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INTERIM REPORTS

I

Seal Marking at Heard Island, 1949

By

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Edited By P.G. Law

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INTRODUCTION

In October, 1947, the Australian National Antarctic Research Expedition established research stations on two subantarctic islands, Heard Island and Macquarie Island. During the second year of occupation on Heard Island, from February 1949, until March 1950, a programme of biological research was carried out by R.G. Chittleborough and E.H.M. Ealey, biologists of the Expedition. The programme included experiments on marking elephant seals (Macrorhinus proboscideus, Peron and Lesueur) and leopard seals (Hydrurga leoptonyx, de Blainville). A satisfactory method of seal-marking was developed and a list of the animals branded appears in the Appendices to this Report.

Seal marking has been carried out in the past for scientific and commercial purposes on almost every species of seal, and there is available today a fairly extensive body of literature on the subject. However, most of this work deals with the northern fur seal of Alaska, which differs in several ways from the subantarctic elephant seal of Heard Island and Macquarie Island. References to the marking of elephant seals are very scanty. Matthews (1929) in his report on the "Natural History of the Elephant Seal" states that some hundreds of seal pups were branded yearly at South Georgia during the period 1921-25, the brand showing the year and the section of the island in which the marking was carried out. More recently, a New Zealand biologist, J.H. Sorensen, branded elephant seals on Campbell Island and Liver-side (1950) in a paper entitled "Elephant Seals in the Antarctic" refers to experiments by Laws, who fixed dated metal clips under the flippers of elephant seal pups on Signy Island. It appears, however, that in all these cases, it has not been considered necessary to circulate the information beyond the group of observers interested in the particular locality.

This Interim Report has been published primarily to acquaint other workers with what is being done at A.N.A.R.E. Stations. At a later date, when observations have been carried out over a number of years, the results will be issued in a full A.N.A.R.E. Report.

REASONS FOR MARKING

Seal-marking is carried out for three main purposes :-

1. To determine the growth rate and times of maturity and senility of the seals.
2. To investigate the seasonal migrations of the animals and changes within their harems during the breeding season.
3. To establish the time and duration of moulting in different age groups.

MARKING TECHNIQUES TESTED AT HEARD ISLAND

In a recently published survey of seal-marking techniques, "Experiments in the Marking of Seals and Sea-Lions", V.B.Scheffer (1950) discusses the branding, tagging, shearing, painting, flipper-punching and ear-clipping of seals, mainly northern fur seals of the Pribilof Islands, Alaska. Several of these methods, however, are unsuitable for elephant seals. Shearing and ear-clipping, for instance, are out of the question since elephant seals have neither ears nor fur. Elephant flippers do not lend themselves to punching, as the webbing of the flippers is shorter and thicker and the digits are less flexible than in fur seals. The marking techniques tested at Heard Island were :-

- (a) Branding with hot irons.
 - (b) Tagging with barbed metal discs.
 - (c) Painting.
- (a) Branding with Hot Irons.
- (i) O Brand. On 25 February 1949, preliminary tests were begun with a circle brand. The branding iron consisted of a short length of cylindrical iron piping, $2\frac{1}{4}$ inches in diameter, roughly sharpened round the edges and bolted to a piece of angle iron which served as a handle. (Plate 1). It was heated by a large blow lamp, the head of which was let into a four gallon tin to protect it from the wind.

To brand successfully, it was essential that the iron should be left in contact with the hide for two or three seconds and consequently it was found most practical to select sleeping seals for branding. As most of the seals slept in large groups amongst the hummocks, it was not difficult to find a seal wedged so tightly between the others that it could scarcely move. Such seals were ideal for branding as they could not swing round to ward off the irons even after they had been awakened.

Ten female elephant seals, and sixteen males, in various stages of moulting, were branded dorsally with the circle, just anterior to the tail. Though Scheffer (1950) recommends a brand "following the fold on the back of the seal's neck" it was decided to brand near the tail, first because the operation was easier to perform, and secondly because it was noticed that the back of the seal's neck was often scarred in fights during the breeding season.

Most of the brand wounds healed rapidly without suppuration. Up to September 1950, none of the branded bulls had been seen again, but the branded cows had made four appearances. On 9 November 1949, a circle brand was seen on a large scarred cow in a harem close to the A.N.A.R.E. Station. Though not very deep, the branded circle was clearly visible. On 19 February 1950, two adult females bearing the circle brand were seen within a hundred yards of the position where they were branded on 25 February 1949. One brand was shallow, and was considered unlikely to survive the next moult, but the other was a circle of bare, scarred skin, with hair in the centre. On 3 March 1950, another cow branded with a clear circle was seen near the Station.

The circle brand therefore has appeared four times in the season following its first use and it offers some evidence that adult elephant seals return to the same place after their migrations.

(ii) L Brand. In April 1949, it was decided to investigate the duration of the moulting period of elephant seals and so a brand of different shape was used to differentiate from earlier markings.

A short length of 2-inch angle iron was bolted to a wooden pole and heated with a large blow lamp. This produced an "L"-shaped brand which was placed in different positions on each seal. On 9 April

twenty-two elephant seals were branded, but a week later all but four of them had taken to sea and the initial aim of the experiment was defeated. By 23 April, only one large bull remained on shore and by 26 April it too had disappeared. However, on 23 April it was observed that 95% of this bull's body had moulted which suggests that it took at least a fortnight to moult.

- (iii) Numerical Brands. During the winter months a hot iron branding system consisting of interchangeable numerals giving combinations from "0" to "999" was evolved. It was planned to brand individually as many of the spring pups as possible so that the growth rate and age at maturity of elephant seals could be studied. Though Scheffer (1950) maintains that branding "does not lend itself to the marking of large series of individually numbered specimens", it was decided that numerical brands could provide more accurate information on growth rate, age of maturity, and the movement and dispersal of seals than was possible with the single brand.

The branding iron (Diagram 1) consisted of a rectangular piece of iron plate 7 inches long, 2 inches wide and $\frac{1}{4}$ inch thick. The numerals, made of iron strips $\frac{1}{8}$ inches wide and $\frac{1}{8}$ th of an inch thick which had been bent into the form of numbers, were fitted to this. A small shaft, oval in cross section to prevent rotation, was rivetted to the centre of one edge of each numeral. An oval hole was cut in the rectangular plate through which this shaft could be passed. A small hole was drilled through that part of the shaft protruding beyond the plate so that the numeral could be held in position by the insertion of a tapered pin. By merely tapping this pin in or out, any numeral could be rapidly changed. An iron handle was attached to the plate (Plate 2).

Owing to the fact that the surface to be branded was generally curved, and there was some difficulty in heating the three numerals evenly, it was later found that similar irons holding only single numerals were preferable. This involved applying each numeral separately, a procedure which was only practical for elephant seal pups since adolescents and adults could not be held during branding. However, for most purposes it is the pups which require branding.

For heating the branding irons, a mobile coke forge was improvised (Plate 3) but it was soon abandoned as it proved inefficient in low temperatures

and the noise it made often disturbed the seals. Thereafter heating was carried out by the blowlamp described in previous experiments.

Branding of the seal pups was commenced on 8 November when the cows were returning to sea and leaving their pups on the beaches. At this stage two men could easily manage one pup. One would sit on the animal's head and hold its foreflippers off the ground while the other stood on its hind-quarters as he applied the brand. However, as the pups grew larger they became harder to manage. The man sitting on the seal's head often had his trousers torn and legs bitten. In order to prevent this occurring a large canvas bag was slipped over the pup's head and fore-flippers which rendered it almost helpless (Plate 4). Occasionally one would try to back out of the bag, but this was prevented by a rope tied to the bag being looped round the hind-flippers.

If the branding iron were not hot enough, the operation had to be repeated spoiling the finished brand. If the iron were left on too long, it burnt right through the hide to the blubber, producing a wound open to infection which often healed leaving an unrecognizable scar. The aim of branding should be to destroy the hair follicles, producing a scorched mark, not a cooked patch of tissue. Hence the iron must be very hot and applied only for a short time.

Experience showed that it was advisable to pull out the juvenile fur and then sponge the hair underneath with water until it lay flat against the skin. The wetting of the hair not only made it lie flat but confined the heat of the branding iron to the actual region being branded, preventing surrounding tissues being killed. This resulted in a very fine, clean brand.

Single numeral brands were heated to bright red heat and then applied for a very short period of a second or less. While one numeral was being applied, the next was being heated, and so on until the complete number was seared on to the animal's back. When one became accustomed to changing brands and holding down seals, it became possible to brand one seal every four minutes. The maximum number of seals branded at one time by two men was 51 in an afternoon.

A total of 275 pups was branded in this way, and a record kept in each case of the beach on which

the pup was born, together with its length, sex and date of marking. A number of the earlier brands are not expected to persist, as those made by an insufficiently heated iron held on for a long time were observed later to be suppurating badly. The brands made with the red hot irons on the wet, flattened hair healed in a few days and a layer of burnt skin peeled off, leaving a clear scar on the hide. (Plates 5 & 6).

Though the most valuable results of this branding will not be obtained for several years, as these elephant seals were taken at different ages, some interesting observations were made on their movements before they finally went to sea. One pup branded on 29 November near the A.N.A.R.E. Station, was seen next day on the other side of Atlas Cove near Mount Aubert de la Rue. Being rather slow and clumsy on land, it seems very unlikely that this pup crawled around the beach overnight, so it must have swum across the cove. This is earlier than we had expected pups to take to the water and shows that pups are strong swimmers from quite an early date.

Other pups, that had been branded while within several hundred yards of the Station, were later seen nearly two miles away on the beach at West Bay.

Branding was discontinued after 8 December 1949, as most of the pups had rather suddenly gone to sea and the few that remained had grown too large to manage.

By 1951 three of the pups branded in 1949 had been taken again. The brands were clear and sharp and the seals were in excellent condition. The first, (brand number 242) was on a male which was taken at Wharf Point on 22 May 1950. This pup had grown 12 inches in body length in $6\frac{1}{2}$ months. The second, (brand number 159) was on a male taken at West Bay on 7 September 1950. This pup had grown 10 inches in 9 months. The third (brand number 230) was a female taken at Atlas Cove on 21 November 1950. This pup had grown 9 inches in one year. Measurements of os penis, blubber thickness, etc., were taken and parts preserved, and this data will be included in a later report when more branded seals are taken. Details of the seals branded are given in the Appendices.

- (b) Tagging with Barbed Metal Discs. On 19 July 1949 another system of marking was tested which it was hoped might be used on large seals. This method consisted of

thrusting a barbed dart into the blubber to hold a 3" circular metal disc on to the surface of the back. These discs were of tinned steel plate 1/32 inch thick and on each disc a number was marked by a series of small drilled holes.

Two types of barbed dart were tried. In the first type a short length of $\frac{3}{8}$ inch iron rod was beaten flat at one end, and then ground and sharpened to a barbed point. (Diagram III). The other end was then ground and fitted through a hole drilled in the centre of the disc. After hammering it flat, the dart and disc were rivetted firmly together.

The second type of dart was made of two pieces of steel 1/32" thick, cut as shown in Diagram IV, the shafts being soldered together and the barbs beaten out at right angles to each other. Half an inch of the double shaft was left unsoldered, then fitted through a slit in the centre of the disc. The two flaps were then bent over and soldered onto the top of the disc.

For inserting barbed tags, a steel plate of the same diameter as the marking discs was screwed to the end of a wooden pole. From this plate two pins projected $\frac{1}{4}$ " to fit into corresponding holes in the barbed disc. A very heavy grease was used to hold the disc and plate together temporarily. When the barb was plunged into the back of the seal, the pins prevented the disc from slipping, and when the pole was pulled away, the weak joint afforded by the grease was broken, leaving the barbed disc flush with the surface of the skin. (Plates 7, 8 and 9).

Both types of tags were tried on elephant seals and on leopard seals. The first type proved more satisfactory than the second type, which bent over or became unsoldered.

Although the barbed darts were usually well inserted, causing little bleeding and no apparent discomfort to the seals, very few useful results were obtained. One male leopard seal was seen again after three weeks, with the brand still in position, but in other animals the brands had either fallen out or were in the process of doing so. The conclusion is that this type of barb is of no use for seals that roll on their back, as do elephant seals and, to a lesser extent, leopard seals.

(c) Painting. This temporary method was first used during March 1949 in an attempt to ascertain the duration of the moulting period of bull elephant seals. On 16 March eight bulls were marked in different ways with quick-drying yellow lacquer. This was fairly easy, even on large bulls, if they were not awakened during the process.

After a week none of these marked seals could be seen. Either they had gone to sea or the paint had been rubbed off or obliterated. The latter is more likely as elephant seals lie in any position in the mud.

Later during October, when the elephant seal pups were being born, the same system was used to find for how long the pups retained their dark soft fur. Several pups were marked, but we were unable to continue our observations as we had to leave for the other end of the island at that time to count the seals at the spring maximum. However, it appeared that lacquer lasted longer on the very young pups, as they do not roll on their backs as much as do the elder ones.

SUMMARY

Three methods of marking seals were tested, namely hot iron branding, tagging with barbed metal discs, and painting.

Hot iron branding was the most satisfactory method. This was proved by sighting four seals branded with circles after twelve months or more.

Three-figure numbers were applied with hot irons to 275 elephant seal pups.

Barbed metal discs were not considered satisfactory for any seals which roll on their backs.

Painted markings do not last, but may be useful to study growth rate and moulting of young pups.

Hot iron branding with numerals is to be continued in 1950.

REFERENCES

- Liversidge, D., 1950. The Elephant Seal in the Antarctic. Discovery Reports, 2 253.

Matthews, L.H., 1929. The Natural History of the Elephant Seal. Discovery Reports, 1, 235.

Scheffer, V.B., 1950. Experiments in the Marking of Seals and Sea Lions. Special Scientific Report. Wildlife No.4. United States Department of the Interior.

APPENDIX A: RECORD OF ELEPHANT SEALS MARKED.

(i) O Brand.

Locality - near ANARE Station, Atlas Cove.

Date	Brand	Sex	Length	Remarks
25/2/49	O	Female	-	Ten seals branded.
Mar.'49	O	Male	-	Sixteen seals branded.

(ii) L Brand.

Locality - near ANARE Station, Atlas Cove

Date	Brand	Sex	Length	Remarks
7/4/49	L	Male & Female	-	Twenty-two seals branded.

(iii) Numerical Brands.

Locality - near ANARE Station, Atlas Cove.

Date	Brand	Sex	Length	Remarks
15/9/49	00--	Male		Large scarred Bull (trial only)

Date	Brand	Sex	Length	Remarks
15/9/49	1--	Male	9'	Small seal (trial only)
9/11/49	10	Female	4'7"	Pup
8/11/49	12	"	4'6"	
"	13	"	3'11"	
"	14	Male	4'9"	
"	15	Female	4'3"	
"	16	"	4'6"	
"	17	Male	4'2"	
"	18	Female	4'5"	
9/11/49	19	Male	5'2"	
"	20	Female	4'6"	
"	21	Male	5'1"	
"	22	"	5'2"	
"	23	Female	4'4"	
"	24	Male	4'8"	
"	25	Female	4'7"	Seen at Atlas Cove 23/11/50
"	27	Male	4'9"	
"	28	"	5'0"	
"	29	"	4'9"	
"	30	Female	4'4"	
"	31	Male	4'5"	
"	32	Male	4'7"	
"	33	Male(?)	4'4"	

Date	Brand	Sex	Length	Remarks
9/11/49	34	Female	4'8"	Seen at Wharf Point 29/11/50, 25/12/50
"	35	Male	3'11"	
"	36	Female	4'10"	
"	37	Male	4'7"	
"	38	Male	4'11"	
"	39	Female	4'1"	
"	40	Female	4'6"	Seen at Corinthian Bay 25/11/50, Wharf Point 29/11/50, 25/12/50.
"	41	Male	4'5"	
"	42	"	4'7"	
"	43	"	4'7"	
"	44	Female	4'5"	
"	45	"	5'1"	
"	46	"	4'11"	
"	47	Male	4'10"	
"	48	Female	4'2"	
"	49	Female	5'2"	
"	51	Male	4'7"	Seen at Atlas Cove 25/11/50
"		Male	4'4"	Brand upside down.
"	52	"	4'6"	
"	53	Female	4'11"	
"	54	Female	4'8"	

Date	Brand	Sex	Length	Remarks
15/11/49	55	Female	5'0"	
"	57	"	4'7"	
"	58	"	4'7"	
"	59	"	4'1"	
"	60	"	4'2"	
"	61	"	4'0"	
"	62	Male	4'9"	
"	63	"	5'0"	
"	64	"	4'6"	
"	65	"	4'11"	
"	* <u>66</u>	Female	4'5"	
"	67	"	4'3"	
"	68	Male	4'11"	
"	<u>69</u>	Female	4'5"	
"	70	"	4'10"	
"	71	"	4'6"	
"	72	Male	4'8"	
"	73	Female	4'9"	
"	74	Female	4'3"	
"	75	Male	4'4"	
"	76	"	4'9"	
"	77	"	5'2"	

*Where a number could be mistaken for another when inverted a bar has been placed beneath it.

Date	Brand	Sex	Length	Remarks
15/11/49	78	Male	5'2"	
"	79	Female	4'9"	
"	80	"	4'9"	
"	81	"	4'6"	
"	82	Male	4'7"	
"	83	Female	4'10"	
"	84	"	4'9"	
"	85	Male	4'8"	
"	86	Female	4'4"	
"	87	Male	4'6"	
"	88	"	4'7"	
"	89	"	4'6"	
"	90	Female	4'1"	Seen 3/12/49 - brand probably will not last.
"	91	Male	4'6"	
"	92	Female	4'0"	
"	93	Male	4'9"	
"	94	Female	4'2"	
"	97	Male	4'8"	
"	98	Female	4'3"	
"	99	"	4'9"	
"	100	"	4'10"	
"	101	Male	3'10"	

Date	Brand	Sex	Length	Remarks
15/11/49	102	Female	4'1"	
"	103	Male	4'2"	
"	104	Male	4'3"	
"	105	"	4'4"	
"	106	"	4'11"	
"	107	"	4'11"	
"	108	"	4'9"	
22/11/49	109	"	4'7"	
"	110	Female	5'0"	
"	111	Male	5'2"	
"	112	Female	4'5"	
"	113	Male	3'11"	
"	114	Female	4'10"	
"	115	"	4'8"	
"	116	Male	4'1"	
"	117	Female	4'4"	
"	118	"	4'4"	
28/11/49	119	Male	4'3"	
"	202	"	4'9"	
"	120	"	4'9"	
"	121	"	4'5"	
"	122	Female	4'8"	
"	123	"	4'4"	

Date	Brand	Sex	Length	Remarks
29/11/49	124	Female	4'5"	
28/11/49	125	Male	4'4"	
"	126	Male	4'11"	
"	127	"	4'8"	
"	128	"	4'10"	
"	129	Female	4'10"	
"	130	Male	5'2"	
"	131	Male	4'9"	
"	132	Female	4'9"	
"	133	Male	4'9"	
"	134	Female	4'11"	
29/11/49	135	Male	4'7"	
"	136	Female	4'4"	
"	137	Male	5'2"	
"	138	Female	4'2"	
"	139	Female	4'0"	
"	140	Male	4'6"	
"	141	Female	4'7"	
"	142	Male	4'10"	
"	143	Male	4'5"	
"	144	Female	4'2"	
"	145	"	4'5"	
"	146	"	5'0"	

Date	Brand	Sex	Length	Remarks
29/11/49	147	Male	4'11"	
"	148	Female	4'2"	
"	149	"	4'4"	
"	150	Male	4'8"	
"	151	Male	4'3"	
"	152	Female	4'0"	
"	153	Male	4'6"	
"	154	"	4'8"	
"	155	Female	4'8"	
"	156	Male	4'8"	
"	157	Female	4'9"	
"	158	Male	4'2"	
"	159	"	4'9"	Killed at West Bay 7/9/50
"	160	"	5'0"	
"	161	Female	5'1"	Seen at South West Bay 1/12/50.
"	162	Male	4'3"	
"	163	Female	4'5"	
"	164	Male	5'0"	
"	165	Female	4'8"	
"	166	"	4'5"	
"	167	Male	4'9"	
"	168	Female	4'8"	

Date	Brand	Sex	Length	Remarks
29/11/49	169	Female	4'8"	
"	170	"	4'7"	
"	171	"	4'2"	
"	172	"	4'0"	
"	173	"	5'3"	
"	174	Male	4'8"	
"	175	Female	5'0"	
"	176	Male	4'7"	
"	177	Female	4'4"	
"	178	Male	4'0"	
"	179	Male	4'10"	
30/11/49	180	Female	4'8"	
"	181	Male	4'8"	
"	182	Female	3'6"	
"	183	Male	4'3"	
"	184	Male	4'7"	
"	185	Female	4'7"	
"	186	Male	4'7"	
"	187	Male	4'5"	
"	188	Male	4'4"	
"	189	"	4'6"	
"	190	"	5'2"	
"	191	"	4'6"	

Date	Brand	Sex	Length	Remarks
30/11/49	192	Male	4'9"	
"	193	"	4'10"	
"	194	"	4'9"	
"	195	"	4'10"	
"	196	Female	4'6"	
"	197	Male	4'5"	
"	198	"	5'0"	
"	199	"	5'0"	
"	200	"	5'0"	
3/12/49	201	"	4'7"	Seen at Baudissen Moraine 27/11/50, 12/12/50.
28/11/49	202	"	4'9"	
3/12/49	<u>202</u>	"	4'4"	
"	203	Female	4'4"	
"	204	"	5'0"	
"	205	Male	4'11"	
"	206	Female	5'1"	
"	207	Male	5'1"	
"	208	Female	4'4"	
"	209	"	4'5"	
"	210	"	5'0"	
"	211	Male	4'5"	
"	212	Female	4'2"	

Date	Brand	Sex	Length	Remarks
3/12/49	213	Female	4'11"	
"	214	Female	4'4"	Seen at Vahsel Moraine 1/12/50.
"	215	Male	5'0"	
"	216	Female	4'2"	
"	217	Male	4'11"	
"	218	Female	4'11"	
"	219	Male	4'9"	
"	220	Female	5'1"	
"	221	"	4'10"	
"	222	"	4'7"	
"	223	Male	4'6"	
"	224	"	4'11"	
"	225	Female	4'3"	
"	226	"	4'6"	
"	227	Male	4'7"	
"	228	Female	4'6"	
"	229	Male	4'4"	
"	230	Female	4'9"	Killed at Atlas Cove 20/11/50
"	231	"	4'8"	
"	232	"	4'6"	Seen at Vahsel Moraine 11/12/50.
"	233	Male	4'4"	

Date	Brand	Sex	Length	Remarks
3/12/49	234	Female	4'9"	
"	235	Male	4'4"	
"	236	Female	4'9"	
"	237	Male	4'3"	
"	238	Female	4'2"	
"	239	Female	4'8"	
"	240	Male	4'8"	
8/12/49	241	Male	5'0"	
"	242	"	4'9"	Killed at Wharf Point 22/5/50.
"	243	"	5'0"	
"	244	Female	4'9"	
"	245	Male	4'8"	
"	246	Female	4'9"	
"	247	Male	5'5"	
"	248	"	5'0"	Seen at Atlas Cove 24/12/50, Wharf Point 25/12/50.
"	249	"	4'3"	
"	250	"	4'5"	
"	251	"	5'2"	
"	252	"	4'8"	
"	253	"	4'11"	
"	254	Female	4'8"	
"	255	"	4'8"	
"	256	"	4'11"	

Date	Brand	Sex	Length	Remarks
8/12/49	257	Male	5'9"	
"	258	"	4'11"	
"	259	Female	5'0"	
"	260	"	4'7"	
"	261	Male	5'3"	
"	262	Female	4'8"	
"	263	"	4'11"	
"	264	Male	4'5"	
"	265	Male	4'9"	Seen at Corinthian Bay 25/12/50.
"	266	"	4'9"	
"	267	"	4'9"	
"	268	"	4'9"	
"	269	Female	4'9"	
"	270	Male	5'1"	
"	271	Female	5'6"	
"	272	"	5'0"	
"	273	Male	5'6"	Seen at Corinthian Bay 27/11/50, 25/12/50.
"	274	Female	5'1"	
"	275	Male	4'11"	
"	276	"	5'0"	
"	277	Female	4'7"	
"	278	Male	5'0"	

Date	Brand	Sex	Length	Remarks
8/12/49	279	Male	5'0"	
"	280	"	4'10"	
"	281	"	5'3"	
"	282	Female	4'11"	
"	283	Male	5'0"	
"	284	"	4'10"	

Date	Brand	Sex	Locality	Remarks
8/9/49	H1	Male	Corinthian Bay	Large
7/9/49	B2	Male	Atlas Cove Beach	Large scarred
13/9/49	B5	Male	Atlas Cove Hummocks	Large Bull
8/9/49	B8	"	West Bay Beach	Large Bull
5/9/49	B9	"	Atlas Cove "	Large scarred
8/9/49	B0	"	West Bay "	Large Bull
8/9/49	C1	"	S.W. Bay "	" "
8/9/49	C2	"	Corinthian Bay	Not well inserted
13/9/49	C3	"	Atlas Cove	Large Bull
8/9/49	C4	"	S.W. Bay Beach	" "
1/10/49	C7	"	West Bay	Harem Bull (70 cows)
15/9/49	C9	"	Atlas Cove Hummocks	Large Bull
13/9/49	D1	"	" "	" "

Date	Brand	Sex	Locality	Remarks
13/9/49	D0	Male	Atlas Cove Hummocks	Large Bull
"	E1	"	" "	" "
15/9/49	E2	"	" "	" "

APPENDIX B : RECORD OF LEOPARD SEALS MARKED.

These seals were all branded with barbed discs in the vicinity of the A.N.A.R.E. Station at Atlas Cove.

Date	Brand	Sex	Remarks
19/7/49	A3	Female	Large
"	A5	"	"
"	A9	Male	Medium sized
2/9/49	B3	Female	Medium-young
"	B4	Male	Medium
"	B6	"	Large
"	B7	Female	Large
"	C3	"	"
"	C5	"	"



PLATE 1. The authors using a shielded blow-lamp to heat an "O" type branding iron.

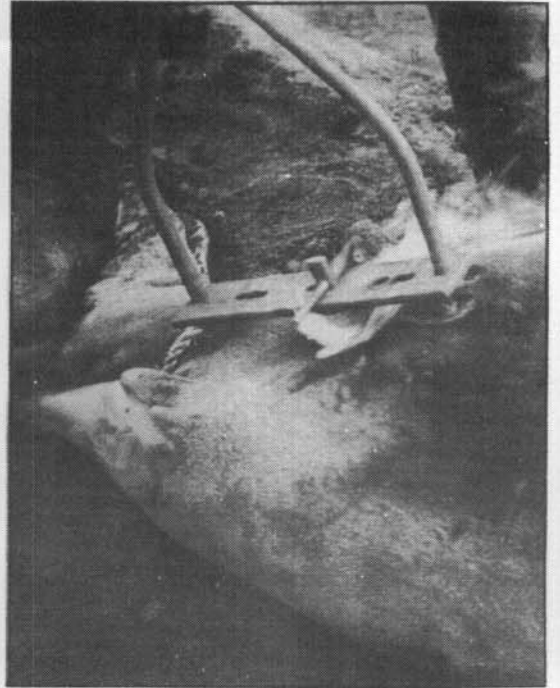


PLATE 2. Marking a sea-elephant pup with a numerical brand.



PLATE 3. Mobile coke forge for heating branding irons.

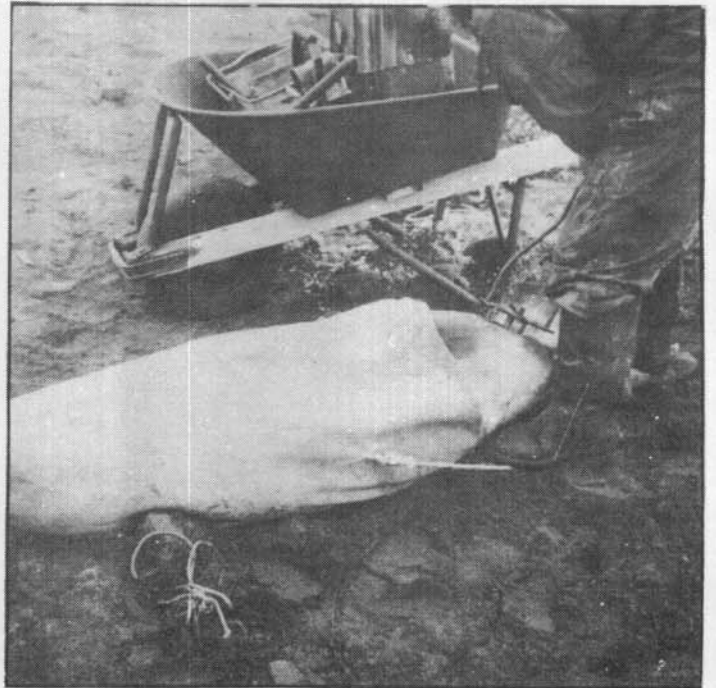
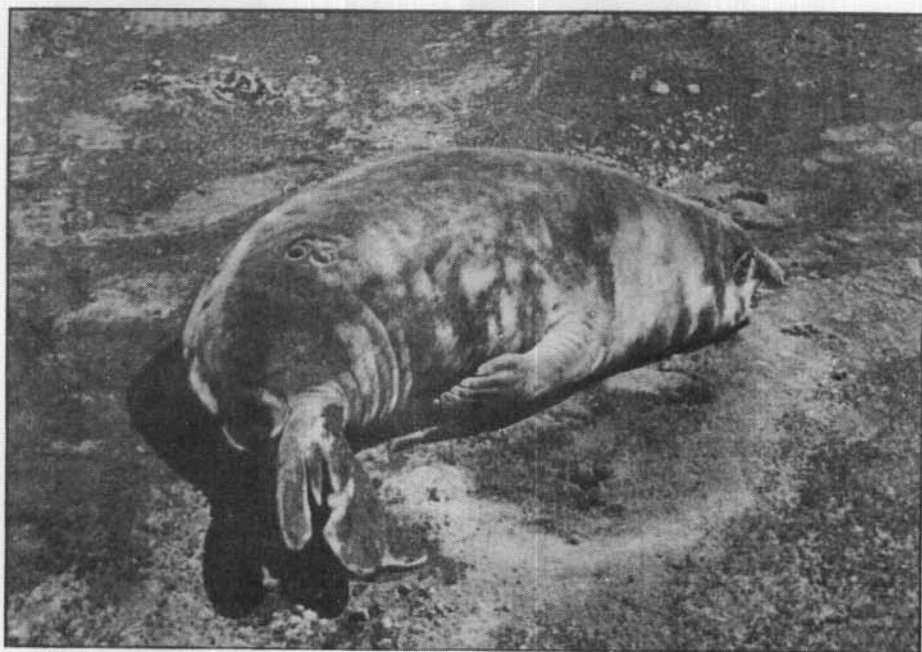
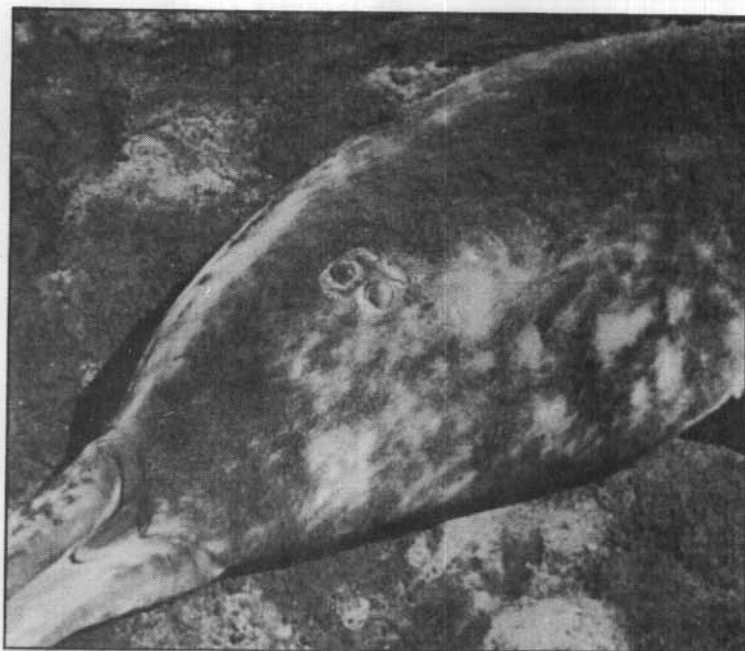


PLATE 4. Method of holding seal pup during branding.



PLATES 5 and 6 Appearance of successful numerical brand immediately after marking.

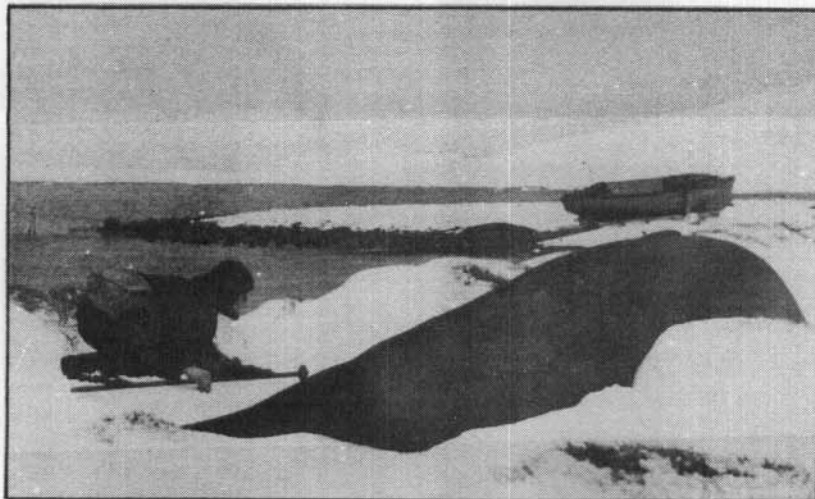


PLATE 7.



PLATE 8.

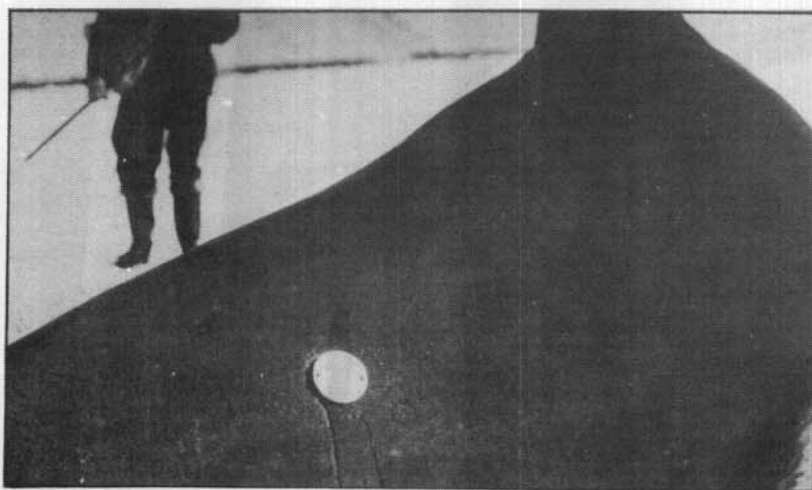
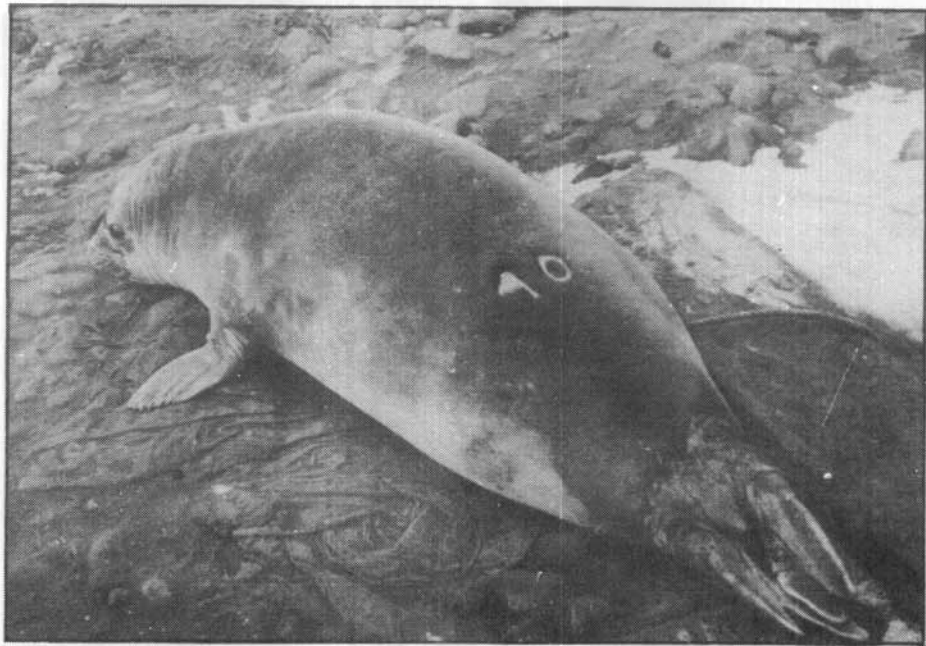
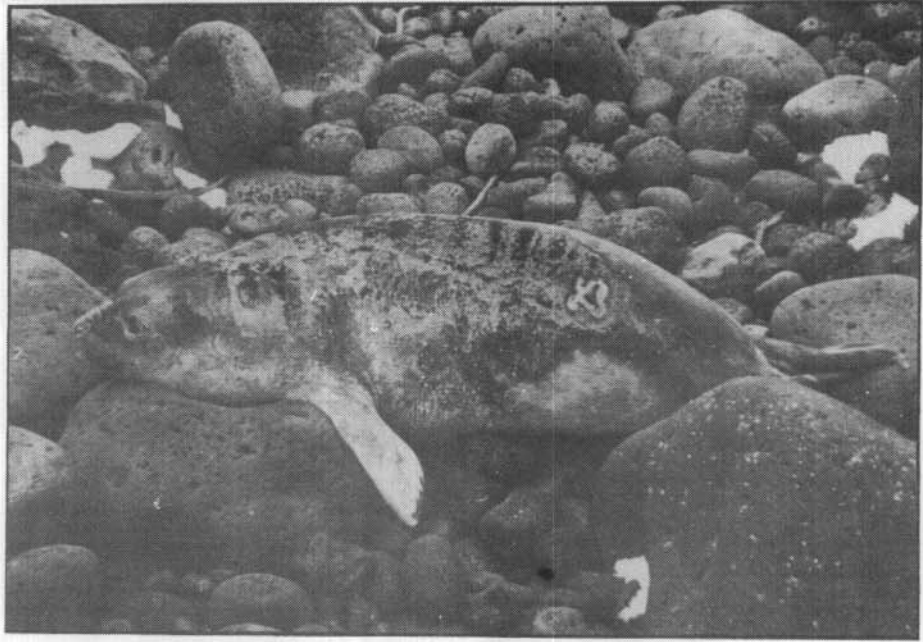
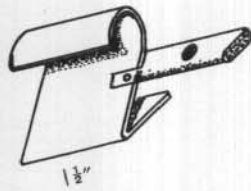
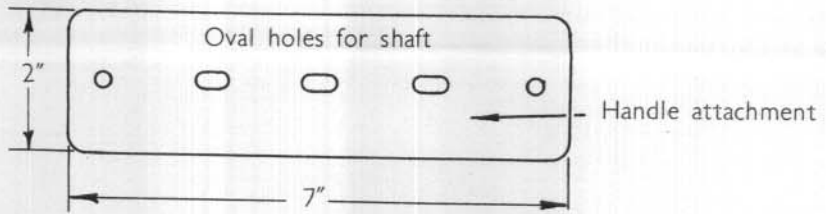


PLATE 9.

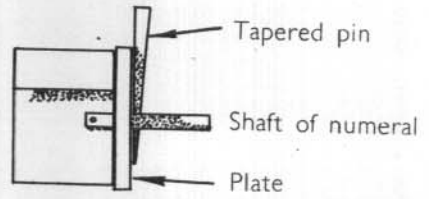
PLATES 7 to 9 Tagging with barbed metal discs.



PLATES 10 and 11 Branded seals seen one year after marking.



Numeral '2' With Shaft



Section Showing '2' Fitted

DIAGRAM I

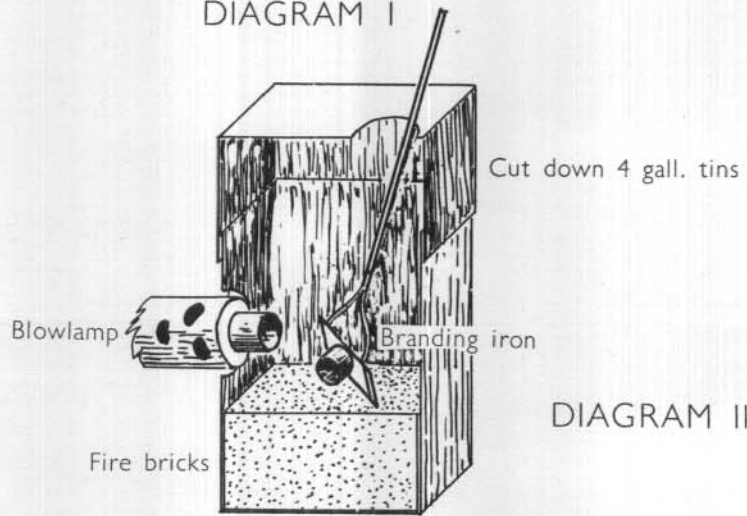


DIAGRAM II

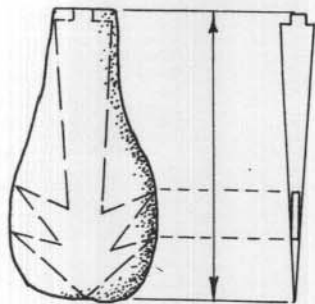


DIAGRAM III

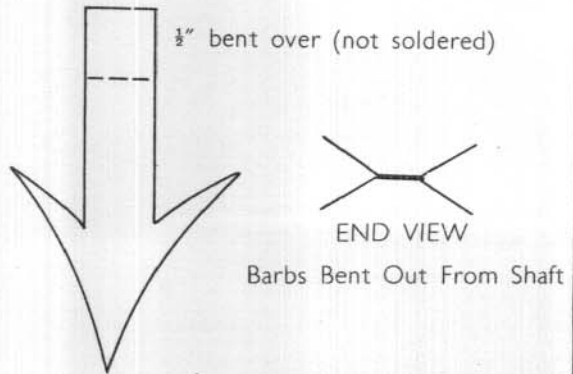


DIAGRAM IV

