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TD 1665

BLUE WHITING - APRIL/MAY 1982 VOYAGE PART II, 27 APRIL-18 MAY - FRV G A REAY CRUISE 5/82

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ABSTRACT

The programme and results are reported from cruise 5/82 for blue whiting, blue ling and silver smelt. The programme was modified to conclude the blue whiting programme following the curtailment of cruise 4/82 for operational reasons.

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REPORT

Blue whiting supplies for experimental processing ashore

The FRV G A Reay sailed from Aberdeen at 1400 h, Tuesday 27 April with 4 double-skin plastic bins for chilled sea water stowage of fish (0.75 tonne) and the tapered roller grader installed on the process deck, and steamed to the west side. The ship was forced to shelter from severe gale force winds. The weather abated on 29 April enough to steam off to the grounds and stretch the new warps which had been installed in port. No signal emitted from the headline transducer. The gear was hauled and the fault traced and repaired. Unfortunately bad weather had again set in and, eventually, the ship sheltered in the Minch, 2 miles off Rubha na Greine, near Stornoway in gale force winds reaching force 10 locally. With no prospect of fishing the G A Reay docked at Stornoway, 1600 h, Tuesday 4 May for a staff change. G P Hill left the ship and J G M Smith joined.

The following day, the weather abated sufficiently to steam for the grounds. Fish were located on Thursday about 60 miles west of the Butt of Lewis (Haul 1). Details of the hauls are given in the trawl log (Table 1). The fishing locations are shown in Figure 1. Most of the catch was stowed chilled in the csw tanks and the remainder stowed in ice in boxes. The fish were landed, Friday, 7 May at Lerwick (18 h after catching) to supply the process line at Scalloway. There was evidence of stratification in the csw tanks and the contents were tipped into shore tanks at the factory.

A full complement of 10 containers was loaded aboard, including larger ones borrowed from the factory for a bulk consignment for Iceatlantic to test the animal food market. The larger containers are used by Iceatlantic to handle sand eels for mink food. The G A Reay returned to the grounds immediately searching further to the north.

Good marks were located about 70 miles west of Foula (Hauls 3 and 4). The former supplied the bulk fish requirements, the latter supplied the csw stowed fish. Ice was applied to the top of the larger containers since the ambient temperature was high. The melt water was drained off from time to time. Haul 4 provided much larger fish (modal length, 31 cm). Details of the length distribution in the various hauls are shown in Figure 2. In the same area, a powered dory lost from a Scandinavian purse seiner was picked up and taken on board for salvage.

The catch was landed (10.5.82) at Lerwick (24 h after catching) to supply the processing line at Scalloway. All the scientific staff assisted ashore with the processing line. A trade demonstration was held in the factory on Tuesday evening for local processors and radio during which the process line was operated continuously and an array of products shown.

During the following 2 days (12-13 May) the process lines and support services were dismantled and transferred and installed on the G A Reay in Lerwick. The mobile laboratory was returned to Aberdeen by ferry.

Process line installed on board

The process line was installed on board mainly to test the performance and efficiency of the Baader 34 filleting machine on freshly caught, pre-rigor, post-spawning fish compared with fish stored in ice and chilled sea water for periods up to 48 h. The layout of the processing deck is shown in Figure 3.

INTRODUCTION

An experimental processing line for blue whiting was installed at the Iceatlantic factory, Scalloway, Shetland, with financial support from the Shetland Islands Council and the support of the local processor's and fishermen's associations. Fish supplies were to be provided by the G A Reay.

Mechanical difficulties with a main generator bearing, which came to light during the repair of a fuel line, forced curtailment of cruise 4/82 (See TD 1655) and the ship returned to Aberdeen for repair. Cruise 5/82 was hurriedly rescheduled to allow completion of the programme to supply blue whiting for the experimental processing line.

PROGRAMME

Cruise 4/82 was terminated early in Aberdeen on 17.4.82 to replace the main generator bearing and repair the shaft. The prepared programme for cruise 5/82 was altered to complete the programme on blue whiting of 4/82 in support of the experimental processing project in Scalloway, Shetland, and to carry out as much as possible of the work originally planned for 5/82.

(i) To land at Lerwick on at least 2 occasions, four chilled sea water (csw) containers filled with blue whiting caught less than 24 h earlier if possible, to supply the experimental processing line ashore at Scalloway

(ii) One landing to discharge bulk filled containers in addition to (i) to supply a sample quantity for freezing ashore at the Iceatlantic factory in Scalloway

(iii) To measure length distributions as a guide to processing ashore.

(iv) To install the experimental process line machinery aboard the ship in Lerwick and continue with shipboard processing to examine the behaviour of very fresh fish.

(v) To obtain supplies of silver smelt (Argentina silus and A. sphyraena) gutted and ungutted, stowed in ice and frozen on catching.

(vi) To obtain supplies of blue ling (Molva dypterygia) gutted, stowed in ice and frozen on catching.

STAFF

G P Hill	27 April – 5 May	Chief Scientist
J G M Smith	4 – 10 May	Chief Scientist
A Hume	12 – 18 May	
K J Whittle	13 – 18 May	Chief Scientist
W A Johnston I McDonald	13 – 18 May	

Machine filleting

Previous trials showed that the efficiency of the Baader 34 was best when set for fish lengths between 270 and 290 mm or 290 to 330 mm. Thus, a pair of machines in a process line could each be set to deal with a respective narrow size range to cover together the entire range of size in the population. A wide spread of size eg 270-340 mm gave rise to problems, particularly at the heading stage. Adjustments cannot be made at the heading or filleting stage in order to cope automatically with such a size range. The machine was set to fillet the average length of 280-300 mm expected to make up the bulk of the fish caught. Modifications of the Baader 34 to fillet blue whiting will be detailed in the report on the Scalloway project. During the Scalloway operation it was making a reasonably good job of both block and single fillets. It was also encouraging that the machine did produce fillets from the very thin fish within the size range 280-300 mm.

Trials at sea

The G A Reay sailed from Lerwick, 1900 h, 13.5.82, for the grounds west of Foula. The programme for on-board processing of blue whiting occupied 14-16 May. The best fishing was Haul 5, a few miles southwest of the position of Hayl 4, some 5 days earlier. In the following 2 days the marks rapidly became more scattered until only traces were seen on the echosounder. Searching further north to 60°40' N 03°00' W revealed no good concentrations.

The blue whiting catches were graded mechanically at a rate of about 4 tonnes/h into 3 grades, small, medium and large. For example: Haul 5 graded 25:14:1 respectively, the medium grade being nominally 27-33 cm; Haul 6 graded 1:34:13 respectively. The fish were processed into frozen laminated fillet and frozen mince blocks (each 7.5 kg) for assessment later at the laboratory.

Initially, lively fish from Haul 5 (a short tow of 30 min) were machined. The machine would not handle them. The fish were very slippery. Settings were adjusted. Eventually, acceptable block fillets were produced but pieces of backbone were left at the tail of the fillets. Alterations need to be made to the guides over the first pair of double knives to improve the separation of the backbone at that point.

The machine was changed to the single fillet mode and pre- and in-rigor fish were tried. The results were not as good as those using post-rigor fish. Much more back finbone was left on the fillets. The problem originated during transfer of fish from the heading stage to the filleting stage. The fish were not lined up with the back fin in the centre. Previously, there was always a slight problem with back finbone being left in one fillet even with 2-3 day old fish. The problem was exacerbated with fresh fish. Modification of the guides at the beginning of the filleting stage would probably reduce the problem. In fact, an improvement resulted when the last pair of double blades that separate the fillet were opened out from 8 mm to 9 mm. The machine will be modified before it is taken to sea again in November. Various other tests were made with fish stowed in csw at various controlled temperatures for periods up to 21 h. The best results were obtained with fish that had been controlled at 0°C for about 18 h. However, it was encouraging that the machine was able to handle the fresh post-spawning fish at all.

The fish tended to be soft. Attempts were made to reduce the muscle pH of small batches of fish at chill temperatures using dilute acid solutions over the range pH 2 to pH 6.5 with up to 24 h exposure. Earlier work is described in TD 693. At low pH the fish showed obvious signs of denaturation. At pH 6.5 this was avoided but there was no obvious sign of improvement in firmness or filleting efficiency. However, not all the possible approaches to this problem could be investigated.

The Baader mince was very gelatinous and sticky in the presence of sea water. This effect could be lessened by reducing the sea water adhering to the belt after the spray washer. Salt water was still picked up at the filleting machine. A number of configurations of the modified Baader 694 were tested, including orientation of the fillets, cleaning and washing of the belt. More efficient cleaning, washing and orientation gave the cleanest looking minces.

Fillets allowed to go into rigor in chilled fresh water showed a marked improvement in whiteness and froze at a higher temperature than untreated fillets. Pre-rigor fillets treated in chilled sea water did not show the whitening effect but had a soft, glistening, gelatinous appearance.

Bottom fishing - blue ling and silver smelt

Throughout the blue whiting fishing, silver smelt (A. silus) were included in the catch. On Sunday evening (16.5.82) the gear was changed to a high headline, bottom trawl (Table 1). In the remaining time Hauls 8 and 9 in deeper water (300 fthm) west of Foula, yielded a variety of fish (Table 1) including sufficient blue ling and silver smelt (A. silus) to carry out a much reduced programme. Fish were frozen or stowed gutted or ungutted in ice to continue examination of spoilage changes in the laboratory. The skinning trials conducted with silver smelt were not entirely satisfactory.

The G A Reay docked in Aberdeen at 2000 h, 19.5.82.

Table 1. Trawl Log

Date	Shoot haul h	Haul no	Latitude	Longitude	Towing Course 0-360°	Depth Bot fthm	Depth Fish fthm	Type of Gear	Warp lengths	Wind Direction 0-360°	Bar Press m bars	Ekts Fish	Remarks
6.5.82	1400 1500	1	58°35' N 58°38' N	08°20' W 08°18' W	050	180	175-180	Pelagic*	20	200	1019	70	Blue whiting, max 30 cm some silver smelt (A. silus)
8.5.82	1400 1420	2	60°30' N 60°31' N	06°15' W 06°10' W	050	200	130	"			1022	-	Hatchet fish and euphausids no blue whiting
8.5.82	2010 2140	3	60°10' N 60°14' N	04°25' W 04°15' W	050	190	185-190	"	21	variable	1021	150	Blue whiting, max 28 cm some silver smelt and squid
9.5.82	0900 1000	4	60°12' N 60°15' N	04°28' W 04°17' W	050	200	190-200	*	21	variable	1016	50	Blue whiting, max 31 cm
14.5.82	0900 1000	5	60°06' N 60°08' N	04°42' W 04°37' W	050	200	190-200	*	21	180	1029	120	Blue whiting, max 28 cm some silver smelt. Dense marks
15.5.82	1400 1515	6	60°08' N 60°13'NN	04°28' W 04°24' W	050	200	190-200	*	21	variable	1020	50	Blue whiting max 32 cm some pre-spawning, some silver smelt, scattered marks
16.5.82	1000 1100	7	60°11' N 60°13' N	04°27' W 04°20' W	050	200	190-200	*	21	180	1010	3	Blue whiting, faint traces Some silver smelt. One deal fish, lantern fish
17.5.82	0900 1130	8	60°08' N 60°03' N	04°47' W 05°01' W	230	300		Bottom⁄	33	180	1012	15	5 bkt silver smelt, 5 bkt blue ling 2 bkt blue whiging, assorted redfish, tusk, ratfish
	1400 1630	9	60°01' N 60°08' N	05°05' W 04°48' W	050	300		⁄	33	180	1016	10	2 bkt silver smelt, 3 bkt blue ling 5 bkt blue whiting, assorted redfish, tusk, ratfish
	1850 1900	10	60°05' N 60°01' N	04°28' W 04°33' W	220	95		⁄	12	110	1017	8	Mixed coley, cod, haddock, Blue whiting

* 1600 Engels pelagic trawl

⁄ Portuguese high lift, high headline bottom trawl

Figure 1. Trawl Positions (see Table 1 for details)

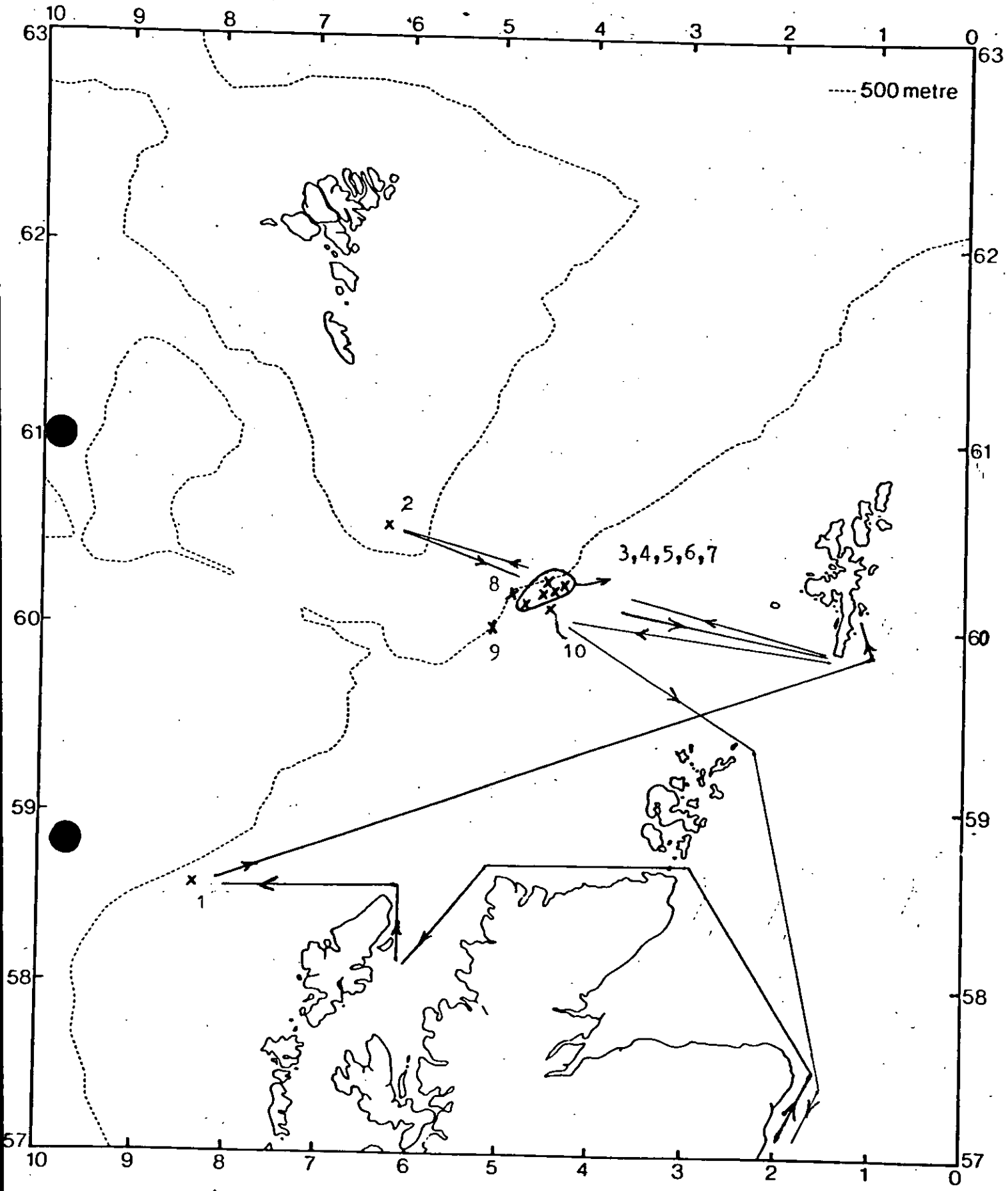
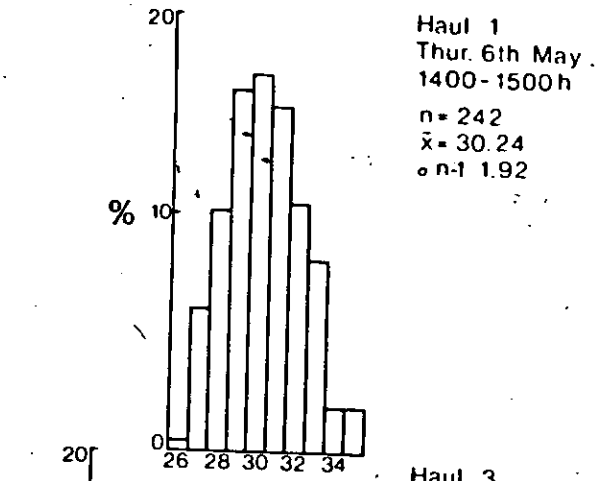
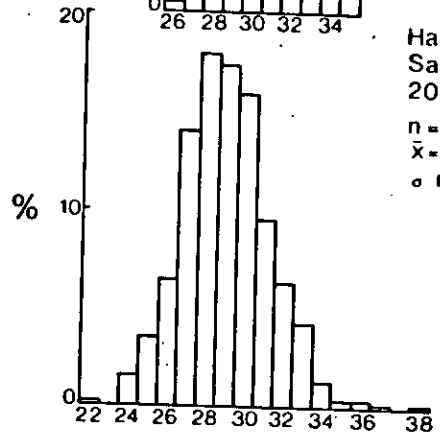
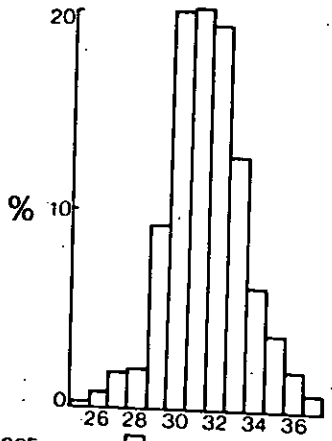
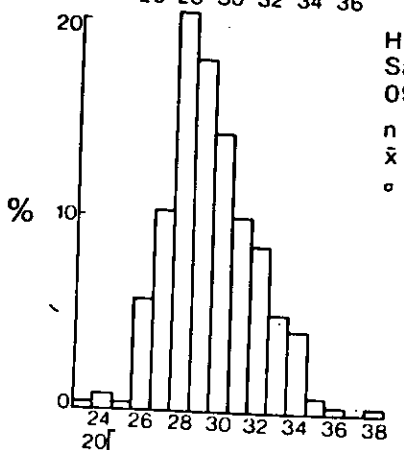


Figure 2


Haul 1
Thur. 6th May
1400-1500h
n = 242
x̄ = 30.24
σ n-1 1.92
%
20
10
0
26 28 30 32 34


Haul 3.
Sat. 8th May
2010-2140h
n = 447
x̄ = 28.98
σ n-1 = 2.3
%
20
10
0
22 24 26 28 30 32 34 36 38


Haul 4.
Sun. 9th May
0900-1000h
n = 394
x̄ = 31.37
σ n-1 = 1.97
%
20
10
0
26 28 30 32 34 36


Haul 5.
Sat. 14th May
0915-1000h
n = 259
x̄ = 29.45
σ n-1 = 2.3
%
20
10
0
24 26 28 30 32 34 36 38

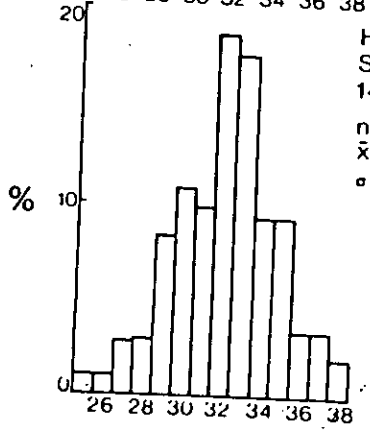

Haul 6.
Sat. 15th May
1400-1515h
n = 204
x̄ = 32.13
σ n-1 = 2.59
%
20
10
0
26 28 30 32 34 36 38

Figure 3

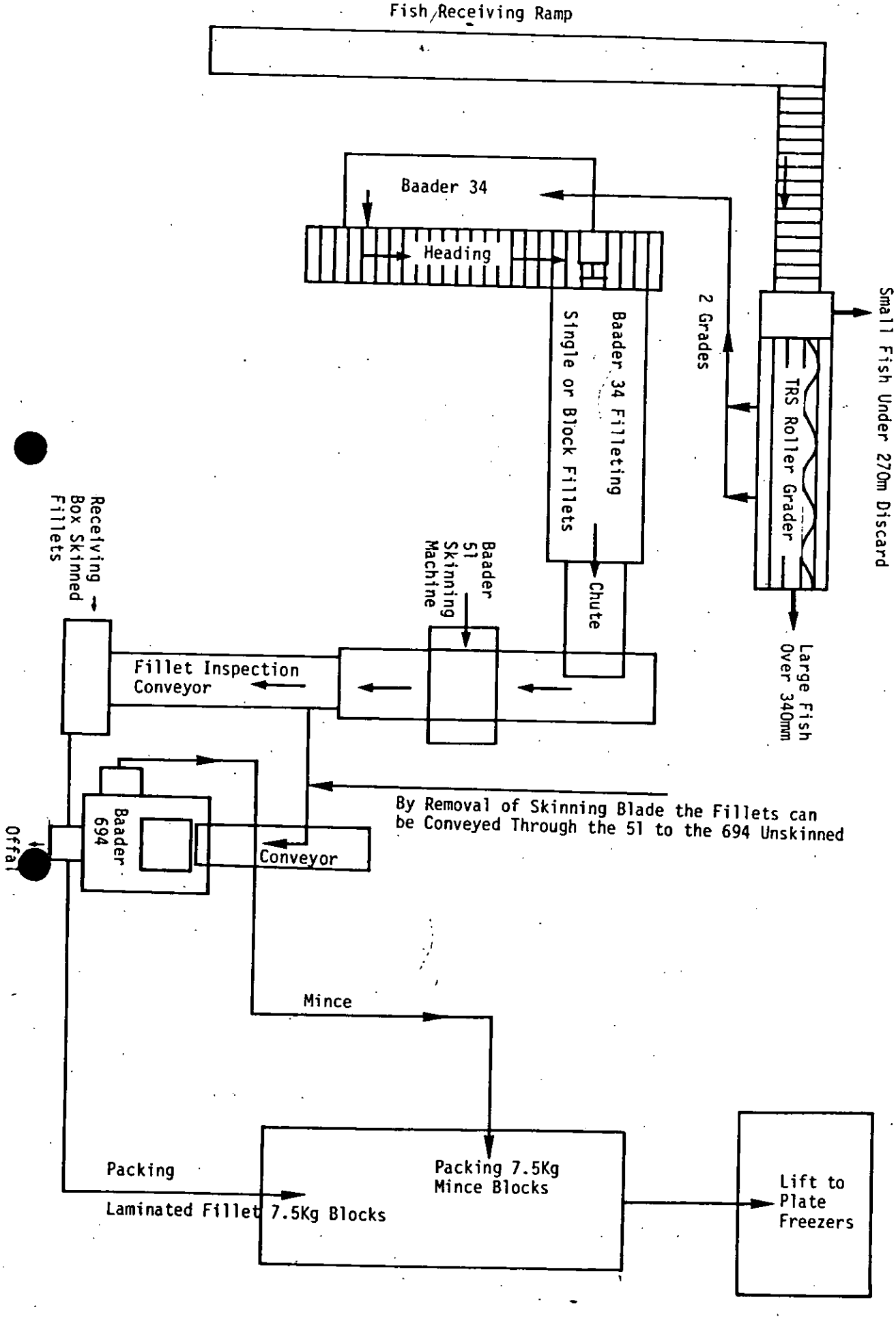


FIGURE 3.
PROCESSING, FACTORY DECK LAYOUT OF G. A. REAY.