	261
Kota Kota	126	148	114	8	765	483	—	—
Salima	455	509	50	124	178	7	—	—
Domira Bay	173	197	95	74	1,046	784	—	—
Chia	923	176	14	10	94	450	147	262
Lake Chilwa	—	—	—	—	8,777	5,570	—	—
Lake Malombe	68	383	—	—	34	16	—	—

Table II. Average Catch per Single Haul of Net at Recording Stations

(Figures Represent Actual Numbers of Fish)

A. Large Meshed Seines.		Tilapia (Adult)	Tilapia (Immature)	Labeo	Catfish	Haplochromids
Matewari	1953	110.45	—	5.28	0.73	—
	1954	130.61	—	5.59	3.4	—
	1955	91.52	—	3.32	2.24	—
Mpemba	1953	40.93	—	3.56	0.37	—
	1954	17.38	—	6.33	2.66	—
	1955	78.2	—	4.2	6.6	—
Shire River	1953	27.53	.25	2.09	0.23	—
	1954	31.3	—	2.91	0.19	—
	1955	25.79	—	1.95	0.23	—
Monkey Bay	1953	4.	—	.89	.37	—
	1954	18.37	—	6.73	1.14	—
	1955	58.12	.115	11.0	1.	—
Kota Kota	1953	64.55	3.5	97.17	16.16	—
	1954	96.04	—	52.61	12.92	—
	1955	30.27	—	75.12	16.82	—
Salima	1953	74.30	—	11.98	3.78	—
	1954	44.87	—	1.43	2.71	—
	1955	49.21	—	17.62	6.17	—
Domira Bay	1953	127.	—	20.58	3.32	—
	1954	135.17	15	51.15	9.72	—
	1955	109.71	—	70.94	12.43	—
Chia Lagoon	1953	31.1	—	1.56	7.62	—
	1954	27.7	—	1.83	9.02	—
	1955	28.86	—	4.65	5.24	—
Mpemba	1954	31.11	—	96.2	11.42	—
	1955	31.84	—	79.09	33.76	—
Lake Malombe	1954	263.03	—	2.29	.5	—
	1955	245.37	—	2.75	1.03	—

B. Small Meshed Seines.

Period and Station		Tilapia (Adult)	Tilapia (Immature)	Labeo	Catfish	Haplochromids
Malindi	1953	0.46	.05	0.47	0.53	455
	1954	0.51	10.	0.61	0.33	645
	1955	0.93	34.5	2.03	0.4	645
Mateweri	1953	1.23	—	—	0.53	905
	1954	0.73	95	0.02	—	655
	1955	2.29	530	0.006	0.01	913
Mpemba	1953	0.72	70	0.34	0.09	310
	1954	0.32	175	0.001	.003	770
	1955	0.24	115	0.009	.02	1,079
Monkey Bay	1953	4.08	20	13.14	1.56	1,345
	1954	42.88	170	43.4	.34	230
	1955	3.21	95	7.07	1.07	1,290
Kota Kota	1953	15.4	90	2.17	4.64	490
	1954	5.43	—	3.2	3.19	990
	1955	8.12	—	13.	13.75	185
Salima	1953	20.64	—	6.92	2.6	535
	1954	26.48	2	13.5	16.96	305
	1955	7.72	—	5.59	6.95	1,410
Domira Bay	1953	161.26	—	31.73	11.53	25
	1954	80.35	10	16.87	9.65	50
	1955	60.85	—	21.83	9.94	530
Chia Lagoon	1954	0.79	—	—	—	1,065
	1955	6.1	—	.1	—	—
Mpamba	1954	—	—	.41	.14	—
	1955	Not observed	Not observed	Not observed	Not observed	Not observed

Table III. Summary of Catches by all Methods Observed at Recording Stations 1955
(Actual Numbers of Fish)

Station	Tilapia (Adult)	Tilapia (Immature)	Labeo	Catfish	Haplochromid
Malindi	2,272	49,225	4,334	1,796	930,350
Mateweri	21,028	78,950	2,737	746	134,950
Shire River	36,972	—	3,060	615	—
Mpemba	4,961	63,100	5,045	6,202	1,165,000
Monkey Bay	1,431	15,500	1,266	864	352,250
Kota Kota	2,753	—	14,303	3,290	1,500
Salima	39,593	—	10,855	5,453	175,125
Domira Bay	29,657	1,500	23,056	3,984	64,250
Chia Lagoon	37,055	—	2,513	3,221	—
Lake Chilwa	22,291	—	—	548	—
Mpamba	3,683	—	10,168	3,567	—
Lake Malombe	94,677	—	1,252	667	—

APPENDIX VII

Summary of Traffic and Flies Caught at Decontamination Posts, 1955

Post	Position	Number Motor Vehicles	Flies Caught	Number Cycles	Flies Caught	Number Pedestrians	Flies Caught	Total Flies
Kota Kota	.. Outskirts Kota Kota township (N)	3,973	15	22,673	13	37,546	—	28
Chota	.. Outskirts Kota Kota township (S)	—	—	10,580	2	61,110	5	7
Mbobo	.. Approach to C.P. Highlands Kota Kota-Lilongwe Rd.	891	26	2,282	18	4,247	6	50
Mvera*	.. Approach to C.P. Highlands Salima-Lilongwe Rd.	5,641	—	3,172	—	4,411	—	—
Fort Johnston	.. Outskirts Ft. Johnston township East of Ferry crossing	2,385	125	149,356	1,356	155,998	1,191	2,652
Kasupe	.. Approach to Zomba Highlands Lilwonde-Zomba Rd.	6,487	12	7,160	26	5,867	8	46
Lirangwe	.. Approach to Shire Highlands From Shire Valley Matope Rd.	6,339	—	7,536	—	9,688	—	—
Masamba	.. Approach to Chikwawa From Sumbu area	88	13	1,134	26	2,133	8	47

*Closed temporarily from October 1955.

Long Term Records from De-Flying Posts. Total Flies

Station	1949	1950	1951	1952	1953	1954	1955
Kota Kota	211	96	113	47	34	16	85
Chota	275	69	34	12	16	12	72
Mbobo	125	110	179	26	45	24	0
Mvera	2,547	735	290	66	7	1	—
Fort Johnston	12,628	14,351	14,521	7,557	11,750	9,591	2,652
Lirangwe	49	21	93	42	32	11	—
Masamba	—	—	—	—	—	—	47

