

# Report

## LOCH MORAR SURVEY 1970

Results of a scientific survey  
carried out in July and August 1970  
with particular reference to reports  
of a large unidentified creature  
in Loch Morar.



© LOCH MORAR SURVEY

## FOREWORD

The Loch Morar Survey has pleasure in presenting its report on work undertaken during the year, including field work carried out at the loch between 11th July and 22nd August, 1970.

Of the three main sections of this report, we would like to emphasise that the investigation into the biology of Loch Morar was, of necessity, only a preliminary study, and more work is required before the ecology of the loch can be fully understood. However, the results are of value, particularly in view of the fact that very little information is available for lakes of this type, and thus we would like to make this report a contribution to European Conservation Year.

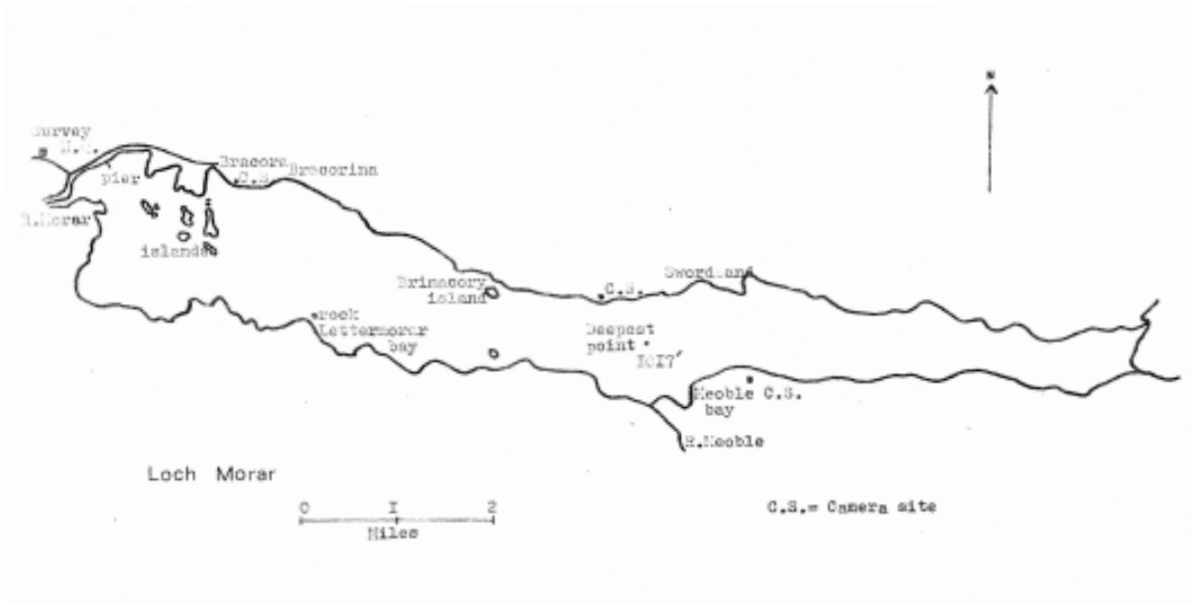
With regard to the reported existence in the loch of a large, unidentified species, our comments are as follows:-

1. Nothing in the results of the biological survey has so far ruled out the possibility that a large, predatory species could be supported in the loch.
2. Eyewitness evidence for the existence of such a species, here collected for the first time, is too impressive to be ignored.
3. On two occasions, members of the Survey reported very large, apparently animate objects in the loch, which they were unable to explain in terms of species known to inhabit it.

In view of the evidence we consider that funds should be made available by an appropriate body for further investigations and research, extending over a period of years.

If finance is available, the Survey would be prepared to assist in the planning and carrying out of future investigations, based on the experience gained in 1970. If not, the Loch Morar Survey will be wound up at the end of the year.

November 24th, 1970



## CONTENTS

	<u>Page</u>
Foreword	
Map of Loch Morar	
Introductory Notes	1
Environmental Description	2
Biological Section	3
Historical Section	14
Operational Section	32
Financial Report	36
References	37
Acknowledgments	38
List of Personnel	39

## INTRODUCTORY NOTES ON ORGANISATION AND FINANCE

The Loch Morar Survey 1970 was set up on February 7th, 1970 as a voluntary association with the aim of carrying out a preliminary investigation of Loch Morar with particular reference to reports of a large unidentified creature said to have been seen in the loch.

The Survey was planned in three parts: biological, historical and operational. Each of the three sections was planned and carried out independently, though with a substantial degree of mutual co-operation. The planning committee and most of the membership consisted of qualified scientists and members of the Loch Ness Investigation, augmented for the field work by Zoology students and others selected for their interest in the work.

Enquiries made through the charities aid fund of the National Council of Social Service established that the Survey was too small to register formally as a charity, but that for taxation purposes the Inland Revenue had agreed to treat it as such.

On formation of the Survey a preliminary budget of £2,000 was prepared and approaches for grants were made to 27 charitable trusts and foundations. Unfortunately no such grants were forthcoming, although one trustee sent a welcome private donation, and it became evident that the Survey would not go ahead unless members provided the capital. Stringent pruning enabled the budget to be drastically reduced but even then it was clear that much equipment would have to be borrowed.

Members undertook to pay their own personal expenses and in many cases have not claimed for additional out-of-pockets. Most members slept on the floor of the shed hired as a workshop/laboratory, when not camping out. Various loans of money and equipment were made by members including the use of two boats. This combination of generosity and economy enabled the Survey to proceed. A summary of the **first** account of the Survey is listed on page 36 of this report.

In addition a number of firms and individuals were kind enough to donate items to the survey or make equipment available free of charge or at very reduced rates. To all these we wish to convey our gratitude for the part they played in making the Survey possible. Their names are given under the list of Acknowledgments.

Finally we would emphasise that the area under investigation is privately owned and the Survey could not have taken place without the permission of local riparian owners. We would like to thank them for their co-operation.

Alan Dance  
(Hon. Treasurer)

Elizabeth Montgomery Campbell  
(Co-ordinator)

For Loch Morar Survey 1970 Committee



## LOCH MORAR - GEOGRAPHICAL FEATURES

Loch Morar is situated on the western seaboard of southwest Invernessshire, Scotland; the village of Morar, near the loch's western end, being about 3 miles north of Arisaig and 2.5 miles south of Mallaig, the important fishing port and ferry terminus for boats to Skye and the Western Isles. The loch is a glaciated freshwater lake lying nearly entirely on Moine crystalline schists, and has the features typical of a lake formed in this manner. It is the tenth longest loch in Scotland, being nearly 12 miles long, and is over 1.5 miles across at its widest, although the mean width is approximately 0.9 miles. It is fed by many small burns running in from the surrounding hills which constitute a total catchment area of about 65 square miles.

Probably the best known feature of the loch is its great depth. It is the deepest freshwater lake in the British Isles, and the seventh deepest in Europe, having a maximum depth of 1017 ft. (309m.) as recorded by Murray and Pullar during their survey of the Scottish lochs in 1902-3. It is probable that modern depth-sounding equipment will show some deeper holes, similar to those observed in Loch Ness recently, as well as indicating the depth of the mud and detrital matter which overlie the actual rock base of the loch. The region over 300m. in depth is situated near the centre of the loch in the widest portion opposite the River Meoble; and the shallowest portion is at the seaward end, where there are also several islands, features which are all typical of glaciated lakes. It is worth noting that to find a similar depth of water in the sea west of Morar, it is necessary to go beyond the continental shelf west of Ireland and St. Kilda.

In cross section the loch is of a simple form. The depth increases fairly uniformly from the sides towards the deeper portions, and so, although Loch Morar is about a third as deep again as Loch Ness, the latter loch is steeply sided and has an average depth of 433 ft. (131m.) while Loch Morar only has a mean depth of 284 ft. (86m.). The surface of the loch is only 10-12m. above sea level which means that virtually the whole loch bed is below sea level, although it is unlikely that there are any subterranean connections. It is believed, however, that the loch was once connected to the sea, and a study of cores of material obtained from the bottom of the loch would probably confirm this. The River Morar runs out to the sea at the western end of the loch, and it is probably one of the shortest rivers in the British Isles, being only 500-600m. in length.

Despite the proximity of the village of Morar and the main road ("The Road to the Isles") and railway running to Mallaig, the loch is in fact remote by comparison with Loch Ness. Any view of the loch from Morar village is obscured by some small hills. There are only a few houses overlooking the loch and these are mainly situated at the shallow western end, where the view of the larger part of the loch is again obscured, by wooded islands and headlands. A single track road runs from Morar village for a few miles along the northern shore of the loch and terminates at the small village of Bracorina. Apart from the few houses in this village there are a few crofts scattered about the shores of the loch, but most of these have long since been abandoned. Swordlands, overlooking Swordlands Bay and the deeper portions of the loch, is the only house which has been regularly inhabited. The only other people who visit the more remote parts of the loch are fishermen and hunters and their visits, by their vary nature, tend to be sporadic.

G. KNIGHTS

## THE BIOLOGICAL SURVEY OF LOCH MORAR

In order that as wide a range as possible of the biological features of Loch Morar could be covered, the survey was divided into three main projects for investigation.

1. A chemical survey of the loch. Dr. P.C. Head with Dr. P.R. Pugh

A knowledge of the concentrations of certain chemicals present in the loch water is an essential part of any investigation into its biology, for they can control the type of flora and fauna which can exist in it. Thus determinations of the concentrations of certain nutrients which are essential for the growth of plants were made. The primary productivity of the lake was also investigated as it indicates the food production potential of the phytoplankton.

2. A floristic survey of the loch. Dr. P.R. Pugh

A study of the plant forms present in the loch and in the burns which feed it was made, and the work correlated with the primary productivity studies outlined above.

3. A faunistic survey of the loch.

A study of the animal forms present in the loch was made on a qualitative basis. This part of the survey was further divided for convenience into the following sections:-

- a) A study of the fish populations in the loch. Mr. D. Solomon
- b) A study of the zooplankton and stream fauna. Dr. N.R. Bass
- c) A study of the benthic fauna of the loch. Mr. P.D. Smith

## CHEMICAL SURVEY AND PRIMARY PRODUCTIVITY OF LOCH MORAR

There have been few biological and chemical investigations of Scottish lochs since the pioneering work of Murray and Pullar at the beginning of the century. The purpose of this survey was designed to provide up-to-date information about the primary productivity of the loch, an important prerequisite to any understanding of the lake's ecology, by attempting to relate the levels of the important nutrient elements, e.g. phosphorous, nitrogen and silicon, to measurements of the rate of carbon fixation, by photosynthetic processes, and the biomass of the phytoplankton. This project is thus closely linked with the studies on the microflora of the loch.

Samples of water were collected from various depths in the loch using an NIO water sampling bottle. The temperature and oxygen content of the water were measured immediately, and pH determinations were made at a later stage. The chemical analyses were carried out using a Technicon AutoAnalyser which was set up in the temporary laboratory close to the loch. Analyses were begun on return to the laboratory and were completed within six hours. Determinations of the concentrations of the following nutrients were carried out: phosphate-phosphorus, nitrate-, nitrite- and ammonia-nitrogen and silicate-silicon. The rate of carbon fixation by the phytoplankton was determined by the <sup>14</sup>Carbon technique on samples illuminated in an incubator. An estimate of the standing crop of phytoplankton, essential to the calculation of primary productivity, was obtained from chlorophyll determinations and by direct counting. As well as the loch water samples, water was collected from six burns which flowed into the north side of the loch. From these samples some indication of the supply of nutrients into the main body of water from its catchment area could be estimated.

The results of these chemical analyses are summarised in Tables 1 and 2. Table 1 shows the existence of two fairly uniform water masses, differing only slightly in chemical composition and separated by the thermocline at a depth of 30 m. Water taken from above the thermocline could be typified by a temperature close to 12.2°C and having a nitrate and silicate content of 5.6 and 14.5 µg at /l. respectively. Below the thermocline the temperatures were close to 6.4°C and the nitrate and silicate concentrations were 7.0 and 16.0 µg at /l. The phosphate content of the loch water was low at all depths (< 0.04 µg at /l.). In contrast to the majority of the loch water, that overlying the mud (at 250 m.) was practically devoid of oxygen and had a high nutrient content, except for nitrate-nitrogen. The bottom mud was also shown to contain about 25% organic matter and the anaerobic bacterial action on this material would be the most probable explanation of the observed nutrient levels. The samples from the streams (Table 2) are similar to the loch in their low phosphate content, while nitrite and silicate are considerably higher and nitrate considerably lower than the loch water.

The maximum concentration of chlorophyll and rates of carbon fixation were found at a depth of 5 m. The daily production of the loch was estimated as 0.2 g.C/m<sup>2</sup>, although later observations indicate that the figures obtained by incubations in the light box may give lower values for the rate of carbon fixation than those obtained by in situ incubations.

The values for the carbon fixation rate are interesting in that they are very close to the upper limit of  $0.3 \text{ g.C/m}^2/\text{day}$  which Findenegg (1962) quotes as being associated with nutrient poor or oligotrophic lakes. Thus, in spite of the very low levels of the essential nutrient phosphorus in the lake water and inflowing streams, there still appears to be a fairly high rate of primary production which is consistent with the large accumulation of organic matter in the bottom sediments. There are two possible explanations for this high production/low phosphorus situation. One is that there is a very rapid recycling of the available phosphorus, i.e. that as soon as it is released from a plant or animal either by death, excretion or secretion, it is reabsorbed by the phytoplankton. The second possible explanation is that the lake derives a significant quantity of its nutrients from the high rainfall which is typical of the region (personal observation). Thus we have calculated from the results of Allen et al that  $4.4 \text{ } \mu\text{g at. phosphorus}$  and  $260 \text{ } \mu\text{g at. nitrogen}$  would be contained in the rain which fell on one square metre of Loch Morar each day. This is obviously a significant amount and represents a large contribution to the available nutrients in the loch and could thus allow the fairly high levels of primary production which were observed.



TABLE 1

Distribution of various chemical constituents in Loch Morar - July 1970

Depth m	Temperature °C	pH	O <sub>2</sub> mg-at/l	PO <sub>4</sub> -P	NO <sub>3</sub> -N μg-at/l	NO <sub>2</sub> -N μg-at/l	NH <sub>3</sub> -N	SiO <sub>3</sub> -Si
0	12.5	6.50	0.66	<0.04	5.7	0.05	1.0	14.4
5	12.3	6.55	0.66	<0.04	5.6	0.05	1.0	14.4
10	12.3	6.65	0.66	<0.04	5.5	0.05	0.5	14.0
20	12.3	6.60	0.68	<0.04	4.9	0.05	1.0	14.4
30	10.0	6.50	0.70	<0.04	5.4	0.05	1.0	16.3
40	8.9	6.50	0.73	<0.04	6.8	0.03	0.7	15.8
50	7.9	6.50	0.72	<0.04	6.8	0.06	1.2	15.8
70	6.4	6.50	-	<0.04	7.1	0.06	0.5	15.9
130	6.4	6.50	0.77	<0.04	7.2	0.06	0.5	15.9
175	6.5	6.50	0.77	<0.04	7.1	0.06	0.5	15.9
250	6.4	6.45	0.77	<0.04	7.2	0.03	0.5	15.9
250 <sup>1</sup>	6.5	5.90	<0.01	1.00	4.1	0.86	10.8	39.6

<sup>1</sup>Sampler penetrated about 0.5m into the bottom mud.

TABLE 2

Chemical composition of 6 streams on the north side of Loch Morar

pH	PO <sub>4</sub> -P	NO <sub>3</sub> -N μg-at/l	NO <sub>2</sub> -N	SiO <sub>3</sub> -Si
6.10	0.46	1.6	0.89	19.6
6.85	0.05	0.4	0.31	69.5
6.40	<0.04	0.2	0.54	41.8
6.52	<0.04	0.1	0.31	27.2
6.80	6.20	51.0	16.70	57.5*
-	0.09	0.5	0.32	27.9

\*Probably contains faecal matter.

## FLORISTIC SURVEY OF LOCH MORAR

The study of the plant populations of the loch was divided into two major sections.

- a) An investigation into the species of algae present, their distribution and their relative abundance. This preliminary ecological survey of the loch was necessary as there is little information of this kind available for Scottish lochs.
  - b) A quantitative study of the numbers of plants present was undertaken so that, in conjunction with the chemical survey, an estimate of the primary productivity potential of the loch could be obtained. This information is necessary for a proper understanding of the trophic relationships of the lake biota.
- a) Samples of the lake phytoplankton were collected, using a tow net (160 meshes/inch), and samples of the benthic algae were collected in the dredge or by hand from the burns flowing into the loch. The samples were preserved in formalin and later examined and the species identified. An incomplete list of the main genera of algae present in the loch is given here, although some of the identifications are subject to confirmation. The classification of the algae is based on that of West and Fritsch (1932).

### Isokontae Chlorophyceae (Green algae)

#### Desmids

<u>Euastrum</u>	<u>Cosmarium</u>	<u>Xanthidium</u>
<u>Arthrodesmus</u>	<u>Stauroastrum</u>	<u>Staurodesmus</u>
<u>Hyalotheca</u>	<u>Micrasterias</u>	<u>Closterium</u>

#### Other genera

<u>Eudorina</u>	<u>Pedicistrum</u>	<u>Sphaerocystis</u>
<u>Gleocystis</u>	<u>Quadrigula</u>	<u>Pandorina</u>
<u>Nephrocytium</u>	<u>Mougetia</u>	<u>Spirogyra</u>
<u>Tetraedron</u>	<u>Pleodorina</u>	<u>Zygoxema?</u>

### Dinophyceae (dinoflagellates)

<u>Ceratium</u>	<u>Peridinium</u>	<u>Gleodinium??</u>
-----------------	-------------------	---------------------

### Bacillariales (diatoms)

<u>Asterionella</u>	<u>Navicula</u>	<u>Tabellaria</u>
<u>Cyclotella</u>	<u>Rhopalodia</u>	<u>Fragillaria</u>
<u>Surirella</u>	<u>Witzschia</u>	<u>Diatomella</u>
<u>Eunotia</u>		

### Chrysophyceae

<u>Dinobryon</u>	<u>Synura??</u>
------------------	-----------------

### Myxophyceae (blue-greens)

<u>Aphanothece</u>	<u>Coelosphaerium</u>	<u>Microcystis</u>
<u>Anabaena</u>	<u>Oscillatoria</u>	<u>Lyngbya</u>
<u>Chroococcus?</u>		

By far the dominant forms found in the tow net samples were species of desmids. These microscopic unicellular green algae are entirely freshwater in their distribution and are characterisable by the presence of a constriction in the cell which divides it into two halves or hemicells, these usually being perfectly symmetrical. However, several forms of species in the genera Staurostrum and Staurodesmus were observed to have asymmetrical hemicells, e.g. where one hemicell had 3 spines or processes and the other had 2 or 4, etc. There was a wide diversity in the desmid species present, although most belonged to either of the aforementioned 2 genera. There were only a few individuals of planktonic diatoms, taken from 3 or 4 genera, present in the samples. This is quite unlike some of the Lake District eutrophic waters in which diatoms predominate, especially in the spring and early summer. Several small green algal species were present, but were difficult to classify from the preserved specimens.

Diatoms were, however, the predominant algae in the stream and benthic samples. At least 7 genera of diatoms have been identified from these samples, and the largest numbers of individuals and species belonged to the genus Mavicula. Several filamentous blue-green algae were also present but their occurrence was limited by the acidity of the water.

b) Quantitative studies on the phytoplankton.

Samples of lake water from different depths were collected in the NIO sampling bottles and preserved for individual counting of cells. Other samples were filtered and the amount of chlorophyll present determined spectrophotometrically. In this way the production potential of the loch at different depths could be determined. The chlorophyll determinations showed that the highest concentration of plant material was at a depth of 5 m., and from this point there was a gradual decline to zero at about 30 m. The numbers of phytoplankton cells follow a similar pattern as would be expected. It is to be noted that the distribution of the phytoplankton in the upper 30 m. of water is coincident with that region of the loch water which is above the thermocline. Although the thermocline represents a barrier separating the upper, warmer and lower, colder layers of water it does not necessarily limit the distribution of the phytoplankton but, in this case, merely coincides approximately with the lower limit of light intensity at which the algae can survive.

The species of algae which are present in any lake are known to be determined by the lake's chemistry. Thus V.J. Chapman in his book "The Algae" states that a lake which has the characteristics of Loch Morar, i.e. hard, ancient rock, generally deep, no oxygen decrease with depth at the thermocline, poor in dissolved minerals, etc., is oligotrophic in nature and would be expected to have species of desmids as the abundant phytoplankters. This is precisely the situation in Loch Morar. Due to the slight acidity of the loch water, the numbers of blue-green algae are limited, and in more acid lakes they are entirely absent. Also the low calcium content of the loch is important in determining the type of plant which will be found in it. Thus the type of phytoplankton populations which were found in Loch Morar is known to be representative of acidic, oligotrophic lakes which are poor in nutrients and these facts were confirmed by the chemical survey. The chlorophyll estimates, however, indicate fairly large populations of phytoplankton to be present in the loch, and the <sup>14</sup>C-incubation studies show that the lake is quite productive, possibly more so than would be expected. This fact, as was previously discussed, may be due to an additional supply of nutrients from the rain, thus allowing the existence of a larger standing stock of phytoplankton and correspondingly a higher rate of primary production.



## STUDIES ON THE FISH POPULATION OF LOCH MORAR

Loch Morar is well known as an angling lake for salmon, sea trout, brown trout and char. A previous survey of the loch by St. Andrews University listed these species, along with sticklebacks, as being present, but they were unable to confirm the existence of the powan, a member of the salmon family, whose presence in the loch was registered at the beginning of the century, but since then there have been no records of it.

With the limited time and facilities which were available, it was decided to restrict the work in this part of the survey to three main projects:-

- a) The listing of the species present.
  - b) Growth rate studies of the commoner fish, e.g. trout and eels. (The presence of eels in the loch was suspected but not confirmed by the St. Andrews survey).
  - c) The collection of fish from deep waters, because some interesting observations on some fish from the deeper waters in Loch Ness had been made.
- a) Species List: Taking into account the previous survey, the fish which have been shown to be present in the loch are:-

Salmon	<u>Salmo salar</u>	Stickleback	<u>Gasterosteus</u>
Sea Trout		(3-spined)	<u>aculeatus</u>
Brown Trout	<u>Salmo trutta</u>	Eel	<u>Anguilla anguilla</u>
Char	<u>Salvelinus alpinus</u>	Minnow	<u>Phoxinus phoxinus</u>

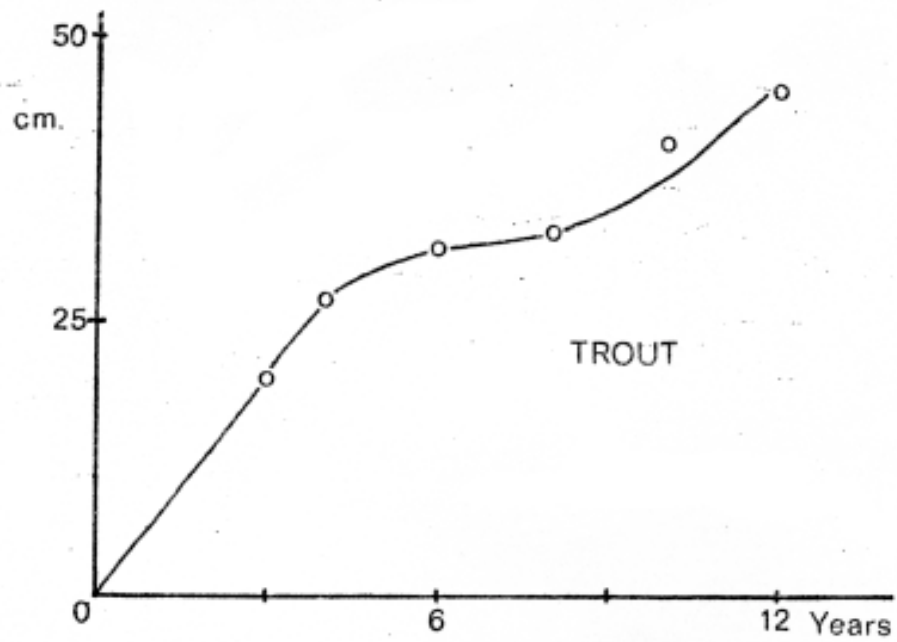
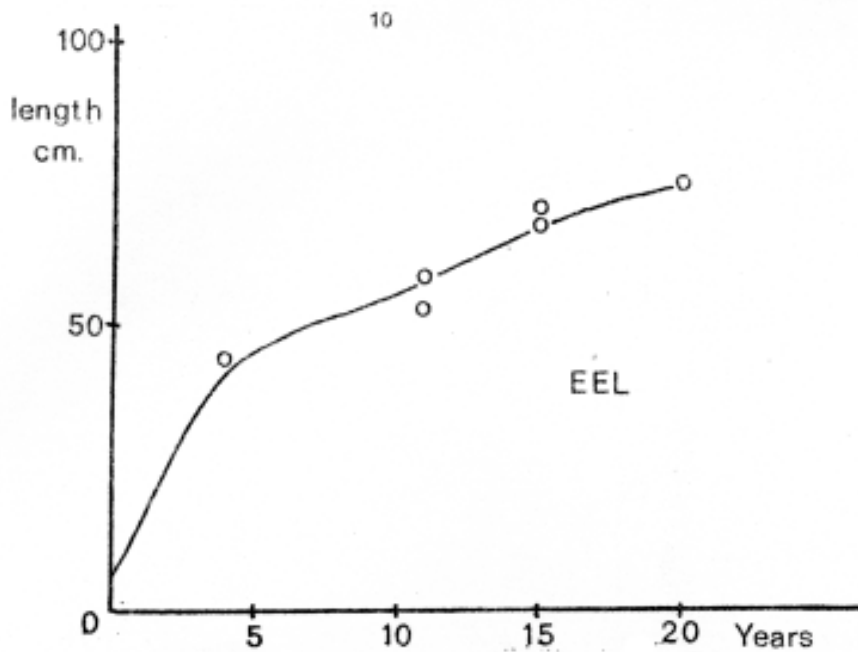
All the above mentioned fish, with the exception of the minnow, either spend part of their life history in the sea (salmon, sea trout and eel) or are known to be able to make migrations via the sea (char and stickleback). Thus their occurrence in Loch Morar was not surprising. The presence of the minnow is, however, more difficult to explain, as this species is not known to make migrations via the sea, but it is possible that they were introduced by visiting anglers who had brought them along as live bait. Several trout were caught which were very silvery in colour and thus quite unlike the normal brown and sea trout coloration. Local anglers suggest that they are descendants of a stock of Loch Leven trout (a variety of brown trout) which were introduced at the turn of the century.

- b) Growth Studies: The growth patterns of the brown trout and the eel were studied using the standard methods of scale reading (trout) and otolith reading (eel). The length/age relationships for each species are shown in the diagram.

The growth pattern of the eels shows the characteristic tailing off with increasing age. The rate of growth appears to be rather slow in comparison with many English lakes, but this may be explicable by the lower temperature of the loch water. The growth pattern of the trout shows a similar tailing off, but this is followed by a renewed burst of growth which is considered to reflect the trout's change of diet with increased size from one comprised of insects and their larvae to one of small fish. This change of diet was confirmed by examination of the gut contents, which in young trout contained large numbers of cases from caddis fly larvae, while sticklebacks were frequently found in the stomachs of the larger fish. Overall, the growth rate of the trout is considered to be reasonable for a population in a large oligotrophic lake.

- c) Fish From Deep Waters: Observations at Loch Ness, using a miniature submarine, reported that there were few fish below 20m., and that those present were white in colour (eels and flatfish). Attempts were made, therefore, to catch fish from various depths in Loch Morar, using a long line. The line was set initially at a depth of 10m. and then, as a result of a daily inspection, was either relocated at a similar depth if no fish were caught, or located at a deeper depth when fish were hooked. This procedure was continued throughout the survey and at the end of it the lines were being set





at depths of 25-35m. Three eels were caught at these depths but they were of the normal coloration (dark green/brown). Due to the lack of time at our disposal, long lines were not set at any deeper depths.

The state of the fish population in Loch Morar, as far as can be seen from this very short survey, is very much as expected. A "drastic decline" in the fish populations over recent years as reported by the local anglers is probably due to the normal fluctuations in breeding, etc., which are cyclic phenomena present in all lakes studied over a period of years. There appear to be good stocks of trout in the lake of weights up to 8 lb., and most of the other species are quite abundant.

Apart from the study of the general food contents of the stomachs from eels and trout, the guts are being examined for their parasites. Many parasites were found to be present, and we are awaiting their identification by a parasitologist. One other interesting observation on the stomach contents of eels, was that two contained salmon parr 5" long, which is an unusually large prey for this animal.

A STUDY OF THE ZOOPLANKTON AND STREAM FAUNA OF LOCH MORAR

Zooplankton samples were collected from 39 stations in and around Loch Morar using 90 µm. mesh nets. Although no effort was made to measure the volume of water from which the plankton samples were taken, the nets were always cast for five minutes. The assumption is, therefore, made that the samples are from water volumes of similar magnitude.

When sampling in the main body of the loch water, samples were taken within 4 metres of the surface with the net cast over the side of a drifting boat. Sampling the burns was carried out by using a similar net held, while wading, near the water's edge. All samples were returned live to the laboratory in specimen tubes for examination as soon as possible after collection. Specimens required for further examination were preserved in 70% alcohol. The species found at each site sampled are shown in the Table.

The most commonly occurring and abundant species were copepods: a white cyclopid (cyclopid i) and a white calanoid, probably a species of Diaptomus. These, and two other cyclopids, designated ii and iii in the Table have not, as yet, been certainly identified. A variety of freshwater cladocerans were also found, the most common being Bosmina coregoni. This species, like the copepods, inhabited also the tarns and burns, while the other cladocerans, for the most part, were present only in the main body of the loch. Of these, while Polyphemus pediculus and Holopedium gibberum were fairly evenly distributed throughout the loch, other species seemed to be limited to particular regions. This was especially the case for Alona affinis, which was limited to the marginal waters at the eastern end of the loch, while Leptodora kindti was found to inhabit the midwater regions only. The water mite, Hyarobates sp. was common in most of the burns and also found in extremely large numbers with the ostracod Cypris sp. in the vicinity of any decaying matter, e.g. the carcass of a deer at N35, near the Glen Oban pier at the southeastern tip of the loch. It was also noted that some species abounded, and indeed totally predominated the fauna in certain samples. For examples, sample N9, from fairly shallow water at the northwestern end of the loch, consisted almost entirely of the white calanoid (Diaptomus sp?), while in N15 there was a predominance of Bythotrephes longimanus.

Since the survey of the zooplankton species was no more than a preliminary study, with no consideration of temporal changes, it is impossible to say whether the patchy distribution is a permanent situation, and if so, what are the reasons for it. It might indicate, however, that much of the loch water is 'stagnant', with little movement or mixing of nutrients or plankton, but at this stage evidence for this is scant. However, what is indicated is that the conditions in the tarns are sufficiently different from those in the main body of water to cause differences in the fauna. Sample N14, for example, only contained one species of cladoceran, Bosmina coregoni, while lochwater samples contained a total of six. The only other cladoceran found in burn waters was Holopedium gibberum. All tarn species are found in the loch, however, as would be expected.

## SPECIES OF ZOOPLANKTON FOUND IN LOCH MORAR - JULY 1970

STATION NUMBER	Burn or Loch sample.	Hydrobatos sp.		Cypripid sp.	Leptodora kindtii.	Bythotrephes longimanus.	Polypheusus pediculus.	Alona affinis.	Bosmina coregoni.	Holopedium gibberum.	Cyclopoid III.	Cyclopoid II.	Cyclopoid I.	Galeneid sp.
		(B)	(L)											
N1	B						x		x				x	x
N2	B			x		x	x		x				x	x
N3	B			x		x	x		x				x	x
N4	L					x			x			x	x	x
N5	L			x		x	x		x			x	x	x
N6	L						x		x	x		x	x	x
N7	L						x		x	x		x	x	x
N8	L				x		x		x				x	x
N9	L								x	x	x		x	x
N10	B	x							x				x	
N11	B												x	x
N12	B	x											x	x
N13	B	x							x				x	
N14	B	x							x				x	x
N15	L					x			x	x		x	x	x
N16	L										x		x	x
N17	B	x	x								x		x	x
N18	L										x		x	x
N19									x				x	x
N20	L					x			x	x	x		x	x
N21	B	x								x			x	x
N22	B	x							x	x			x	x
N23	B	x	x						x	x			x	x
N24	B	x								x			x	x
N25	L					x	x			x	x		x	x
N26	L					x	x		x	x	x	x	x	x
N27	L					x	x		x	x		x	x	x
N28	L					x	x		x	x			x	x
N29	L				x	x			x	x			x	x
N30	L				x	x	x		x	x		x	x	x
N31	L				x	x	x		x	x	x	x	x	x
N32	L				x	x	x		x	x		x	x	x
N33	L				x	x	x		x	x			x	x
N34	L					x	x		x	x		x	x	x
N35	L	x	x			x	x	x						
N36	L	x				x		x				x	x	x
N37	B													
N38											x		x	x
N39		x											x	x

At a station where a species was found, this is signified by x. In some cases, where a particular species predominated, it was also present in extremely high densities; this is signified by \*



## SURVEY OF THE BOTTOM FAUNA OF LOCH MORAR

Samples of material from the bottom of the loch, at various depths, were taken using a dredge net towed along by a boat. The loch bed material was seen from the samples to vary from a rocky bottom covered only by a thin layer of detritus to a very muddy bottom, where larger samples were obtained.

The numbers of species of animals found in each of the samples were few and the 'catches' in the dredge net were generally poor. By far the commonest animals present, however, were caddis fly larvae (Trichoptera) and of these the ones which had cases constructed largely of sand grains predominated. A few others with cases constructed from pieces of wood or leaves were also found. The trichopteran larvae were found to be limited to the shallower waters of depth not greater than 20 m. There also appeared to be a size/depth interrelationship, as those caddis fly larvae taken from about 20 m. depths of water were considerably smaller than the ones obtained from the shallower depths.

At a depth of 3 m. several larvae of beetles (Coleoptera) were also found together with several species of water mites (Hydracarina). One notable feature of the material collected was, however, the virtual absence of water snails, only two being found in samples from a large number of dredges. In fact, these two snails were found to have 'jelly shells', indicating the virtual absence of calcification as a result of the very low calcium concentrations in the loch ( $<1.0$  ppm  $Ca^{++}$ , from measurements made by St. Andrews University).

The samples taken from areas with a soft bed of mud were found to contain only sparse populations of animals, which were usually species of annelids or protozoa. However, the mud samples from the shallower depths were observed to have very large populations of benthic algae, mostly species of diatoms (Bacillariophyceae).

No live animals were observed in any of the dredges from depths greater than 30 m., although several samples were taken.

The bottom fauna of a lake, and more especially its population of trichopteran larvae, command quite an important position in any consideration of the lake ecology as they constitute one of the major food sources for the fish population. Thus the young salmon and trout are known to feed almost exclusively on these larvae, and other fish, e.g. eels, are known to eat them. It is concluded, therefore, that although the diversity of species present in the dredge samples is small, the large numbers of caddis fly larvae found would provide a food supply for quite a large population of fish. It is interesting to note, however, that since the distribution of the bottom fauna is restricted to shallower waters which are mainly to be found at the loch's western end, together with a narrow strip around the edge of the rest, then a spatial distribution of the young fish in the loch would be expected to occur along similar lines. Unfortunately the apparatus necessary to check this hypothesis was not at our disposal.



78

REPORT OF THE HISTORICAL SECTION,  
LOCH MORAR SURVEY 1970

AIM OF THE HISTORICAL SECTION

The aim of the historical section was to collect as many eye-witness accounts as possible and try to deduce from their nature and numbers whether or not they had any factual basis.

Those of us who were members of the Loch Ness Investigation and had studied the evidence from Ness were convinced of the existence of a large unknown species there. Our approach to Loch Morar, however, was no more than open-minded, since at that time so little information was available.

At the beginning of 1970 we knew of only three accounts from Morar, reported by local witnesses to the Loch Ness Investigation (13, 16, 17). There were also two or three early references in Constance Whyte's book on the Loch Ness Monster, More Than a Legend. No photographs or film had ever been taken as far as we knew.

The questions we sought to answer were:-

1. How many more accounts could be traced?
2. Would their numbers amount to what might be expected from this particular loch?
3. Would they be reasonably consistent with one another?
4. Would they bear any resemblance to reports from Loch Ness? (These describe a large hump-backed creature from 20 ft. to 60 ft. in length, with snake-like head and neck, four limbs or paddles and a massive tail. The head and neck is often seen alone, and the "upturned boat" appearance is the most common.)
5. How many of them, if any, would we be prepared to accept as genuine?

BACKGROUND TO THE RESEARCH

Until 1969, when the McDonnell/Simpson incident (17) was widely reported, Loch Morar had received no publicity. It was still relatively unknown to the majority of people and would remain so until our activities became known. It was important, therefore, to carry out as much research as possible before announcing our plans publicly or publishing any details. Any reports we received afterwards could incur suspicions of suggestion or publicity-seeking.

The work of tracing accounts began at once and the majority that are listed here were already known to us before we held our press conference in July.

Not until we visited the loch, however, could we relate them to the general situation there and consider them in the context of their setting.

The situation we found at Loch Morar can best be understood by a comparison with Ness. There is a large population in the Loch Ness area; the loch itself has a good road along both shores and is visited annually by thousands of tourists. The Loch Ness monster is world-famous and many sighting reports are received by the Loch Ness Investigation each year. A high proportion have to be discounted as coming from tourists with over-active imaginations and no experience of conditions on the loch.

By contrast Morar has a tiny population, mostly concentrated at the western and shallow end of the loch. There is only one lochside road which peters out after a few miles, leaving most of the north and the whole of the south shores with no more than a hillside foot track. Beyond the road's end only one house and one croft actually overlook the loch nowadays - at Swordlands on the north shore. There is a lodge at Meoble on the south shore but it does not overlook the loch. In other words, apart from the shallows at the western end, the greater part of the loch including its maximum depth of more than 1,000 ft. is unseen except by the occasional stalker, shepherd or fisherman. The small crofting communities which once existed around the loch shores are abandoned and in ruins.

There is a relatively small tourist throughput in summer, most of them one-night-stoppers taking the Road to the Isles or regular visitors who come up annually from Glasgow and other Scottish towns to camp at the western end and fish. Few boats go beyond the western end and the ones which do are mostly 12 ft. dinghies carrying fishermen, who seldom go out in the classic "monster-sighting" weather conditions of flat calm and warm sunshine.

We realised that it would be surprising therefore if more than a few people were to have a sighting in any one year. We also found that there was marked reluctance to talk about these experiences.

Until 1969 this reluctance could have been attributed to lack of interest, fear of ridicule or a lingering respect for the legends of ill omen surrounding the creature's appearances. After the 1969 McDonnell/Simpson incident the local eyewitnesses became heartily sick of being pestered with questions and reading distorted newspaper accounts of their experiences, and the Survey had some difficulty in persuading them to give their accounts yet again.

We found that like people anywhere else, the Morar people held differing views on the subject of their "monster". Some said they believed in it, some did not, and some alleged that many more people had in fact seen it than were prepared to say so. None of the local people had been sufficiently interested to investigate the stories themselves and they were just as liable as anyone else to get the facts wrong concerning the better known local accounts.

At first there was some doubt as to what the Survey was up to but once we had established our scientific purpose we were received with courtesy, friendliness and helpfulness. There was no wall of silence, no conspiracy to thwart us, and no Highland mystique. Neither was there any eagerness to come forward with information.

The local accounts given in this report were mostly obtained only after considerable perseverance. I can think of hardly anyone who offered information spontaneously. Some individuals undoubtedly withheld it.

In tracing eyewitnesses I had hoped for leads from the files of the Oban Times, but found that this newspaper has for years made it a matter of principle never to publish stories of loch "monsters". This made investigations extremely difficult.

To all those who helped us we record our very sincere thanks.

## EVALUATION OF EYEWITNESS ACCOUNTS

Three seasons at Loch Ness - two of them as group commander - have given me some experience of interviewing and summing up eye-witnesses, together with some knowledge of the most common sources of error. They have also taught me that the evaluation of eye-witness accounts can never be infallible, and that even the most experienced interviewers are liable to disagree.

In an attempt to apply some kind of standard yardstick I have evolved the following principles and applied them to the best of my ability to the eyewitness accounts we have collected concerning Loch Morar.

Basically there are three possibilities to be considered when assessing the average sighting report:-

- a) It is a genuine sighting
- b) It is a hoax
- c) It is a mistake

In attempting to decide which, the first two questions to be asked concern the witness. One is easy to answer and one difficult. They are:-

1. Has the witness a sound experience of the loch (or places like it) including surface appearance under different weather conditions, habits of birds and fish, movements of boats etc?
2. Does the witness appear to be a reliable person (by observation and/or reputation).

The answers to these questions should make it possible to place the witness in one of the following four categories:-

1. Reliable and experienced. His story is likely to be genuine.
2. Unreliable but experienced. His story is likely to be either genuine or a hoax.
3. Reliable but inexperienced. His story is likely to be either genuine or a mistake.
4. Unreliable and inexperienced. His story could be genuine, a hoax, or a mistake.

Each individual story still requires further investigation but broadly speaking, I would expect to accept as genuine most reports from category 1); a higher proportion from category 2) than from category 3), since in my experience mistakes are very much more common than hoaxes; and few if any from category 4).

When further assessing the reports I would consider the following additional questions:-

1. Could any known natural or normal occurrence have caused the incident described (e.g. birds, fish, floating debris, otters, wind slicks, boats, boat wakes etc.)?
2. Can the story be faulted on obvious points of circumstantial detail (e.g. wrong weather conditions for that day described)?
3. Does the story tally reasonably well with other reports?



4. If more than one eyewitness is involved, are the discrepancies in their stories of a normal degree (nil discrepancies would be suspicious)?
5. Did the witness appear unduly eager to get his story published?
6. Can any apparent motive for a hoax be discerned?
7. Were the conditions good for visibility and has the witness good eyesight?

On the basis of the answers to these questions it should be possible to come to a reasonable conclusion as to whether or not the story describes a genuine sighting.

For obvious reasons no breakdown of results from Loch Morar can be given. It must be equally obvious, however, from the background section, that practically everyone who has penetrated beyond the shallows is by definition familiar with conditions on the loch so that the majority of accounts so far have come from experienced people. We found no evidence of hoaxing and have therefore rejected very few of the reports collected to date.

In future years the situation may not be so straightforward.

#### THE STORY OF THE MHORAG

"Who has not heard of the Mhorag?" wrote James Macdonald, a local fisherman and writer, in 1907.

The legend of the Mhorag (pronounced "Vorack" in Gaelic and Anglicised to "Morag") goes back for centuries and was still being spoken of by many people at the time of our survey. A Guardian reporter found the following in a nineteenth century collection of traditional Scottish lays:-

"Morag, Harbinger of Death,  
Giant Swimmer in deep-green Morar,  
The loch that has no bottom ...  
There it is that Morag the monster lives."

Unfortunately we have not been able to trace the source.

According to James Macdonald the Mhorag was a spirit capable of taking on different forms, whose appearances in Loch Morar spelt doom to members of a certain clan (the Gillies). This fabulous, golden-haired, mermaid-like being who lured young men to death by drowning was never believed to be a living creature. But it seems likely that some at least of her alleged appearances were based on the same phenomena that are still being described today.

James Macdonald published his writings privately to give to his friends. Very few copies of the book still exist but his niece, Mrs. Alan Macdonald of Kinsadel, South Morar, was able to lend me one. It contains descriptions of local places and legends, essays, homilies and a short autobiographical novel called "The Story of a Mallaig Fisherman in the Pre-Electricity Era". The stories were written "to divert the long nights of my brother fishers waiting in their forecastles, for a good haul". They show how strongly the belief in ghosts, fairies and other supernatural creatures once existed in this Catholic stronghold of the Highlands, and it is not surprising that these beliefs became interwoven with more factual accounts of unexplained phenomena on the loch surface.



It seems reasonable to deduce from his essay on the Mhorag that James Macdonald saw three humps on the loch in 1887. If so, his is the earliest eyewitness account that the Survey has been able to trace. In any event, by providing a bridge between the legends of the past and the factual reports of recent times, it makes an appropriate beginning to our list of eyewitness accounts.

#### LIST OF ACCOUNTS COLLECTED BY THE SURVEY

##### 1. January, 1887.

(Extract from Tales of the Highlands by James Macdonald, printed privately by The Highland News Printing and Publishing Works, Inverness, 1907.)

"The Mhorag as a rule only shows herself on Loch Morar whenever a member of a certain clan is about to die. We durst not name the clan, but clan there be, and woe betide someone on the night when the Mhorag detaches herself upon the surface in three distinct portions - one portion representing death, another a coffin and the third a grave.

"When the Mhorag appears in her normal state she is, as far as one can judge, a most attractive creature ... she very much resembles a mermaid, only the Mhorag's body is more cumbersome than that of the latter. In fact, it is more in affinity to the sea serpent's.

"I met the Mhorag one night in January, 1887, when crossing the loch by moonlight to stalk a deer at Raitlan. Had I belonged to the particular clan whose name, as already stated, I dare not mention, instead of a Macdonald, I would have been greatly intimidated. In fact, I would have gone home and counted my beads to prepare for the next world; but, being simply a Macdonald, I apprehended nothing except an awkward keeper."

##### 2. Late Nineteenth Century.

(From Afoot in Wild Places (Seton Gordon, 1937).)

Seton Gordon (with whom I have corresponded) reports that 50 to 60 years before the time of writing this book, the old people at Morar told him they recalled seeing "a boat without sails towing one or two smaller boats after it" on the loch at dusk. Some thought they had been "seeing" the motor boats of the future, but others said this was the beast of Loch Morar playing on the loch surface in the quiet of the evening.

##### 3. Summer, 1895

(Extract from the memoirs of the late Mrs. Austin Mackenzie - formerly Mrs. Theodore Brinckman - now in the possession of her son, Col. Sir Roderick Brinckman. The Brinckmans were out fishing with McLaren, their stalker, one evening, waiting for the launch from Meoble to bring their dinner.)

"One evening, it was getting towards dinner time and I was sitting looking back, when suddenly I saw a great shape rise up out of the loch, a good way off. I called the attention of Theodore and McLaren to it and asked if it was the launch and that it did not seem to be coming the right way. McLaren pointed a long way to the left as being where the launch would come from, and then, while we were watching, it disappeared. McLaren said "It'll just be the monster" and he said it was a well known thing that one was seen from time to time. Round this loch was very unpopulated, being mostly high forest ground coming down to the shores, and besides, those people who did see it were rather shy of saying so."

(See also More Than A Legend (Whyte) in which Mr. Cameron-Head of Inverailort reports that Sir Theodore Brinckman had seen the Morar beast and referred to the "upturned boat" appearance.)

#### 4. Early Twentieth Century

(From Afoot in Wild Places (Seton Gordon, 1937).)

Seton Gordon records that a year or two before the outbreak of World War One, on a fine late summer's day in bright sunshine, a visitor deerstalking on the hillside looked down and saw what appeared to be a motor boat rushing up the loch, throwing up a glistening bow wave. As he took up his stalking telescope to look more closely it sank, leaving a great eddy and ripples spreading to both shores of the loch.

#### 5. March 27th, 1934

(From the diary of the late Father Cyril Dieckhoff, The Abbey, Fort Augustus.)

"Charlie Macdonald (one of my Glenuig friends), at that time keeper at Letter Morar, went out to look after the deer and being near the hut saw some animal suddenly coming out of the water. It shot up with its neck to about the length of his arm. It reminded him of an eel except that an eel never shoots up like that. He judged it must have been a very big animal to cause so much commotion."

(Note: A relative of Mr. Macdonald's, still living in Morar, confirmed to Elizabeth Montgomery Campbell that he had reported seeing the beast. Mr. Macdonald is still living and I am at present trying to get in touch with him for further first hand corroboration of this report.)

#### 6. July 30th, 1948

(From reports carried in The Scotsman and The Glasgow Herald the following day, plus eyewitness accounts given to Elizabeth Montgomery Campbell by Mr. John Gillies, boatman, and Mr. Noel O'Donnell, bus-driver, in August, 1970.)

Mr. John Gillies was taking a party of tourists (mostly from Liverpool) for a day trip on the loch. His foster-nephew, Noel O'Donnell, then aged 12, was with the party. The boat was returning at the end of the day and had reached a point south of Swordlands when a Liverpool visitor spotted a movement some distance astern. Newspaper reports describe "four or five humps about 20 feet in length" moving slowly, dark in colour, not undulating, at a distance of about a quarter of a mile. Mr. Gillies confirms this (speed 4 mph, wash like an outboard but not big) but now estimates the length at 30 ft. Mr. O'Donnell does not recollect seeing humps, only a black dome-shaped object about 5 ft. out of the water, travelling about 8 knots with a big wash like a motor boat, a mile away. No-one saw a head or tail. All reports state that it was in bright sunshine with the loch surface flat calm. Mr. Gillies adds that the weather had been hot for three or four weeks previously.

#### 7, 8, 9. 1940-1960 - exact date not known

7. Mr. Angus Cameron, 85 years old, who still lives at Swordlands, told Allan Frake that he remembered seeing an object looking like an upturned boat about 20 years ago or more. It was a large stationary black hump in mid-loch, about a mile distant to the east. He had no idea what it was and had never seen anything like it before in a lifetime spent at the Swordlands croft. He was not convinced that it was the monster, he simply knew that it was like nothing he had ever seen before.

8. Mr. Duncan McDonell of Bracora (see also No. 17) told AF that the 1969 incident was not the first time he had seen the creature. He had once seen a head and neck about 3 ft. out of the water, and he had seen a hump on several occasions. However he did not wish to give details and he knew of a good many other eyewitnesses who would not talk about what they had seen. He commented: "I would never have opened my mouth about it if I hadn't been dragged into it. You know how it is. People don't believe anything; you're only a liar and that's the way it is."

9. Mrs. Julie Parks, also of Bracora (see also Nos. 18 and 20), told EMC and AF that she remembered seeing what she and her mother thought was an upturned boat drifting past their house, one bright, sunny day when she was about ten years old. It was quite close to the shore and they watched it travel westwards until it vanished out of sight round the next point. In the evening they told her father, who pointed out that the slight wind that day had been from the west.

10. July 1963 or 1964

(Report supplied to Survey by Mr. A.H. Malcolm, headmaster of a Perthshire school and regular visitor to Morar).

Mr. Malcolm, (see also No. 23) who visits the same house at Bracorina every year, was reading in the sitting room overlooking the loch when something made him go and look out of the window. At that time neither he nor his wife had heard stories of a "monster" in the loch. He saw an object in Lettermorar Bay, well to the left of the prominent rock in the bay and opposite the house. It looked like an upturned boat (see also No. 24).

At that moment his wife joined him from the kitchen and they discussed the object. They agreed that it was too big and the wrong colour for a fish, too still for a shoal of fish with no splashing evident, the wrong shape for a boat. They wondered if it could possibly be a floating log.

They went outside with binoculars but while Mr. Malcolm was trying to focus on it it disappeared without trace, having apparently remained stationary and without changing shape throughout.

The time was from 11.15 to 11.30 a.m. Visibility was excellent with sunshine and slight cloud. There was a little wind and the loch surface was rippled. They estimated that the object which was about 3 miles distant was approximately the shape and size of a 14 ft. dinghy and appeared to be greeny brown in colour.

(A local eyewitness was also present and discussed the incident with them both at the time and in later years, but now denies being able to recall it.)

11. August 1964

(Reports from Mr. William Fotheringham, ganger, and Mr. Alexander Easton, moulder, both from Stirlingshire; also interview by EMC with Mr. Fotheringham. Both are regular visitors and familiar with the loch.)

Mr. Fotheringham and Mr. Easton were standing on the north shore near Brinacory Island at about 2 p.m. on a warm, ~~calm~~ day. There was no wind, the loch surface was flat calm and there was some heat haze.



About 200 yards out they saw what Mr. Fotheringham described as a "huge lump" on the surface. It was from 3-4 ft. high and from 5-6 ft. across, black and shining "how a fish looks when held in the sun, as if it had some sort of scum on it." It was travelling round the island towards the deep water in mid-loch. Both men said it was going very fast with a "heavy back wash". As they watched, the object submerged vertically in deep water.

#### 12. Years 1966, 1967, 1968, 1969

(Summary of detailed information given to EMC by Captain J.S. Metcalf, D.S.C., R.N.(retd.), and his wife, who lived in Swordlands Lodge overlooking Loch Morar, from 1962 until 1969. Written information followed by personal interview).

Capt. and Mrs. Metcalf did not believe there was anything large in the loch until 1966, when they first saw three light coloured patches moving below the surface of the water across Swordlands Bay against the wind. Nothing broke the surface and they concluded this must be a pair of very large otters followed by their young. However, from then onwards for four years the same phenomenon appeared frequently - sometimes twice in one week, then not for a month or so. The patches were yellowish-grey, oval shaped, always the same distance apart and the same size. The leading patch was 12 ft. long by 6 ft. across, the second 7 ft. by 4 ft. and the third 4 ft. by 3 ft., with a gap of about 9 ft. between both the first and second and the second and third. The track never varied; the patches rounded the eastern headland of the bay, moved slowly along the edge of the deep water in about 30 ft. depth of water, paused for a few minutes near the western headland "as though feeding" and then rounded the point (turning as one object, not as three) and glided out of sight. The speed was always about two to three knots.

This phenomenon was seen through binoculars in all weathers, at all times of day and all times of year but particularly early Spring. It usually lasted about a quarter of an hour. Nothing ever broke the surface. Capt. Metcalf and his wife became so familiar with the sight that in the end they did not trouble to watch. They gave it as their opinion that the three patches were obviously connected and they believed them to be caused by the multi-humped creature reported by other witnesses.

#### 13. August 27th, 1968

(Report by John MacVarish, local hotel worker. Reported to Loch Ness Investigation in 1968 and again to EMC in 1970.)

Mr. MacVarish (see also Nos. 16 and 25) was going up the loch at 10.15 a.m. on a day of bright sunshine with no wind and a flat calm loch surface. At a point midway between Bracora and Lettermorar Point he saw something coming towards him which he at first thought was a man standing in a boat. As he got nearer he saw it was a head and neck coming out of the water, travelling slowly forwards with a very slight wash. He thought from the movement of the water there might have been paddling at the sides. The neck was about 5 ft. or 6 ft. long, about 18 ins. in diameter tapering to from 10 ins. to 12 ins. at the top. There was a flat, snakelike head, very small compared to the size of the neck. No features were seen. The skin appeared smooth and black. When he started up the out-board and got to within 300 or 400 yards of it, it turned aside into the deep water and settled straight down into the water and out of sight.



14. July 8th, 1969

(From newspaper reports, confirmed to EMC by letter with added details by Mr. Bob Duff of Leith.)

Mr. Duff, a regular visitor, was fishing in Meoble Bay, doing about two knots and looking over the side. The water was about 16 ft. deep and very clear, the bottom almost white in colour with leaves visible on the loch bed (Note: We have confirmed that on a calm day in bright sunshine these conditions are correct - EMC). Mr. Duff saw what he described as a "monster lizard" lying on the bottom. It was not more than 20 ft. long, motionless, and looking up at him. The shock of seeing it caused him to rev up and get away as fast as possible so that he only saw it momentarily. As described and drawn by Mr. Duff it appears he saw only the front part clearly. The head was snakelike with a wide mouth and slit eyes. As it was seen from above the neck was not visible and its length could not be estimated. It had four legs and the front legs were clearly seen to have three digits each. The body, hindquarters and tail were only vaguely seen. It was a grey-brown colour, the skin rough "like burnt coke". Mr. Duff went back later to look for it but it had gone. He told two people about it but was laughed at, and so did not repeat the story to anyone else until after the reports of the McDonnell/Simpson sighting a month later (17).

15. Mid-July, 1969

(Interview by EMC with Mr. Bertie Maclean, shopowner, of Mallaig.)

Mr. Maclean did not wish to make too much of a rather vague experience but said he had been out fishing in Meoble Bay on a bright, windless day, with the loch surface flat calm. Looking over the side in about 20 ft. of water he saw "a great greeny shape" on the bottom. He knew that it was not a rock but could not tell what it was. The friend who was with him refused to take him seriously and would not stop the boat or turn back so he was unable to get a closer look at it, but he was convinced he had seen something very unusual.

16. August 11th, 1969

(From reports given to the Loch Ness Investigation in 1969 by Mr. James Hanratty and Mr. John MacVarish, and interview by EMC with Mr. MacVarish in July, 1970. (See also 13 and 25).)

Messrs. Hanratty and MacVarish (local fisherman and hotel worker respectively) were travelling up the loch at about noon in bright sunshine, with no wind, the loch surface flat calm. At a point between the islands Mr. Hanratty called out that he could see something big about 500 yards away. They both looked and saw a big object south of the islands travelling at about 30 knots, "really skating over the water". They turned the boat towards it and as they got closer saw three light brown humps, each 3 to 4 ft. out of the water, with a shallow depression between each hump - the humps were not pronounced. The middle hump appeared the largest. Overall length was about 30 ft. By the time they came close the object had turned, leaving a big area of churning water as it did so, and was coming towards them under the surface very fast, leaving a wake like a big outboard motor. It came quite close inshore, passed them at about 10 to 20 yards and then disappeared in deep water. No head or tail could be seen and they were not able to describe skin texture.

17. August 16th, 1969

(Reports to Loch Ness Investigation in 1969 by Duncan McDonell and William Simpson, also interview by AF with Duncan McDonell in August, 1970.)

Duncan McDonell of Bracora (see also No. 8) and William Simpson of Mallaig, both long distance lorry drivers, were returning from a trip on the loch in their motor boat. It was about 9 to 9.30 p.m., still daylight but the sun had gone. The day had been fine and warm at the end of a long, hot, dry spell turning to thundery weather, and the loch surface was flat calm. The boat was approaching the islands at about 6 or 7 knots with Mr. McDonell at the wheel, and the kettle was on for tea. Suddenly Mr. McDonell heard a disturbance in the water astern of them and turned to see something very large heading towards them from about 20 yards away. He estimated its speed as from 20 to 30 miles an hour (Mr. Simpson thought it was slower). Within seconds it had struck the boat; he was convinced that this was unintentional and happened simply because they were on a collision course. The impact slowed the creature down and also knocked the kettle to the cabin floor. Mr. Simpson ran to turn off the gas as the water had doused the flame. Meanwhile Mr. McDonell got out an oar which he had brought for pushing the boat off the shore, and tried to fend the creature off; he struck it quite hard, breaking the oar (which was an old one), but this seemed to have no effect and the creature kept alongside. By this time Mr. Simpson had loaded a rifle which was on board and fired in the direction of the beast. Both men then saw the creature slowly sink away and thought it was the noise of the rifle shot which scared it off.

They estimated the length of the body at between 25 to 30 ft., with a rough skin dirty brown in colour. Both described three humps about 18" out of the water at the highest point, but Mr. McDonell later changed his opinion and thought they had seen undulations rather than humps. No tail was seen but Mr. McDonell saw the top of a large snakelike head, brown in colour, about a foot across the top and perhaps 18" out of the water. No features were visible.

Mr. McDonell stated that the body felt solid when he levered with the oar, and did not "give". In his opinion it must have been an overgrown eel.

18. Late August 1969

(Interview in August 1970 by EMC with Mr. John Clement, newspaper executive, of Morecambe, and Mrs. Julie Parks of Bracora - see also Nos. 9 and 20).

Mr. Clement, a regular visitor to Bracora, had arrived just after the McDonell/Simpson incident (17) and had already joked about it with Mrs. Parks, declaring himself a sceptic. Shortly after his arrival he was sitting in Mrs. Parks' house looking out of the window when he saw what appeared to be a group of three disturbances on the calm surface of the loch, a long way to the east and on the opposite side. As he continued to watch, the disturbances moved gradually westwards and closer, appearing, disappearing and re-appearing in a synchronised manner "as though there were three masses joined together by a pole and moving together". When the three disturbances appeared almost opposite he called Mrs. Parks and they went outside with binoculars. Mrs. Parks was in time to see the disturbances but they disappeared and did not reappear. Mr. Clement thought each of the three disturbances was about the length of a small dinghy with an equal distance between them. He could not say whether anything had actually broken the surface or not.



19. September 19th, 1969 (UNCONFIRMED)

(From a report in The Scotsman, September 20th, 1969. Efforts to contact Dr. and Mrs. Burnett or to trace the other witnesses have so far been unsuccessful.)

Dr. and Mrs. W.H. Burnett of Edinburgh are reported to have seen a creature with two humps, roughly 20 ft. to 30 ft. long, whilst taking a holiday stroll by the lochside. They are said to have watched it for 20 minutes through binoculars. Other visitors, alerted by their signals, said they saw an object which dived and appeared several times.

20. February 5th, 1970

(Report given to EMC by Mrs. Julie Parks of Bracora - see also 9 and 18.)

Mrs. Parks was returning from Morar with her young nephew one afternoon. They were about half a mile from her house at Bracora, walking along the road; the loch surface at the time was flat calm. About 30 yards from the shore at a place called the White Beach, Mrs. Parks saw what looked at first like three cows standing in the water - three motionless black humps. They both saw the humps clearly and watched until all three submerged simultaneously. No head was visible; the overall length was about 30 ft.

21. May 1970

(Report given to EMC by Mr. T.E.J., a local resident and retired schoolmaster who wished to remain anonymous.)

Mr. and Mrs. T.E.J. were looking out of the kitchen window of their house which overlooks the loch near the islands, at about 7.45 a.m. on a fine day in mid-May. There was sunshine and a few clouds; visibility was excellent as the sun was not yet strong enough to cause any distortion of what they saw. The loch surface was absolutely calm and there was no wind.

About 300 yards away from them they saw a long V-shaped wake travelling slowly across the loch. Nothing broke the surface and the wake continued moving eastwards for about 15 minutes. No boat had passed and they saw nothing else that could account for the wake.

22. July 14th, 1970

(Reports by three Survey members: Dr. Neil Bass, marine biologist; W.F. Parker, research technician; Philip de Nahlik, zoology student.)

The three members of the biological team had walked up towards Swordlands on the north shore and at about 2 p.m. were standing sheltering from the rain. Dr. Bass was watching the loch from a point overlooking Swordlands Bay; the others were sheltering under some trees above the path. The rain was just stopping; there was a fresh breeze, the sky overcast but clearing, and the loch surface was rippled with long wind slicks. Dr. Bass noticed a black, smooth-looking, hump-shaped object in the water about 300 yards away and called the others, but by the time they arrived it had submerged, going smoothly and vertically down. About half a minute later all three saw a disturbance of the water at the same spot, followed by a spreading circular wake or ripple which radiated across the waves to about 50 yards diameter. Nothing else was seen although a watch was kept for some time. Mr. Parker who saw only the disturbance considered it could not have been caused by a fish or shoal of fish.

Dr. Bass who saw the hump stated that the only species known to inhabit the loch which could have produced a black hump would have been an eel, but it would have had to be enormous and the movement was not characteristic of any eel. In his opinion he saw an animate object of a species with which he was not familiar in this type of habitat.

23. July 1970

(Report by Mr. A.H. Malcolm, headmaster of a Perthshire school, given to the Survey.)

Mr. Malcolm was staying at the same house in Bracorina from which he and his wife saw a hump in 1963 or 1964 (No. 10). It was a bright, clear morning, about 9.10 a.m., with a light, evenly blowing south east wind causing a regular ripple on the loch surface.

He suddenly noticed a pattern of disturbed water moving across the waves at right angles to the wind direction. There was nothing visible on the surface; the effect was like waves breaking gently on a submerged rock. The disturbance moved steadily in a straight line from Bracorina boat house across the loch to the rock off Lettermorar Point, taking about 20 minutes to do so which gave an estimated speed of about 6 miles per hour.

Mrs. Malcolm also watched the disturbance and both were satisfied that it was quite unlike any wind slick, squall or catspaw, with which they were both extremely familiar. They had never seen anything like it before.

24. August 4th, 1970

(Report by Survey member Alan Butterworth, zoology student.)

Mr. Butterworth was on camera watch at 11.10 a.m. at the Bracora site, scanning the opposite shore from east to west with a pair of 10 x 50 binoculars. The water surface was mirror calm; there was good visibility for 3 to 4 miles with heat haze, light cloud and no wind or rain. He saw what he thought was the rocky islet almost opposite the camera station (see also account no. 10) but on continuing the sweep round saw the islet again. He immediately went back to the first object and saw that it was a dark-coloured hump of similar size to the islet, about 15 ft. long and 3 to 4 ft. high, but more regularly dome-shaped than the islet. It was about a mile and a half away. Mr. Butterworth put down the binoculars and ran to the cameras but when he looked again the object had disappeared.

25. August 5th, 1970

(Report by Mr. John MacVarish, local hotel worker, to Survey.)

Mr. MacVarish, having had two previous sightings (13 and 16) in hot, windless conditions decided to go out on the loch, as it was once more a fine, hot day following a spell of hot weather, with no wind and the loch surface glassy calm. At 5 p.m., about three quarters of a mile from the eastern end of the loch (his birthplace) he saw a big disturbance in the water about 30 yards from his boat. When the water settled a big wave about 2 ft. high spread out from it, well out into the loch. He said that the disturbance on the flat, calm loch surface was much larger than anything he had ever seen when fish were jumping or turning in the water.



26. September 11th, 1970

(From written reports sent to the Survey by Mr. Charles Fishburne, B.A., administrative officer, Edinburgh University; and Mr. Ian Mitchell, electrician, of Edinburgh. Both men are familiar with Loch Morar and had only heard in general terms of a possible "monster" in the loch; Mr. Mitchell was a declared sceptic before this incident.)

Mr. Fishburne and Mr. Mitchell had been on a sailing trip to the head of the loch (eastern end). The wind had dropped and the loch was dead calm; their Scagull engine had broken down and it was after 7 p.m. when they set out on the return journey with sails struck and engine running, moving at about 3 - 4 knots.

At about 9 p.m. they had passed Brinacory Island and were several hundred yards out from the north shore. Ahead of them the western horizon was clear, the hills silhouetted against the sky; they did not yet need lights. To the east, however, the sky was cloudy; the hills, water and sky were distinguishable but not clear, and a boat travelling eastwards would have needed lights.

Suddenly Mr. Fishburne noticed three objects silhouetted in the water off the port bow (i.e. ahead of them and to their left, in mid-loch). At first he took them for trees or rocks, but quickly realised they were much too far from shore for that (the only rocky islets in mid-loch are at the western end where they form part of the moraine). The water was flat calm and grey in colour, the objects black and protruding clearly.

Then Mr. Fishburne realised that the objects were approaching faster than the speed of the boat and must therefore be moving. He continued on course, the objects continuing to approach on the opposite course. He thought of signalling in case it was a boat, then realised that it would be strange for such a large boat to be moving so fast towards the dark end of the loch silently and without lights, especially with Brinacory Island so close.

The three objects passed within 30-50 yards to port, moving at from 12-15 knots, and he clearly saw them to be three large, black, hump-shaped objects.

He called to Mr. Mitchell but by this time they were past. Mr. Mitchell could not see anything in the dusk and with no sound of engines or lights showing, told him it was his imagination.

Just then they encountered the first of three long, deep swells, which both men state were quite unlike the wash from a large boat moving fast. Their boat rose and fell gradually with each swell, instead of rocking or hanging against them (and they were still moving at 3-4 knots on a flat, calm surface).

Mr. Fishburne's impression was that the swells trailed behind the object at a much more acute angle than the normal, widely spreading boat wake.

At that point, in Mr. Fishburne's words: "My friend agreed that the wake was not imagination, and was bloody peculiar. We turned to shore, beached the boat, and walked home."

(A local resident met them walking back in a state of considerable shock, took them home for a meal and later put them in touch with the Survey which by then had left Morar.)

27. Date unknown - STORY UNCONFIRMED

(This report is taken from Selected Highland Folktales by the late R. Macdonald Robertson. It is included because it was given at first hand to a writer of considerable repute, and is familiar in outline to a number of Morar people who knew Mr. Alexander Macdonnell. Efforts are still being made to establish its authenticity further. This is particularly important since it is the only alleged land sighting on record.)

The late Mr. Alexander Macdonnell stated that he was taking a party of people (including some schoolchildren) to Morar from Mooble, in the Mooble estate boat. No date is given; the incident was described as "some years ago" in 1961. As they were passing Bracorina Point, on the north side, some of the children shouted out: "Oh look! What is that big thing on the bank over there?" Mr. Macdonnell described the beast as being about the size of a full-grown Indian elephant. It plunged off the rocks into the water with a terrific splash.

CONCLUSIONS

The answers to the questions we set out to answer, listed on the first page of this section, are as follows.

1. Number of reports

Twenty-seven are listed here, though some refer to more than one sighting (2, 8, 12), and there is evidence that many more unreported sightings have taken place.

2. Whether this number amounts to what might be expected

Yes, the pattern seems logical.

Something gave rise to a very strong local tradition in the days when small crofting communities existed around the shores and relatively more people were in daily sight of the loch. Since then the population has steadily declined but there must have been enough sightings from time to time to keep the tradition alive; there is evidence that this was so. Recently, better communications have brought more regular visitors to the area and local people are more willing to talk; it now seems that in present-day circumstances up to half a dozen sightings are probably occurring each year. This is about what we anticipated (see under "Background to the Research").

3. Consistency

The sightings proved very consistent - and consistent even when there is inconsistency, as the following brief analysis shows.

a) Head and Neck

The five witnesses who saw the head describe it as eel-like or snakelike. Three of these saw it upraised on a long thin neck (5, 8, 13) without the body, while the other two did not notice the neck or could not see it (14, 17). The measurements given in the Metcalf report (12) may suggest a fairly long outstretched neck.

b) Body

Nine accounts describe a single hump and these could obviously be multiplied indefinitely as this is the most common form of sighting. Many used the "upturned boat" analogy though they were unaware that others had used it too. Not all were certain that what they had seen was in fact the beast, (3, 4, 7, 8, 9, 10, 11, 22, 24).

Ten accounts specify or suggest several humps. Of these, eight describe three humps. Of the other two, one is an unconfirmed newspaper report mentioning two humps (19) and in the other (6) the witnesses disagree between four or five, and one.

The humps are sometimes prominently separated (1, 2, 12, 18, 19, 20, 26) and sometimes apparently not (6, 16, 17).

Three accounts describing the whole creature do not specify body shape at all. Of these, 15 is too vague to contribute to an analysis and Nos. 14 and 27 stand out as astonishing individual accounts - not necessarily irreconcilable with the others. Both descriptions suggest a four-legged amphibian and No. 27 (as yet unconfirmed) actually describes a land sighting. Both must remain enigmas until further corroboration is received.

Body measurements recorded are variable but appear to indicate a length of from 20 ft. to 40 ft.

c) Colour and Texture of Skin

Fourteen accounts mention colour of which eight specify dark or black (6, 7, 11, 13, 20, 22, 24, 26). The others give greeny brown (10) yellowish grey (12) grey-brown (14) greeny (15) light brown (16) dirty brown (17).

It is difficult to draw any conclusions since distance makes all colours appear darker while different people describe colours from memory in widely varying ways. However the two accounts from close quarters (14, 17) use a similar description and both describe a rough skin. The only witness to have pushed at the creature described it as solid (17).

d) Motion

The creature is described as travelling at various speeds; slowly, with only a small wash (6, 9, 12, 13, 18,) or really fast, like a motor boat, throwing up a bow wave (2, 4, 11, 16, 17, 26). In other words, it is sufficiently powerful to travel at high speed when desired and cause considerable water disturbance. There is no description of the creature surfacing but those who watched it submerge say that it does so vertically (10, 11, 13, 17, 20, 22). The only witnesses who watched it constantly under water described a smooth gliding motion (12). Only one witness thought, after a lapse of time, that the humps might in fact have been undulations (17).



e) Weather Conditions and Time of Day

The creature has been seen under water in all weathers and at all times (12) but the preponderance of surface sightings in hot, windless conditions is noticeable and dusk is the time of day most frequently specified.

Twelve accounts including all the most important surface sightings were in hot weather with the loch surface glassy calm (6, 11, 13, 14, 15, 16, 17, 20, 21, 24, 25, 26). (The two underwater sightings in Macble Bay (14, 15) would obviously only have been possible in bright sunshine with a flat calm surface.) Three more were in bright sunshine with a light wind or wind not mentioned (4, 9, 23). Only one brief sighting was in light rain and wind (22).

Five incidents took place at dusk (2, 3, 6, 17, 26), one at night (1), and eight at different times of the morning or afternoon (10, 11, 13, 16, 20, 22, 24, 25). The rest were unspecified.

f) Behaviour

Very little can be deduced except that the creature appears to frequent shallow water (though not at the extreme western end of the loch where there is most human activity) and particularly bays.

Only seven of the 17 accounts which mention or imply depth, describe deep water (4, 6, 7, 11, 13, 22, 26). Five mention shallow water close inshore (9, 16, 17, 20, 21) and five more specify bays directly or implicitly (10, 12, 14, 15, 24).

The Metcalf report (12) is of particular importance as it indicates a regular routine pattern of behaviour by one individual.

The overall consistency of the reports is remarkable, especially as few of the witnesses were aware of many - sometimes any - other accounts. Where they had heard other stories they still stuck to their own descriptions whether or not these appeared to tally.

4. Comparison with reports from Loch Ness

Most striking of all is the resemblance to reports from Loch Ness, which again were not known in detail to most of the witnesses at Morar. The same descriptions and the same consistent inconsistencies occur.

From Morar there is not such a wide range of descriptions (e.g. the number of humps reported from Loch Ness is much more variable and witnesses there have reported seeing the outline of the back actually change shape) but every one of the surface sightings could have come from Ness. (See standard works of reference and annual reports of the Loch Ness Investigation).

Of especial interest is the fact that all the most important Morar incidents occurred in hot weather with a mirror calm water surface. It has been calculated that 95% of significant sightings at Ness have occurred in similar conditions.



The main difference between Morar and Ness is in the underwater sightings. These would have been impossible in the peaty waters of Loch Ness, which also has steep sides and few shallows, eliminating the possibility of a preponderance of shallow water sightings such as occur at Morar.

Another difference is that the Loch Morar creature appears not necessarily to fear the sound of a motor (14, 15, 17, 26) whilst reports from Ness indicate otherwise. However, there are no boats on Loch Morar of the large size which travel daily through the Caledonian Canal.

#### 5. Credibility

It must already be obvious that all the accounts quoted in this report have been accepted as genuine. We rejected only three. One of these - a long range hump sighting - was submitted by myself. I rejected it on grounds of unfamiliarity with the locale (I had only arrived two days earlier) and distance (it could conceivably have been a boat although in fact the speed I estimated was greater than the speed of any boat known to have been in the area at the time). I also rejected a sighting that could have described a large otter or floating log, and a water disturbance that could have been a wind effect.

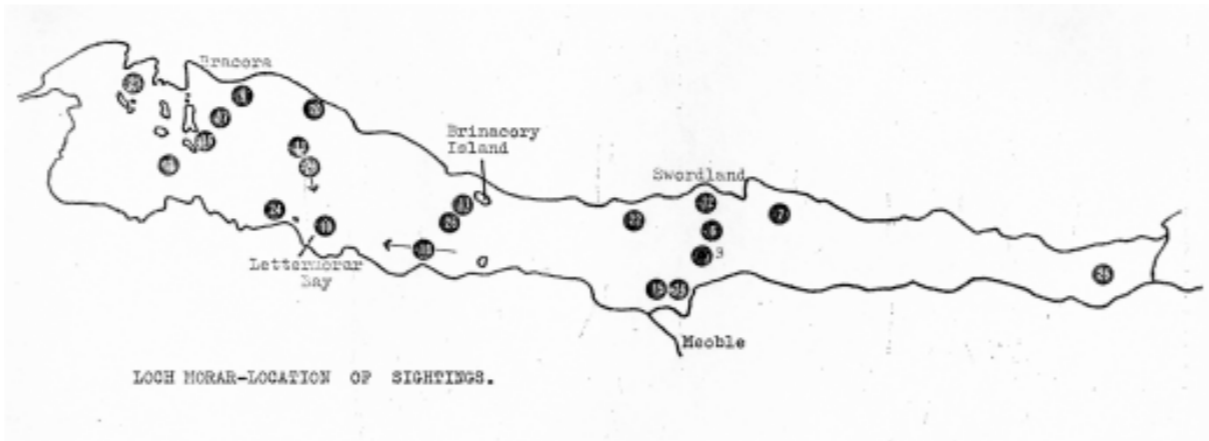
Only five of the reports are secondhand (2, 4, 5, 19, 27). Of these, two were given to a well-known writer, Mr. Seton Gordon, with whom we have corresponded (2, 4). The other three, although we have not yet succeeded in tracing them back to source, are well established accounts given to or by reliable people, and have therefore been given the benefit of the doubt for the time being.

It is as yet impossible to do more than speculate on what species has given rise to these accounts. More than one species may be involved; certainly it appears that more than one individual has been described. If indeed this is so, there is hope that the species will survive for long enough to allow the riddle to be solved, and steps to be taken to protect and preserve the creatures in their natural habitat.

Elizabeth Montgomery Campbell  
Assisted by: Allan Frake, Alan Dance

#### References

- Whyte, Constance      More Than A Legend (Hamish Hamilton, 1957)  
Macdonald, James      Tales of the Highlands (Highland News, 1907)  
Gordon, Seton          Afoot in Wild Places (Cassell & Co., 1937)  
Robertson, R. Macdonald      Selected Highland Folktales (Oliver & Boyd, 1961)
- See also Loch Ness Monster by Tim Dinsdale (Routledge and Kegan Paul, 1961) and reports of the Loch Ness Investigation Bureau.



## OPERATIONAL REPORT

### Introduction:

The basic aim of the operational section of the Loch Morar Survey 1970 was to confirm the eyewitness accounts (reported in the Historical section) which suggest that a large, yet unidentified animate object exists in and around the shores of the loch, by keeping a continuous watch on various parts of the loch in the hope of sighting and filming this animal. Loch Morar, as an environment for such an investigation, would appear to be very favourable when one considers the factors which may influence the frequency of sightings, for example, noise and other disturbances. Loch Morar is inaccessible to motor vehicles for the greater part of its length and contains only a few small boats. On the other hand, Loch Ness has a considerable disturbance problem as there is a road surrounding the loch and large boats navigate it on their ways through the Caledonian Canal.

Thus, from previous experience at Loch Ness and from the reports of the eyewitnesses, we considered that to obtain evidence of the existence of the animal we would use mainly land based sites for the direct observation and efficient photographic coverage of as much of the loch surface as possible, using 16 and 35 mm. cine and still cameras, together with baiting experiments designed to entice the animal to the surface.

When considering the effectiveness of surface photography one has to consider the problems involved in covering a stretch of water 11.5 miles long with a mean width of 0.9 miles. There is thus 10.3 sq. miles (6600 acres) of loch surface to cover and since we could only effectively man three camera sites, we were presented with rather a difficult situation. Therefore, we positioned the cameras on sites covering areas where, in the past, sightings have been reported and where a wide angle of view could be obtained.

In addition to these three semi-permanent camera sites which were operated under conditions of good photographic light, night watches were also maintained under suitable surface and weather conditions. Due to the elevation of the camera sites above the loch surface, night observations required critical light conditions to be effective, and shore watches at the loch surface used in conjunction with night fishing for eels, as a part of the Biological section, were more effective. Night drifting in 'Kolpic', the Survey boat, was also carried out under reasonable conditions.

*by the Loch Ness Investigation*

Surface observation and photography was also carried out<sup>1/2</sup> as has previously been done at Loch Ness, using an airborne camera platform, an autogyro, piloted by Wing Cmdr. Ken Wallis, who under ideal visibility and good surface conditions made several high altitude (3-5000 ft.) longitudinal runs down the loch. Under optimal conditions it would be possible to scan the surface layers of the loch down to a depth of several feet, as in Loch Ness where Wing Cmdr. Wallis had been operating in a similar way for the Loch Ness Investigation. At Loch Morar, however, the efficiency of aerial observation is reduced by the presence of numerous shallow bays along both sides of the loch which makes perfect coverage impossible. The east/west orientation of the loch also presented problems of surface light reflection which, with several days of light northerly winds, made underwater observation disappointingly ineffective.

### Camera sites

As previously mentioned, the main emphasis of the operational section was surface photography from strategically placed observation positions. The camera sites themselves were semi-permanent bases, consisting of two tents used for storage and accommodation. These were operated by two people who manned them for 3-4 days at a time depending upon the weather conditions. Each crew was required to adopt a standard procedure of activities so that all the results could be evaluated and correlated. The main function of these sites was to continuously observe the loch surface during periods of 'photographic light', unless prevented from doing so by adverse weather conditions.

The two man crew was also required to keep a comprehensive record of wind direction, cloud cover, visibility and surface conditions at hourly intervals throughout the day. Similarly all boats were recorded with their size, direction and speed together with any other natural phenomena, such as drifting objects, aquatic bird species and peculiar 'wind slicks'.

The crews were normally operational at first 'photographic light' usually at about 5 a.m. and would continue observation until the light faded at about 9-10 p.m. As may be imagined, this type of operation is extremely tiring physically, and hence the necessity to relieve the crews regularly. At the Bracora site changing of crews was easily achieved as the site itself was only 3 miles from the Survey H.Q. at Morax and only a few hundred yards from the Bracora road. The Swordlands and Meoble sites, however, due to their isolated positions, could only be relieved by boat.

### Bracora camera site

The site was specifically positioned to obtain a very wide view stretching from the islands at the western end of the loch around to Brinacory Island, with the main emphasis of observation being focussed around the islands and Bracora.

The site was approximately 100 ft. above loch level, and was situated at the top of an almost vertical cliff which thereby facilitated a commanding view of the north and south shorelines without any obstructions. Although the site was ideal for the observation of the loch, there were disadvantages in that its position made the site susceptible to the prevailing winds. Thus, due to the adverse weather conditions in the latter part of the Survey the base had to be temporarily dismantled to ensure the safety of both the equipment and the personnel.

This site crew used a tripod mounted 35 mm. Newman Sinclair cine camera with a 20" telephoto lens, plus a 35 mm. Practica single lens reflex back-up still camera which had a 36" Wray telephoto lens.

The loch surface was observed for a total of 310 man hours during its operational period of 18 days for which we were rewarded by a single sighting (see Historical section No. 24). Rather unexpectedly this area of the loch was subject to a large number of disturbances in the form of small boats and as many as 24 boats passed the camera site in a single day.

### Swordlands Camera Site

The Swordlands camera site was also a high level observation position, being about 100 ft. above the loch surface and situated about 1 mile west of the house at Swordlands. It was chosen because of the photographic coverage it offered for two areas of the loch from which several sightings have been reported. These are the Swordlands Bay



area on the north side, and the Meoble Bay, directly opposite the camera site on the south side of the loch. The camera employed at this site was a 16mm. Bolex single lens reflex with a 300 mm. telephoto lens. The site was operational for a total of 16 days during which 294 man hours of observation were recorded. Compared with the Bracora site, the boat traffic was slight and it represented virtually the only disturbances encountered.

#### Meoble camera site

This site was the only observation position on the south shore of the loch, being positioned about 20 ft. above the loch surface. The fields of view of the Swordlands and Meoble camera sites overlapped to quite an extent but it was considered preferable to efficiently cover this particular area where many sightings have been reported in the past. Also any film of a possible sighting taken from the two sites at different elevations would enable a more positive identification of the particular object to be made.

The other factor influencing our selection of a suitable camera site was that of accessibility. The absence of a road or even a footpath on the south shore resulted in boats being the only form of communication possible for this site, and therefore a suitable landing beach was essential.

The site was equipped with a 16 mm. Bolex cine camera fitted with a 20" telephoto lens. A total of 201 man hours of observation was recorded for this site.

#### Bait bag experiments

These experiments were designed to investigate the sensitivity of any large animal to a possible food source in the form of fresh fish and their extracts. Two experiments were carried out with this material. The first experiment involved the anchoring of a bait bag beneath one of the camera sites. This experiment was tested at both the Bracora and Swordlands sites. The main part of the bait bag consisted of a square float comprised of a number of inverted screw cap plastic bottles, half of which were water tight and the other half were filled with a liquid extract from the fresh fish. This liquid was allowed to diffuse gradually out of the bottles through a small hole which was pierced in the screw caps. This set-up allowed the diffusion of the fish material out of the bottles over a period of several hours. The solid parts of the fish were placed in a 1" mesh net which was suspended a few feet below the float. Very small fragments of fish were placed in small perforated plastic bags within this net. Finally, the whole construction was anchored to the bottom of the loch in about 100 ft. of water. One of the camera site crew members then trained the cine camera on to the float ready to record any movement or other disturbance in its vicinity. No observations of unusual activity around these bait bags were observed although the experiment was repeated on several occasions at both camera sites.

The second experiment carried out with these bait bags involved a more widespread release of the fish material over the surface of the loch, using a boat equipped with large containers of material which was periodically fed into an open net trailing behind the boat. This net was towed from the Bracora camera site towards the Swordlands one and observations were made from both of these sites and from on board the boat. This experiment was carried out under various conditions ranging from rough (3' high waves) to flat mirror calm. The slick of oily fish material was observed to cover quite a large area, even around the stationary bait bag, and remained present on the surface of the water for several hours even in rough weather.

No water disturbances or sightings occurred during the course of these experiments. However, when one considers the actual volume of water which would be 'affected' by the fish extracts, it is seen to be extremely small in comparison with the total volume of the loch, which must be in the region of 81,000 million cubic feet, and so it is not too surprising that a large animal was not stimulated into surfacing in the vicinity of the source material. Great care was exercised throughout the planning and execution of these experiments to ensure that no infection, parasite or contamination was introduced into the loch. All remains were buried at the end of each experiment.

In conclusion I would like to thank all the members of the Survey who pursued our objective of finding a solution to this intriguing phenomenon by intense interest, devotion and hard work, and it is disappointing that all the efforts of this operational section were only rewarded by the single sighting made by Mr. A. Butterworth. However, the accumulated evidence for the existence of a large unidentified animal in the loch waters is extremely good when objectively analysed and the encouraging results from what was an experimental operational project have given us much food for thought. Thus, a 'greater' knowledge of the problems involved in the mounting of such a project will allow us to make a more positive approach to the problem in future years.

Allan Frake

PRELIMINARY INCOME AND EXPENDITURE ACCOUNT  
(15th November, 1970)

---

<u>Expenditure</u>	£
Printing, stationery and administration	76
Camera hire and insurance	30
Vehicle hire, insurance and running costs	72
Site operating costs	103
Boat hire and running costs	35
Miscellaneous equipment and insurance	45
	<u>361</u>
 <u>Income</u>	 £
Donation	20
Fees from radio and television interviews	30
Loans and contributions by members	311
	<u>361</u>

Alan Dance  
(Honorary Treasurer)  
15.10.70



#### REFERENCES

- ALLEN, S.E., A. CARLISLE, F.J. WHITE & C.C. EVANS (1968). *J.Ecol.*, 56, 497-504.
- CHAPMAN, V.J. (1964). "The Algae". Macmillan & Co. Ltd., London, 472 pp.
- FINDERIGG, I. (1962). *Verh. int. ver. Limnol.*, 15, 352.
- GORDON, S. (1937). "Afoot in Wild Places", Cassell & Co.
- MACDONALD, J. (1907). "Tales of the Highlands", Highland News.
- MURRAY, J. & L. PULLAR (1910). *Bathymetrical Survey of the Scottish Freshwater Lochs*. 6 vols.
- REPORT of St. Andrews University Biology Society Expedition to Loch Morar (1969).
- ROBERTSON, R.M. (1961). "Selected Highland Folktales". Oliver & Boyd.
- WEST, G.E., & F.E. FRITSCH (1932). "A Treatise on the British Fresh Water Algae", Cambridge University Press, 534 pp.
- WHYTE, C. (1957). "More than a Legend", Hamish Hamilton.

## ACKNOWLEDGMENTS

### Research

All eyewitnesses who gave their accounts to the Survey are warmly thanked for their co-operation together with the following:-

Col. Sir Roderick Brinckman; Father Aloysius Carruth; the library staff of The Glasgow Herald; Mr. Seton Gordon; the editor of the Inverness Courier; the staff of the Inverness Libraries; Father Ewen MacInnes; Mr. G.F. Paton; the library staff of The Scotsman; Mr. David Turnock.

### Donation

The Survey is particularly grateful to Mr. J. Cadbury for a donation towards the costs.

### Assistance with Equipment and Donations of Food and Supplies

The following are thanked for gifts, loans and reduced hire charges:-

Warwick Wright Motors Ltd.  
Edric Films Ltd.  
Orwo Ltd.  
Samuelson Film Services Ltd.  
Metal Box. Co. Ltd.  
Tate and Lyle Refineries Ltd.  
Marlow Ropes Ltd.  
West Ham Technical College  
T.J. Smith and Nephew Ltd.  
Bovril Group Marketing Ltd.  
Laywood and Baker Co. Ltd.  
Meredith and Drew Ltd.  
Dunlop Co. Ltd.  
Beechams, Food and Drinks Division  
Motorway Garages Ltd.  
Flamingo Park Zoo  
H.J. Heinz Co. Ltd.  
*Northern Polytechnic*

### General Organisational help

The Survey is grateful for the guidance, co-operation and general assistance of Mr. Stanley Bowler; Mr. M.H. Despard; Miss Cecily Ford; Mr. Hugh Grigor; the Harrow College of Technology (School of Photography); Mr. Tony Lewis; the Loch Ness Investigation; Lord Lovat and Lovat Estates Ltd.; Capt. J.S. Metcalf; the proprietor and staff of the Morar Hotel; Mrs. Anne Mackellaig; Mrs. Julie Parks; Mr. K.R. Warr; Miss Patsy Semple.

MEMBERS OF THE LOCH MORAR SURVEY 1970

Committee

Elizabeth Montgomery Campbell, M.J.I. (Co-Ordinator)  
Neil Bass, B.Sc., Ph.D.  
Alan Dance, (Hon. Treasurer)  
Allan Frake  
Peter Head, B.Sc., Ph.D.  
Brian Knights, B.Sc.  
Philip Pugh, B.Sc., Ph.D.  
David Solomon, B.Sc.

Members

Holly Arnold  
Ronald Binns, B.A.  
Tim Butler  
Alan Butterworth  
Peter Dyson  
Ian Johnson  
Philip de Nahlik  
Ivor Newby  
Bill Parker  
Marketta Parker  
Michael Parkinson  
Dee Passman  
Dick Raynor  
John Rosser  
Donald Smith  
Patrick Smith, B.Sc.