
NOTES
ON
THE ABERDEEN TRAWLING INDUSTRY
WITH AN INTRODUCTION TO THE
ABERDEEN TRAWL AND LINE STATISTICS, 1901-1903,
BY
D'ARCY WENTWORTH THOMPSON.

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NOTES

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BY

D'ARCY WENTWORTH THOMPSON.

The method of fishing with a trawl appears to have been first introduced to this coast in the year 1872 by Mr. D. B. Walker, then of Johnshaven and subsequently of Aberdeen, who had purchased a Plymouth smack with her beam trawl equipment. To-day (1904), excluding Herring and the few other fish that are caught by net, 70 per cent. of all the fish landed in Scotland is obtained by means of the trawl, and 60 per cent. of all the fish landed in Scotland comes into the Port of Aberdeen. In 1874 Mr. Walker made his first landing at Aberdeen amid demonstrations of popular hostility. In the month of March, 1882, steam trawling was commenced at Aberdeen, about two years after its first beginning in the north of England. The first Aberdeen steam trawler was the *Toiler*,* an old wooden tug boat, built upon the Tyne, and the *North Star*, an iron vessel, launched in 1883, was the first trawler built in Aberdeen. Since that time the growth of the industry has been continuous and rapid. In November, 1895, two Aberdeen vessels were fitted out with the Otter trawl, on the system known as the Scott-Rippon patent, and by 1897 the beam trawl had been entirely discarded.

In the early days of trawl fishing the work was confined to grounds at no great distance from the port, and was carried on only in comparatively shallow water and on smooth sandy or muddy bottoms. The introduction of the Otter trawl rendered work possible, by its greater ease of management, at much greater depths than before, and had practically the effect of opening up to the trawler the whole region of the sea between 50 and 100 fathoms depth, or, roughly speaking, all the sea (apart from the coast regions) from just north of Aberdeen to a considerable way beyond the Shetlands. Of late years enterprise has opened up still more distant fishing grounds, such as Iceland, Faeroe, and others to be afterwards discussed. And, furthermore, work is no longer confined to the sandy and muddy bottoms, where alone it was practicable at first; but with the heavy boats now used, a comparatively small sized trawl and a large "bosomed" ground-rope, boats are able to fish on hard and rock-strewn bottoms that in former days were carefully left alone. It follows from this that a comparison of the present catch with that of former years is rendered difficult in many ways, and that, even in the case of the nearer and older fishing grounds, conditions have so changed that comparisons must be made with caution and reserve.

* Priority has also been claimed for an earlier steamer called the *Deacon*, with which both trawling and line-fishing were attempted but without success.

The following preliminary Table, compiled from the General Reports of the Fishery Board for Scotland, shows for the last thirteen years the number and estimated value of Steam-trawlers working (1) from Aberdeen and (2) from all Scottish ports.

TABLE SHEWING THE NUMBER AND VALUE OF STEAM TRAWLERS EMPLOYED FROM ABERDEEN AND IN ALL SCOTLAND.

Year.	Aberdeen.		Scotland.	
	Number.	Value.	Number.	Value.
1892	86	£ 229,684	118	£ 316,234
1893	75	219,404	111	329,104
1894	80	228,970	115	334,670
1895	76	239,300	112	349,800
1896	72	214,870	109	326,870
1897	77	238,170	117	359,140
1898	94	291,270	149	491,440
1899	129	470,500	207	783,440
1900	148	585,100	232	938,740
1901	179	746,585	256	1,060,205
1902	198	876,825	275	1,185,825
1903	198	892,490	280	1,216,423
1904	178	743,600	270	1,102,350

The next Table, also extracted from the Reports of the Fishery Board for Scotland but giving more detailed statistics in the case of the flat fish, shows how vastly the supply of trawled fish has increased at Aberdeen since the year 1889. The total quantity landed has increased ninefold in 15 years; it has rather more than doubled every five years. It is of great interest to see how different has been the rate of progressive increase for the different kinds of fish. The supply of round fish is 14 times as great as in 1889, while that of flat fish has little more than doubled. Halibut and Ling at the beginning of the period were caught by the trawl in insignificant quantities: the yield of 1889 is now multiplied by nearly 400 in the case of Halibut and by about 150 in the case of Ling. Cod and Saithe have each increased about fortyfold, Haddock about ninefold. Of Whiting, which, however, was of little account and largely wasted in the earlier years, 180 times as much is now brought to market as in 1889. On the other hand, the supply of Turbot has scarcely held its own, that of Plaice has fluctuated with no steady increase, and that of Lemon Sole has only grown to half as much again; but Whitches and Megrims, that at the beginning of our period were only beginning to be an important factor in the market supply, have increased twelvefold, though as will be afterwards mentioned their increase has been checked during the last three years.

TRAWLED FISH LANDED AT ABERDEEN, IN CWTS., 1889-1904.

Year.	Cod.	Ling.	Saithe.	Haddock.	Whiting.	Eel.	Total Round Fish.	Turbot.	Halibut.	Lemon Sole.	Brill.	Plaice and Dabs.	Whitches and Megrims.	Total Flat Fish.	Skate.	Various.	Total Trawled Fish.	Number of Shots Landed.	
1889	...	7,946	247	1,118	69,253	477	17	79,058	3,760	23	9,750	...	28,676*	...	42,209	920	15,006	137,193	...
1890	...	10,635	678	1,607	83,439	1,391	62	97,812	2,747	23	11,922	525	27,964	2,620	49,008	1,630	23,932	172,382	...
1891	...	13,622	988	1,359	101,834	823	31	118,657	3,024	14	13,592.5	213	31,359	4,158	52,361	3,733	24,237	198,988	...
1892	...	20,779	2,023	1,351	141,341	2,218	34	167,809	2,480	66	18,355	171	26,297	3,647	51,016	1,923	24,854	245,602	...
1893	...	28,006	3,629	2,379	176,264	3,845	14	214,137	2,527	542	12,833	67	32,089	4,633	52,691	1,593	22,457	290,878	...
1894	...	46,118	3,280	1,322	185,303	2,193	61	238,277	1,634	624	13,477	237	35,006	4,118	55,096	1,541	13,397	308,311	...
1895	...	53,486	4,107	1,281	223,373	2,953	85	285,285	2,095	818	15,424	275	35,304	3,774	37,690	2,838	10,599	356,412	5,205
1896	...	77,450	6,459	1,387	207,561	3,120	112	296,089	3,668	814	14,882	485	38,001	5,186	63,036	4,099	10,462	373,686	5,543
1897	...	94,380	5,036	3,621	262,945	5,971	78	372,031	3,301	1,261	10,197	262	27,040	6,436	48,497	5,251	10,095	435,874	5,788
1898	...	120,464	9,121	5,669	344,545	9,631	53	489,483	4,269	1,496	13,027	300	24,867	9,593	53,552	8,167	17,514	568,716	6,758
1899	...	116,622	21,908	7,266	416,023	18,579	84	579,672	3,821	2,511	15,525	226	24,912	21,746	68,741	12,380	26,714	687,507	7,522
1900	...	120,984	33,472	14,443	459,267	30,723	72	658,961	3,133	4,475	12,243	402	23,642	36,383	80,278	16,409	30,800	786,448	7,132
1901	...	148,134	41,704	21,576	549,573	71,623	84	832,694	3,007	5,921	13,250	506	23,518	52,741	98,943	21,541	37,452	990,630	8,390
1902	...	187,418	36,946	27,726	600,820	95,126	99	948,135	3,362	6,315	15,603	438	27,755	36,359	89,832	23,232	43,200	1,104,399	8,951
1903	...	233,260	36,094	35,397	644,861	74,379	320	1,025,680	3,672	6,939	16,419	594	41,763	29,664	99,051	29,508	46,979	1,199,849	9,423
1904	...	290,403	37,961	46,606	629,228	88,329	205	1,092,732	3,517	8,968	14,861	498	39,971	33,512	101,327	31,094	44,501	1,279,656	8,726

NOTE.—In 1889 Brill, Whitches and Megrims are included under *Plaice*.

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For the years from 1897 onwards, Plaice, Dabs, Whitches and Megrims are further discriminated in the following supplementary Table* :—

	Year.	Plaice.	Dabs.	Whitches.	Megrims.
1897	25,858	1,182	4,932	1,504
1898	23,484	1,383	6,074	3,519
1899	22,741	2,171	12,569	9,177
1900	20,964	2,678	24,343	12,040
1901	21,522	1,996	35,507	17,234
1902	26,150	1,605	24,499	11,860
1903	39,667	2,096	18,214	11,450
1904	38,172	1,799	23,312	10,200

A record of the number of shots landed, or voyages made, since 1895 (furnished by Mr. James Ingram, Fishery Officer in Aberdeen) enables us to compare, for 10 out of the 16 years covered by the former Table, the average quantities landed per voyage. It will be seen that the total produce of a voyage is now about double what it was in 1895; that the yield of round fish has about doubled on the average, but that that of flat fish is unchanged. The comparison is not a complete or satisfactory one, for we do not know the difference in the average length of the voyage, still less in the actual time spent in fishing, from one year to another. The average duration of the voyage is doubtless considerably greater, and so also is the time spent in fishing, though the latter has probably changed less than has the whole length of the voyage.

Of the separate kinds of fish Plaice and Lemon Sole are the only ones that show a diminution. In the case of Lemon Sole no significant diminution has taken place since 1897, but the years 1895 and 1896 gave better returns than any of the following. In the case of Plaice the falling off was steady for many years until about 1900 the average return per trip was less than half that of 1895, but since then there has been a partial recovery. Turbot has kept fairly steady. In the case of all those fish that come principally from deep water and from distant grounds the average catch per trip has increased greatly.

To this Table I am able to add, by Mr. Ingram's help, the average value of the catch per voyage and the average value per hundredweight of the fish landed. It is not our purpose to deal in this Report with the question of commercial profit and loss, but these figures are sufficiently striking to deserve brief mention here, even though a further analysis would be requisite to show their full meaning and value.

* Cf. Fulton, Twentieth Ann. Rep., S.F.B., Pt. III., p. 85, 1902.

AVERAGE CATCH PER TRIP, IN CWTS., ABERDEEN TRAWLERS, 1895-1904.

	Cod.	Ling.	Saithe.	Had-dock.	Whit-ing.	Eel.	Total Round Fish.	Tur-bot.	Hali-but.	Lem on Sole.	Brill.	Plaice and Dabs.	Whitches and Megrims.	Total Flat Fish.	Skate.	Various.	Total Trawled Fish.	Average Value of Catch in £.	Average Price per cwt. in Shillings.		
1895...	10.3	0.8	0.25	42.9	0.6	0.02	54.8	0.4	0.16	3.0	0.05	6.8	0.7	11.1	0.5	2.0	68.5	42.1	12.3		
1896...	14.0	1.2	0.25	37.4	0.6	0.02	53.4	0.7	0.15	2.7	0.09	6.9	0.9	11.4	0.7	1.9	67.4	42.1	12.5		
1897...	16.3	0.9	0.6	45.4	1.0	0.01	64.3	0.6	0.2	1.8	0.05	4.5	0.2	0.85	0.26	8.4	0.9	1.7	75.3	46.2	12.2
1898...	17.8	1.3	0.8	51.0	1.4	0.01	72.4	0.6	0.2	1.9	0.04	3.5	0.2	0.95	0.52	7.9	1.2	2.5	84.1	51.1	11.9
1899...	15.5	2.8	1.0	55.2	2.5	0.01	77.0	0.5	0.3	2.1	0.03	3.0	0.3	1.7	1.2	9.1	1.6	3.5	91.4	59.1	12.9
1900...	17.0	4.7	2.0	64.4	4.3	0.01	92.4	0.4	0.6	1.7	0.06	2.9	0.37	3.4	1.7	11.2	2.3	4.3	110.3	72.9	13.2
1901...	17.7	5.0	2.6	65.5	8.5	0.01	99.3	0.4	0.7	1.6	0.06	2.6	0.24	4.2	2.0	11.8	2.6	4.5	118.1	74.3	12.6
1902...	20.9	4.1	3.1	67.1	10.6	0.01	105.9	0.4	0.7	1.7	0.05	2.9	0.2	2.7	1.3	10.0	2.6	4.8	123.4	70.7	11.5
1903...	24.7	3.8	3.8	68.4	7.9	0.03	108.8	0.4	0.7	1.7	0.06	4.2	0.2	1.9	1.2	10.5	3.1	5.0	127.3	67.5	10.6
1904...	33.3	4.4	5.3	72.1	10.1	0.02	125.2	0.4	1.0	1.7	0.06	4.4	0.2	2.7	1.2	11.6	3.6	5.1	146.6	72.8	9.9

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A supplementary Table is next given, in which the same figures are reduced to percentages, for the purpose of showing more clearly what changes have taken place in the composition of the average catch, and over our period of 15 years these changes will be seen to be great and noteworthy

In 1889, while trawling was still confined to the neighbouring waters and while the Moray Firth was still open, Plaice and other flat fish constituted 30 per cent. of the entire catch, by 1893 they had dwindled to 18 per cent., and by 1903 to 8 per cent. Plaice itself has fallen from 16 per cent. in 1890 to 3 per cent. in 1904.

Round fish have correspondingly increased from about 57 per cent. in 1889 to 85 per cent. in 1897, since which time there has been no further increase; but since 1897 the constitution of that 85 per cent. has altered, Haddock having fallen from 60 per cent. to about 50 per cent., an increase in Whiting and also in Saithe having made good the loss.

On the whole, we may say that the proportion of Haddock, the staple fish of our Scottish trawl fisheries, has changed comparatively little, always forming one-half or rather more than a half of the total landings; but it deserves to be mentioned that, in the earlier days of trawling, large quantities of small Haddocks for which there is now a market used to be thrown overboard.* Cod, Ling, and Saithe have greatly increased in relative importance. Flat fish have greatly fallen off though among them Halibut shows a steady increase, its total abundance, however, not being sufficient to affect the totals for flat fish. Whitches and Megrims overtopped Plaice for the first time in 1900, and in 1901 were twice as abundant as Plaice, but they have since fallen off to some extent.

* For the last ten years or thereby, Haddock have been classified in the market into Extra Large, Large, Medium, and Small. In former times there were two classes only, Large and Small, and the small Haddocks of those days mostly corresponded to what are now known as medium or "middles."

PERCENTAGE (BY WEIGHT) OF THE SEVERAL FISHES INCLUDED IN THE TOTAL CATCH OF THE ABERDEEN TRAWLERS, 1895-1904.

18577

—	Cod.	Ling.	Saithe.	Haddock.	Whiting.	Eel.	Total Round Fish.	Turbot.	Halibut.	Lemon Sole.	Brill.	Plaice.	Whitch Megrim.	Total Flat Fish.	Skate.	Various.
1889	5.8	0.2	0.8	50.5	0.3	0.012	52.6	2.7	0.02	7.1	—	20.9	—	30.8	0.7	10.9
1890	6.2	0.4	0.9	48.4	0.8	0.036	56.7	1.6	0.01	6.9	0.3	16.2	3.3	28.4	1.0	13.9
1891	6.8	0.5	0.7	51.2	0.4	0.016	59.6	1.5	0.01	6.8	0.11	15.8	2.1	26.3	1.9	12.2
1892	8.5	0.8	0.6	57.5	0.9	0.014	68.3	1.0	0.03	7.5	0.07	10.7	1.5	20.8	0.8	10.1
1893	9.6	1.3	0.8	60.6	1.3	0.005	73.6	0.9	0.19	4.4	0.02	11.0	1.6	18.1	0.6	7.7
1894	15.0	1.1	0.4	60.1	0.7	0.02	77.3	0.5	0.02	4.4	0.08	11.4	1.3	17.9	0.5	4.3
1895	15.0	1.2	0.36	62.6	0.9	0.03	80.0	0.6	0.23	4.4	0.08	9.9	1.1	16.2	0.7	3.0
1896	20.8	1.8	0.37	55.5	0.9	0.03	79.2	1.0	0.22	4.0	0.13	10.2	1.4	16.9	1.0	2.8
1897	21.6	1.2	0.8	60.3	1.3	0.13	85.4	0.8	0.27	2.4	0.06	6.2	1.5	11.2	1.2	2.3
1898	20.8	1.5	0.9	59.6	1.6	0.009	84.6	0.7	0.23	2.2	0.05	4.3	1.7	9.2	1.4	2.9
1899	17.0	3.1	1.1	60.4	2.7	0.01	84.2	0.55	0.33	2.3	0.03	3.6	3.2	10.0	1.7	3.8
1900	15.4	4.3	1.8	58.4	3.9	0.009	83.8	0.36	0.54	1.5	0.05	3.0	4.6	10.2	2.1	3.9
1901	15.0	4.2	2.2	55.5	7.2	0.01	84.1	0.34	0.6	1.4	0.05	2.4	5.3	10.0	2.2	3.8
1902	16.9	3.3	2.5	54.4	8.6	0.008	85.8	0.32	0.57	1.4	0.04	2.5	3.3	8.1	2.1	3.9
1903	19.4	3.0	3.0	53.7	6.2	0.024	85.5	0.3	0.55	1.3	0.05	3.5	2.5	8.2	2.4	3.9
2 T 1903	22.7	3.0	3.6	49.2	6.9	0.016	85.4	0.27	0.70	1.2	0.04	3.1	2.6	7.9	2.4	3.5

ABERDEEN TRAWLING.

These Tables convey a lesson, perhaps many lessons, of their own, but what they teach us has nothing to do directly with the question of whether fish are or are not gradually diminishing in abundance in the sea or in any part of it. The increased average of the catch per voyage is due in varying measure to more protracted voyages, to better boats and gear, to work carried on on more distant and more productive grounds. The slow increase or even diminution in the average catch of certain fish may be due to various causes, but one of them is the fact that certain fishes have a comparatively limited range of distribution and are rare or even wanting on certain of the grounds where much trawling is nowadays carried on.

The Tables deserve to be studied in connection with the principal dates of the trawling industry (*see* p. 330), the dates which mark the opening up of the more distant grounds or the protective closure of inshore waters. By so comparing the statistics with these dates a simple explanation will often be suggested of the cause of sudden changes in the former. It will be seen, for instance, that a great increase in the supply of Whitches from 1899 onwards coincided with the opening up of the "Whitch Ground"; that Cod and Saithe increased greatly in and after 1901, with the commencement of the Faeroe fishery; that Turbot increased suddenly in 1896, when St. Kilda was first visited; and that round fish on the whole increased greatly after 1896, with the introduction of the Otter trawl. It is not safe to press such suggestive explanations too far or to assume lightly that they account completely for the statistical facts, for several causes may be working together, and, besides, though we know in many cases when a certain fishery began we do not know in detail anything about the varying number of boats that subsequently took part in it.

There have been many changes of fashion in regard to the favourite places of fishing, of which in former days no historical record was kept, and so some of the statistical changes must remain obscure that otherwise might probably have been easily elucidated. We may still on enquiry elucidate some of them. For instance, we find that about 1902 Plaice began to increase very considerably from a low point to which they had fallen, this increase being very manifest according to the Table of average catches per voyage: the increase, Mr. Ingram tells me, is largely due to increased fishing and heavy catches at Iceland.* There is also evident in the same year and in subsequent years up to the present time a diminution, or at least a diminished rate of increase, of Whitches and Megrims: the cause of this diminution, which has also contributed to the increase of Plaice, is to be found in the fact, so Mr. Robb tells me, that the Whitch Ground is now less frequented than in former years, especially in summer, the vessels that formerly resorted thither going rather to the Minch and other western waters on the one hand and to the Fisher Bank and Holmen Ground on the other.

To analyse these Aberdeen statistics in further detail, throwing all the light upon the statistical changes that our knowledge of the changing circumstances permits, would be a very interesting task, but it is one that is beyond our powers at the present moment.

With a view to showing still more vividly the growth of the fish trade in Aberdeen, and the extent to which it has outstripped the smaller ports, the following Table has been compiled showing in the form of percentages the proportion of the several kinds of fish landed at Aberdeen (by both trawl and line) to the total quantities landed for the whole of Scotland, Aberdeen itself included. Among other interesting facts, which this Table shows at a glance, it will be seen that the supply of fish in the Aberdeen market has grown between 1889 and 1904 from 13 per cent. to 60 per cent. of the total supply for the whole of Scotland, and that this increasing proportion has grown with remarkable steadiness, the only interruption to its continuous growth being a slight one in the last year of the whole period.

* No great catches of Plaice have ever come from Faeroe.

PERCENTAGE PROPORTION OF THE QUANTITIES OF FISH LANDED AT ABERDEEN (LINE AND TRAWL) TO THE TOTAL QUANTITIES LANDED IN SCOTLAND.

185/7

Year.	Cod.	Ling.	Torsk.	Saithe.	Haddock.	Whiting.	Eel.	Total Round Fish.	Turbot.	Halibut.	Lemon Sole.	Plaice, etc.	Total Flat Fish.	Skate.	Total.
1889... ..	5.7	3.1	0.42	5.6	14.4	18.6	0.5	10.2	58.4	10.5	67.7	38.9	38.4	8.3	13.0
1890... ..	19.8	3.2	2.6	1.6	17.3	23.2	1.4	12.5	50.4	32.4	71.6	42.3	45.0	12.0	15.5
1891... ..	8.5	3.5	1.8	5.7	20.3	27.9	1.8	13.9	60.7	23.7	76.6	45.8	48.2	16.2	16.8
1892... ..	12.7	9.6	6.1	8.2	24.7	19.1	1.5	17.9	54.6	45.7	78.6	42.8	50.5	15.9	21.1
1893... ..	16.9	9.6	7.3	10.5	31.1	29.1	2.4	22.3	61.2	32.1	74.3	49.0	48.7	18.8	24.7
1894... ..	21.1	10.0	13.9	9.6	28.8	22.1	1.8	22.9	52.7	47.6	75.4	49.0	52.3	21.6	25.3
1895... ..	24.9	18.3	16.2	11.0	28.0	22.3	4.0	25.1	59.1	49.8	79.4	49.6	54.3	30.2	27.2
1896... ..	27.5	27.2	21.5	9.6	26.9	22.6	10.3	25.6	68.7	64.9	80.0	51.9	73.2	46.1	28.4
1897... ..	30.6	22.8	27.3	10.8	36.9	32.2	11.5	30.2	66.7	65.9	77.2	48.4	56.8	47.7	33.0
1898... ..	36.8	28.6	27.8	13.2	49.6	42.2	10.6	40.7	68.9	64.9	73.4	48.6	56.4	45.4	42.1
1899... ..	36.2	36.8	27.3	15.4	56.3	46.3	14.1	44.8	55.1	63.0	67.4	51.9	56.3	46.2	45.5
1900... ..	40.2	44.3	39.1	22.1	62.9	54.6	19.3	51.3	56.3	74.7	59.4	60.2	62.4	52.8	52.1
1901... ..	43.8	53.0	48.0	33.1	68.0	64.5	10.4	57.4	54.9	74.7	59.3	63.3	64.8	56.8	57.4
1902... ..	48.8	64.8	61.8	39.9	68.3	67.9	10.3	60.8	59.8	83.0	61.7	61.7	65.4	65.4	58.4
1903... ..	52.2	70.5	69.8	46.9	65.6	62.3	14.6	60.7	40.9	90.2	61.7	65.1	67.5	78.0	62.1
1904... ..	52.6	68.2	69.1	53.2	62.5	62.9	10.6	59.6	51.2	84.3	55.8	56.7	62.2	68.0	59.8

ABERDEEN TRAWLING.

2 T 2

NOTE.— Of formerly unclassified fish, the figures for 1904 may be given as follows :—Gurnard, 34.5; Catfish, 64.3; Monk, 86.7; Hake, 98.0; and of Flat-fish previously included under Plaice :—Flounder, 0.0; Plaice, 60.0; Brill, 35.2; Dabs, 32.5; Whitches, 97.5; Megrims, 98.7.

As a final illustration of the growth of the trawling industry a Table is next appended showing, for the whole of Scotland, the percentage of trawl-caught fish to the total supply from line and trawl for the years 1889-1904. It will be observed that the rapid and continuous increase of the proportion of trawled fish has begun to be arrested within the last two years, and that in certain cases, *e.g.*, Ling, Haddock, Turbot, a slight decrease is apparent. This result is due in part to the increasing number and productiveness of the steam liners, but also to what is, I believe, the undoubted fact, that the ordinary sailing liners had in 1904 a better season than for several years before.

On reducing to curves the results shown in the last-mentioned Table and in that on p. 321, which shows the growth of the Aberdeen market, the curves for the two will be found to be closely akin; and, indeed, in the case of the totals, for instance, the two curves are almost identical. This agreement is what might have been expected, the Aberdeen market having grown *pari passu* with the trawling industry.

PERCENTAGE OF TRAWL-CAUGHT FISH TO TOTAL SUPPLY OF ALL KINDS CAUGHT BY LINE AND TRAWL IN SCOTLAND, 1889-1904.

		Cod.	Ling.	Torsk.	Saithe.	Haddock.	Whiting.	Eel.	Total Round Fish.	Turbot.	Halibut.	Lemon Sole.	Plaice, etc.	Total Flat Fish.	Skate.	Other kinds.	Grand Total.
1889	...	4.7	0.8	...	2.7	15.5	7.2	1.7	9.7	80.1	0.4	97.7	57.0	53.2	6.3	...	13.5
1890	...	6.6	0.8	...	1.6	17.4	10.1	1.1	10.8	72.3	0.2	98.1	73.0	64.0	7.6	...	15.7
1891	...	6.5	1.0	...	1.8	21.6	10.8	0.7	12.5	81.2	0.2	98.3	64.9	60.2	16.7	...	18.8
1892	...	8.5	1.7	...	2.0	29.0	14.8	0.7	17.5	78.0	0.5	99.1	63.1	57.7	11.2	45.0	21.5
1893	...	12.4	2.4	...	3.7	35.3	21.8	0.4	21.4	84.4	1.8	98.6	66.2	55.4	9.3	45.9	24.8
1894	...	17.4	2.3	...	1.7	31.9	11.4	1.0	21.8	79.7	2.0	98.9	62.9	53.8	11.7	41.6	24.4
1895	...	18.4	2.8	...	1.8	33.7	12.9	0.7	24.4	85.7	2.9	98.9	65.1	56.9	8.3	40.9	26.4
1896	...	19.1	5.8	...	1.4	32.3	13.2	1.0	23.5	87.9	2.5	98.9	70.5	59.0	11.0	42.5	25.9
1897	...	21.9	3.6	...	4.4	40.4	25.0	1.0	28.1	86.9	4.2	98.8	64.7	54.1	11.3	45.6	29.5
1898	...	29.8	9.7	...	6.6	61.6	40.4	0.4	41.7	89.7	6.2	98.5	66.3	60.0	15.1	54.8	42.5
1899	...	37.5	17.2	...	9.7	71.3	51.5	0.6	50.2	86.1	12.0	99.6	71.0	66.0	20.2	78.3	51.1
1900	...	44.1	24.3	...	20.0	78.6	60.8	0.6	57.8	90.2	18.9	99.5	76.6	70.6	28.7	84.3	58.7
1901	...	48.6	30.4	...	30.3	85.0	80.1	0.8	65.6	92.0	18.4	99.6	79.9	70.7	31.3	86.2	65.6
1902	...	58.9	36.3	...	40.2	85.2	83.9	3.3	71.4	95.1	23.3	99.3	77.4	71.9	35.0	87.5	70.7
1903	...	62.8	44.5	12.3	46.7	82.4	79.0	3.9	72.4	96.5	25.6	99.1	80.0	74.8	47.0	86.9	72.2
1904	...	63.0	33.6	10.9	54.1	81.3	81.8	1.6	70.7	94.6	25.6	98.9	76.7	70.0	38.6	...	69.5

NOTE.—The classification of the Statistics in 1904 is not quite identical with that of former years, several species being brought under the Total Round Fishes that were formerly classed only as "Other kinds."

SCOTTISH TRAWLING.

THE PRINCIPAL DATES OF THE ABERDEEN TRAWLING INDUSTRY.

- 1874. Trawled fish first landed in Aberdeen.
- 1882. Steam trawling commenced in Aberdeen.
- 1883. First steam trawler built and launched in Aberdeen.
- 1890 (?). Aberdeen trawlers first resorted to the Fisher Bank.
- 1892. Trawlers, equipped as liners, began to visit Faeroe.
- 1893. Aberdeen trawlers first visited Iceland.
- 1893. Aberdeen trawlers first visited Rona.
- 1895. Otter trawl introduced.
- 1896. Aberdeen trawlers first visited St. Kilda.
- 1897. Beam trawl finally discarded.
- 1898. Aberdeen trawlers first resorted to the Witch Ground.
- 1900. Aberdeen trawlers first resorted to Faeroe.
- 1902. Aberdeen trawlers first resorted to the Holmen Ground.
- 1904. Aberdeen trawlers first resorted to the Butt of Lewis.*

DATES WHEN THE PRINCIPAL ACTS AND BYE-LAWS AFFECTING TRAWLERS ON THE EAST COAST OF SCOTLAND CAME INTO FORCE.

- 14th August, 1885. Sea Fisheries (Scotland) Amendment Act, 1885. Powers conferred on the Fishery Board to restrict or prohibit any mode of fishing in any part of the sea adjoining Scotland and within the exclusive fishery limits of the British Islands.
- 5th April, 1886. Firth of Forth, St. Andrews Bay and Firth of Tay, and Aberdeen Bay closed to trawlers.
- 4th July, 1887. The above bye-law revoked as regards Aberdeen Bay; closure extended from the Firth of Tay to the Red Head, within territorial limits (including Carnoustie Bay); territorial waters of the Moray Firth closed, from the Ord of Caithness to Kinnaird Head (including Cromarty, Dornoch and Inverness Firths).
- 28th Feb., 1889. Closure of territorial waters extended from Kinnaird Head to the Red Head (including Aberdeen Bay).
- 26th July, 1889. Herring Fishery (Scotland) Amendment Act, 1889. Closure of territorial waters extended (with small exceptions) round all the coasts of Scotland. Powers conferred on the Fishery Board to prohibit beam and otter trawling within a line drawn from Duncansby Head, in Caithness, to Rattray Point, in Aberdeenshire.
- 19th Nov., 1890. Moray Firth closed inside of a line from Ord of Caithness to Craighead, near Buckie.
- 22nd Nov., 1892. The whole of the Moray Firth closed from Duncansby Head to Rattray Point.
- 6th July, 1895. Sea Fisheries Regulation (Scotland) Act, 1895. Powers conferred on the Fishery Board to prohibit beam and otter trawling, under certain conditions, in an area within 13 miles of the Scottish coast. [These powers have not been exercised.]

NOTE.—Owing to a legal decision, afterwards overturned, the Moray Firth was open to trawling (except in its territorial waters) from 7th January to 1st March, 1896.

* The productive ground N. and N. by W. of the Butt of Lewis was discovered in 1904. The Minch itself had been fished by trawlers long before that date.

THE TRAWLING GROUNDS OF THE ABERDEEN FLEET.

The principal fishing grounds of the Aberdeen trawlers may for our present purpose be grouped as follows, the numbers in brackets representing the corresponding areas according to the subdivisions of the Chart made use of in the Statistical Tables :—

1. Iceland.
2. Faeroe.
3. The Western Grounds, including—
 - Rona and Sule Skerry, Stack Skerry, and Sulisker.
 - Nun Bank.
 - The Noup Head Grounds (Hoy) (XIII).
 - Stormy Bank and Whiten Head Bank.
 - The Minch and Butt of Lewis.
 - St. Kilda.
5. The North and North-east Grounds, including Shetland (X), with Foula (IX) and the Fair Isle (XIV)—
 - Bressay Shoal (XV with part of XIV and XVI).
 - Viking Bank (XII).
 - Various Deep-sea Grounds north of 58° N. (VI-VIII, XI, XVIII, XXI).
6. The North Sea Grounds, including—
 - The Fisher Bank (XXV, XXVI, XXXI, XXXII) and the Gut (XXIV, XXX).
 - The Holmen Ground, Horn Reef, &c. (XXVII, XXXIII, XXXVIII).
 - The Dogger and other grounds south of the Fisher Bank (XXXV-XXXVII, XXXIX).
7. The Near Grounds, within about 50-60 miles of the East Coast of Scotland (part of XVII, XXIII, XXVIII, XXIX).

1. *Iceland.*

Aberdeen trawlers do not visit Iceland at all seasons of the year,* as some Hull and Grimsby boats do, nor do they at any time of the year go there in very large numbers. Aberdeen trawlers commenced to run to Iceland in 1893, but neither then nor since does the business appear to have been a very profitable one. At first fish were found to be extraordinarily plentiful, but of very inferior quality; the flat fish especially are said to have been only skin and bone, the supposed result of over-abundance of fish and consequent insufficiency of food. Great quantities of fish were at first thrown overboard, little more than the better class of flat fish being saved and brought home; and it is said that at times great bags of dead and putrid fish were brought on board, the result, or supposed result, of fishing in the wake of previous voyages.

As is well known the Iceland fish are easily recognisable; they are of large size and dark in colour, in general quality they are inferior and their market value is low. The great demand for cheap flat fish in the great English towns renders this trade more profitable to Hull and Grimsby than to Aberdeen, which is too far away from the great centres of demand.

As a matter of fact, off the extensive coasts of Iceland the fish doubtless vary in quality just as elsewhere, and only about a year ago a new ground was discovered by a Hull shipmaster to the north-west of Iceland, very rich in Plaice the quality of which, to the eye at least, was very similar to that of North Sea fish.

Since trawling at Iceland for fresh fish has so often proved unremunerative at Aberdeen, "salting voyages" are undertaken and these yield at the present time about one-half of the total Icelandic import. These voyages generally occupy from six to seven weeks; extra hands are taken on, generally at Faeroe or

* For the first time, in 1904, our Aberdeen trawlers fished nearly the whole year round at Iceland.

Iceland, as "splitters," bringing the number of the crew up to about 21 all told. The catch consists principally of Cod and of the largest class of Haddocks, with sometimes in addition moderate quantities of Saithe, Plaice, and Halibut. In 1903 the result of these voyages is reported to have been satisfactory in spite of the heavy expenses entailed, but in 1904 Cod were much less plentiful on the Iceland grounds.

German trawlers from Iceland not unfrequently make Aberdeen a port of call and dispose of their fish there if markets be good, or if their shots be small and not worth carrying home. About one-fifth of the fish landed from Iceland at Aberdeen come in these German vessels, hailing from Geestemünde, Bremerhaven, and Nordenham.

In 1904 for the first time three Aberdeen vessels were stationed at Iceland from April to August, fishing under contract for a Leith firm of curers, with a station at Reykjavik.*

2. *Faeroe.*

As early as 1892 steam lining was prosecuted at Faeroe during April, May, and June by nine Aberdeen vessels, but it was eight years later before the Aberdeen trawlers began to resort thither; nor was it till 1902 that trawled fish from Faeroe became of importance to the market supply. The waters off Fuglö (and also Myggenaes and Kallsesfjord) are the principal resort, and the bulk of the shots consist of Cod, Codling, Haddock, and Catfish. A very considerable proportion of the Cod and Codling and of the extra large Haddocks is bought to be cured dried.

On the grounds in the neighbourhood of the islands a considerable number of small Cod are obtained, about 40 per cent. on an average being classified as Codling out of the total catch of Cod. But, on the other hand, upon the Faeroe Bank the Cod are, on the whole, larger than are to be found elsewhere, except at Rockall.

Statistics of the sizes of these and other fish will be dealt with in detail subsequently.

The Haddocks at Faeroe are of large size, very few small or even medium sized fish being found. They are of fair quality off the islands, but those from the bank are soft and cure badly.

Faeroe Plaice and Lemon Soles are the largest found anywhere. The Plaice are said to have fallen off in numbers lately, but there is no sign of such a falling off in the case of Lemon Soles. A fact much to be regretted in the Faeroe trawl fishery is the destruction of immature Halibut, large quantities being brought home of so small a size that they are sold by the hundredweight in boxes like Plaice and Lemons.

During 1904 eight vessels equipped with both lines and trawl gear worked during summer at Faeroe and Iceland, almost wholly, except in the case of two, at the former place.

The Faeroe fishing is chiefly prosecuted from April to August, during which period it yields from about 10 to over 20 per cent. of the whole supply of trawled fish in Aberdeen market. At other times of the year the quantities from Faeroe are insignificant, though an occasional voyage is made there at all seasons.

3. *Rona and Sule Skerry.*

The remote uninhabited island of Rona, or North Rona, lies about 40 miles from Cape Wrath in a direction north by west and about the same distance from the Butt of Lewis. In the "North Sea Pilot" (edition of 1894) Rona is mentioned as a resort of English fishing smacks, and the skipper, Captain Peacock, who is credited with discovering Rona, had served his apprenticeship in a Grimsby line-fishing smack.

* The current year (1905) promises a great increase in Icelandic voyages, and prices for Cod, Ling, Saithe, and extra large Haddocks, bought to be cured dried, have advanced very considerably, in consequence of a shortage in the Newfoundland supply.

Sulisker is a high rock 10 miles further to the west. In about the same latitude, but much further to the eastward, about equidistant from Cape Wrath and the nearest point of Orkney, lie the rocks known as Sule Skerry and the Stack, surrounded by important fishing banks. South of the Skerry Bank is Whiten Bank, west of it is the Nun Bank with the dangerous submerged Nun Rock in the centre of it, and south or south-west of Sule Skerry is Stormy Bank, a region notorious for fog and gales.

These various banks taken together form an important fishing ground. Though a considerable distance lies between Sule Skerry and Rona to the far west and Sule Skerry and the banks adjacent to it to the east, yet we may safely treat the whole as a single area: indeed it is not possible to do otherwise since vessels continually go from one bank to another if this or that one prove unproductive.

The first trawl shot that came to Aberdeen from Rona was landed in or about the year 1893, but the fishing there was not developed to any great extent until so lately as 1902. Within the last two years, however, this region has become of great importance. It is fished more or less all the year round, but appears to be most productive and is most frequented from May until August. During this period, in the years 1903 and 1904, it has yielded to the Aberdeen market on an average over 100 tons a week, and in some weeks has produced nearly one-fourth of the total supply.

In the earlier years of this fishing the shots landed consisted almost entirely of large Haddocks with a very limited quantity of Plaice, two or three hundredweight to a voyage, and a few Turbot. In January, 1900, a Grimsby boat delivered in Aberdeen a catch of 327 cwts., of which all but 10 cwts. were large Haddocks. This catch was reported to be the result of 14 hours' fishing off Sule Skerry, and realised in a good market a sum of £450, which still stands as a "record" for the Aberdeen market, apart, of course, from the six weeks' salting voyages to Iceland.

The Rona Haddocks are practically all of large size, but they are not so well adapted for curing purposes as are North Sea fish, being soft in substance as a result, so the fishermen say, of feeding upon Sand-eels, or of being gorged in its season with herring spawn.

The Rona grounds have the reputation among fishermen of giving very uncertain fishing, big hauls being obtained on one trip, while on the next visit all the fish are gone or their place taken by great shoals of Dogfish: as fishermen say, the fish are "off and on with a tide." Nowadays, the grounds being better known and consequently the area of operations being more extended, a skipper is more certain of a catch from one bank or from another before the end of his voyage.

These grounds would be more frequented than they are during the winter were it not for their stormy character and the risk of being storm-bound in Loch Eriboll for many days.

4. *The Minch.*

In the Minch, Scourie Bank and in a less degree Rhu Stoer and Inchard Bank are the areas chiefly frequented by Aberdeen trawlers; they voyage thither when the Cod and Plaice are spawning, that is to say, principally in March and April. Here, in the Minch, Plaice are found in deeper water than they are known to frequent regularly elsewhere, namely, about 45 fathoms. Indeed, a little to the north of the Minch, about 18 miles from Cape Wrath, a skipper reported Plaice to be comparatively abundant in the beginning of this year in 75 fathoms water, a fact unprecedented in his experience.

The Butt of Lewis Ground became known only this year (1904) to Aberdeen trawl masters, and had previously been worked, but only for a few months, by trawlers from Hull. It was found to be prolific and to yield a large variety of fish, including good Cod and Haddock, Ling, Saithe and Whiting, large Turbot, many Plaice and Megrims, with some Halibut and Lemon Soles. In the month of November a

trial of the same ground yielded nothing but Gurnard, of which immense quantities were caught and thrown overboard as worthless. Fishermen frequently report that where Gurnard are abundant other fish are scarce or absent, and the phenomenon appears to deserve investigation in connection with temperature and other hydrographical phenomena.

The grounds off Noup Head at the north end of Hoy have been frequented for some years past as a summer fishing ground, and have recently been resorted to with success in winter, the fishing being carried on at a greater distance than formerly from land. The ground is hard and rough, and the wear and tear of gear considerable.

St. Kilda was first discovered as a trawling ground in 1896 by an Aberdeen trawl master, Captain R. S. Sedgewick. The area of workable ground is small, and the abundant catches at first obtained did not continue. The rapid impoverishment of this small ground is said to have been due more to the visits of numerous trawlers from Fleetwood than to those of the comparatively small number of Aberdeen vessels that resorted thither. In the first year of the fishing Turbot of a large size were extremely abundant at St. Kilda, and Captain Sedgewick landed on one occasion a "shot" of 744 fish, whereas nowadays three or four score would be deemed a good week's fishing. Very large takes of Cod, Ling, and Skate were also obtained. In recent years few Aberdeen trawlers have been at St. Kilda, though it is still a frequent resort of the steam liners. With reference to the above-mentioned great hauls of Turbot at St. Kilda in 1896, it deserves to be mentioned that in 1892 Turbot were found within 50 miles of Aberdeen (47 miles east $\frac{1}{2}$ south) in much the same numbers, though the fish were on an average of a smaller size, and it is therefore not impossible that their great abundance at St. Kilda was in like manner an exceptional and temporary occurrence.

Rockall is seldom visited by Aberdeen trawlers, and most of the Rockall fish brought to this market is landed by Grimsby boats. The Cod, as has been already mentioned, are of great size, and the Haddock are very light in colour. The rough ground covered with loose coral causes the fish to come on board rubbed and chafed.

5. *The North and North-eastern Grounds.*

What are grouped here together as the North and North-eastern Grounds include several very distinct areas.

The Shetland grounds have been fished since the early days of trawling, but at first only on the western side, off the Fair Isle and between Foula and the mainland. This is still found to be a good fishing ground, yielding considerable shots of Plaice among other fish. It seems, too, to be something of a nursery for young Halibut which come thence so small as to be sold in boxes, though not in great quantities as they come from Iceland and Faeroe. In the winter time Scalloway Deeps give large takes of Haddock and Whiting, especially the last named, of which the biggest shots to be got anywhere are brought from here and from the neighbourhood of Flugga.

On the east side of Shetland, at no great distance from the islands of Balta, Fetlar, and Out Skerries, are found in their season immense shoals of Hake together with Megrims, and it may be mentioned that the Hake, which usually appear in October, or which did so in 1902 and 1903, arrived a month earlier in 1904. Off Flugga, just beyond latitude 61° , is the deepest water fished at present by Aberdeen trawlers; one skipper reports a sounding of 105 fathoms in ground over which his trawl had passed with good results at each drag. In 1903 a few great shots of Haddocks, feeding on herring spawn, were got off Balta just outside territorial waters on ground very rough and consequently destructive to netting. The great area of Bressay-shoal yields heavy supplies, especially in late spring and early summer, but the

proportion of small Haddocks from this region is all too great. This area is of greater extent as a fishing ground than the shoal as it is plotted on the Charts, the fishermen frequently reporting that they have been working above or below Bressay-shoal, and, by the way, to the *English* skipper below means north and above south. The so-called Northern Ground, including the Unst and Viking Banks, between Shetland and Norway, are deep water grounds, the exploration of which began soon after the introduction of the Otter trawl. From these, as well as from all the other grounds to the northward, comes the great bulk of what is called in the trade the "long" and "rough" stuff, that is to say, Cod, Ling, Hake, Saithe, Tusk, Skate, Roker, Monks, and so forth. The quantity delivered of the coarser species among these has very greatly increased of recent years with improved methods of preparing them for sale.*

The Witch Ground became a favourite resort about 1898, or perhaps a year earlier, but since 1902 it has been less in favour. It has always contributed a large proportion of small Haddocks, and with an apparent general increase of these, and with increased fishing on the Witch Ground and the similar adjacent area to the south of it known as the Gut or Gut-way, a great glut ensued of these fishes. This glut of small Haddocks was most marked in 1901, 1902 and also in 1903, but within the present year of 1904 appears to have been counterbalanced by an increased yield of large Haddocks, especially from the Western Grounds. As its name implies, the Witch Ground is notorious for the supply of Whites, and also to a less extent of Megrims. Both of these fishes may be said to have come into existence as an article of food with the practice of deep-water trawling. Restricted to deep water, they were both of them looked upon as comparatively rare fishes not so very many years ago, and within the last year a distinguished continental authority was surprised to hear from me that either was an article of commerce with us.† From 1897 to 1902 the quantity of Whites landed in Aberdeen advanced from 5,000 cwts. to 25,000 cwts., but the actual increase in the take was not so great as this, since in the earlier years small Whites were of little value and were not unfrequently thrown overboard.

6. Fisher Bank.

The limits of the area known to the Aberdeen trade as the Fisher Bank are not defined alike by all fishermen, but in all cases the area is very much more extensive than that represented by the bank itself as it is plotted on the Charts. A leading Aberdeen trawl master has defined it for us as lying between latitude $56^{\circ} 34' - 58^{\circ} 50'$ and longitude $1^{\circ} 50' - 4^{\circ} 30'$. According to this definition it is more or less artificially separated from the Dogger Bank on the south and from the little Fisher Bank with its associated Holmen Ground, Jutland Bank, &c., to the east, while to the north and west it has more natural boundaries of deeper water, the Gut to the westward and the Witch Ground and so-called Norwegian Channel to the north.

It is from 13 to 15 years ago that this area began to be resorted to by Aberdeen trawlers, the uncertainty as to date being associated with the uncertainty as to the limits of the area itself. The Fisher Bank during these 15 years has not been uniformly productive. About 1893 there were complaints of a general scarcity of fish in the North Sea, which meant, for the larger vessels, the Fisher Bank, and to this scarcity was due the fitting out of a number of trawlers for line fishing at Faeroe in that year. For some years thereafter the Northern Grounds were the chief resort of the larger Aberdeen trawlers, and the Fisher Bank was held to have become exhausted, at least by the Aberdeen men. But during the Grimsby strike of 1901, when Aberdeen vessels began to take their catches to the southern market, they began also to resort to the Fisher Bank, fishing their way home, and the Fisher Bank was then again found to be fairly prolific. Since that time the Fisher Bank has once more become a very important source of supply

* The "smoked fillet," in which Monkfish or Anglers, Catfish, Saithe, Tusk, Codling, and "Jumbo" Haddocks are utilised, was the invention of Mr. W. S. Eunson, an Aberdeen fish curer, and by origin, I believe, a Fair Isle man.

† Birmingham, by the way, is the great market for Megrims.

to the Aberdeen market, and it will be seen from our statistics that during the year 1903-1904 it yielded about one-fifth of the whole market supply and as much as one-half in exceptional weeks. But some fishermen hold that the Fisher Bank would have been better left alone for a still longer period as it has yielded since its reopening an undue proportion of small Haddocks. However, as has been already said, the Gutway or Swashway to the westward of the Fisher Bank (usually reported by the fishermen as 100-130 miles E.S.E., S.E. by E., and S.E. of Aberdeen) is the principal southern nursery for small Haddock, and is very probably a feeder to the Fisher Bank.

Of "long" fish the Fisher Bank yields Cod and Saithe, Catfish, this last mostly in summer, and a few Ling. The Fisher Bank Haddocks are of the finest quality and have the highest reputation; the Plaice, too, command a higher price than the "gray-backs" or lighter-coloured fish from Orkney, Shetland, and the Western Grounds. The few Whitches that the Fisher Bank supplies and the larger quantity that come from the Gutway also are thick, large fish, as compared with those from the Northern Grounds, and small Whitches are practically absent.

The Eastern or Holmen Grounds were visited at least 25 years ago by English smacks and have been frequented since the early days of trawling by Grimsby and Hull boats, but they have only of late years become a fairly frequent resort of Aberdeen trawlers and were little heard of in Aberdeen before 1902-1903. From this region come very fine catches of Haddock, Plaice, and Cod, and among the Haddock large fish are in good proportion.

In strong contrast to the fishing of the Holmen Ground is that of the Horn Reef to the southward of it. Here on the shallow sandy shores of Denmark is the most important and characteristic part of the well-known "Small-fish Grounds." This region is not resorted to by Aberdeen skippers, and during the past year no single delivery of any bulk has been made in Aberdeen of the undersized Plaice such as frequent it. The trade in these very small Plaice seems to be dependent on the multitude of cheap "fried fish" shops that have sprung up in the large English towns, and this market is too remote from Aberdeen to furnish a remunerative trade for fish whose intrinsic value is so small. When Aberdeen trawlers work now and then on the Horn Reef Grounds they carry their catches to Ymuiden and other ports where small Plaice are in demand.

7. *The Near Grounds.*

Protective Legislation, and especially the bye-laws by which first a large portion and in 1892 the whole of the Moray Firth was closed to trawling, has narrowed the area in the neighbourhood of our own coasts that is available for trawling. But, nevertheless, the Near Grounds continue to be a very important source of our fish supply. They are resorted to chiefly by the smaller boats, which usually make two trips a week to the fishing ground. Such boats are run at comparatively small expense, and their profits, at least in some cases, would appear to compare favourably at the present time with those of the larger vessels. In the winter time these vessels fish mostly within a very short distance of the land, usually within sight of the lights of Tod Head, Girdle Ness, Buchan Ness and Kinnaird Head, great experience and local knowledge being necessary for trawling among the many rough places of the coast.

For the best quality of fresh or "live" flat-fish, especially Lemon Sole and Turbot, the market depends principally on the inshore fleet, and their aggregate import of Plaice is also no inconsiderable quantity. The greater part of the catch of these "short-trip" boats (except the Haddocks, which are often smoked) goes at once into consumption in a fresh state, and the better class trade of the fishmonger could not be supplied from the more distant voyages.

In the heat of summer an especially large number of trawlers are at work on the Near Grounds, partly for the sake of chance employment in towing the herring boats to port in calm weather, and partly also because of a decreased demand at that season for any but the best and freshest of fish.

ON THE QUANTITY OF FISH YIELDED BY THE SEVERAL FISHING GROUNDS.

The foregoing pages relate how the enormously increased supply of trawled fish in the Aberdeen market is drawn from an immense and still increasing area of capture, and it has been stated that the great discrepancies which exist between the rate of increase in the supply of different fishes during recent years is in part at least due to the fact that some of them have a range of distribution so much more limited than others that the extension of the fishing to deeper waters and to more distant grounds has done sometimes little and sometimes nothing to increase the supply of these particular sorts.

It would manifestly be of great interest, for commercial as well as for scientific purposes, if we could so classify the whole of our market statistics as to ascribe to each of the principal fishing grounds its proper share of the total catch. It is impossible at present to do so fully and accurately. In the conspicuous cases of Iceland and Faeroe the information is at hand, but in regard to the other grounds frequented by the Aberdeen fleet, from St. Kilda and Rockall on the west to the Norwegian and Danish coasts on the east, we obtain only partial information. In another portion of this Report the statistics are dealt with which give us, by the help of a certain number of Captains, the precise locality of a portion of the catch; but there are many other cases in which information is forthcoming, though somewhat less precise. Moreover, even when no actual statement is rendered, it is generally possible for an experienced eye to discern with no small degree of accuracy, from an inspection of the catch of fish, the ground where the vessel has been working. In this way, Mr. Robb, our excellent clerk of market statistics in the Fishery Office at Aberdeen, supplied during the latter half of 1903 and has since rendered to me regularly an approximate estimate from week to week of the total quantities of fish landed by trawlers from all the principal fishing grounds. From this information there have been drawn up the following Tables showing the quantities and percentage of trawled fish yielded by the various grounds from June 14, 1903 to June 12, 1904, the first complete year of which we have record; such statistics will, I trust, be made more complete and detailed in future years. The quantities set down as coming from the "Near Grounds," that is to say, from within some fifty or sixty miles of the east coast of Scotland, are here set down in round numbers as the residue left after deducting from the total landings of the week the catches more or less clearly recognisable as coming from one or other of the more distant fishing grounds. This method, the only one hitherto available, doubtless leads to a certain measure of over-statement as regards the Near Grounds, but I do not think that such over-statement is of very great amount.

Fragmentary as they are, and at best only approximately correct, these Tables give us several pieces of interesting information. They tell us that, apart from the "Near Grounds," the Fisher Bank and the northern part of the North Sea are by far the most important source of the market supply, the former yielding one-quarter and the latter one-fifth of the whole. In winter time, the North and North-eastern Grounds are of still greater relative importance, sometimes furnishing possibly half and more than half of the monthly supply. Next in order of importance come the Rona and Sule Skerry Grounds, which yield nearly one-tenth of the whole in spite of the fact that through the winter months they are little frequented. The supply from Iceland is seen to be very irregular and uncertain; it ceases altogether in the winter time, and yields altogether only some 4 per cent. of the total supply. The supply from Faeroe, about 6 per cent. of the whole, though greater than that from Iceland is still not very considerable, so that to this market these two distant grounds are of very subordinate importance. What are here called the "Near Grounds" extend as far as the eastern side of the Orkneys, and (subject to the reservations set forth above) are set down as furnishing one-quarter of the aggregate. While this, as has been said, is to some extent an overestimate, yet it is certain that these older fishing grounds of the Scottish Coast continue to furnish a very important contribution, a larger one than I think is commonly supposed, to the total market supply.

ABERDEEN MARKET, 1903-1904. TOTAL WEEKLY SUPPLY OF TRAWL-CAUGHT FISH, IN CWTS., SHEWING
THE ESTIMATED QUANTITIES YIELDED BY THE PRINCIPAL FISHING GROUNDS.

Week ending	Iceland.	Faeroe.	Rona and Sule Skerry.	Other Western Grounds.	Shetland and North and North-east Grounds.	Fisher Bank.	Other North Sea Grounds.	Residue principally from Near Grounds.	Total Supply.
1903.									
June 20	2,270	2,300	...	...	11,400	...	5,400	21,378
„ 27	2,127	2,143	100	100	10,780	100	9,300	24,658
July 4	2,545	2,084	1,735	1,365	8,373	...	8,400	24,515
„ 11	2,978	1,398	1,800	...	3,800	...	7,900	17,886
„ 18	3,909	3,358	500	400	6,500	...	9,200	23,911
„ 25	3,818	3,651	600	200	2,530	...	8,000	18,855
Aug. 1 ...	6,000	5,024	2,471	...	...	3,795	600	8,500	26,464
„ 8	1,818	3,487	500	...	3,300	...	8,000	17,164
„ 15	2,542	2,135	...	200	4,330	...	8,600	17,802
„ 22	926	2,883	500	...	5,871	...	9,000	19,675
„ 29 ...	1,100	517	3,535	400	700	7,900	...	7,800	21,959
Sept. 5	432	1,100	900	900	5,000	1,500	11,000	20,920
„ 12 ...	5,157	...	1,356	2,180	2,000	5,400	5,700	10,000	32,364
„ 19	2,130	1,000	5,300	2,530	9,130	9,000	28,977
(No information.)									
Nov. 21	165	...	300	5,990	9,484	850	8,000	24,861
„ 28	2,938	8,387	...	6,000	17,122
Dec. 5	686	...	7,845	8,596	4,589	6,500	28,241
„ 12	716	...	8,953	15,564	...	7,000	32,226
„ 19	9,350	9,174	...	5,300	23,839
„ 26	110	100	5,502	8,000	6,804	209	5,600	26,375

ABERDEEN MARKET, 1903-1904. TOTAL WEEKLY SUPPLY OF TRAWL-CAUGHT FISH, IN CWTS., SHEWING THE ESTIMATED QUANTITIES YIELDED BY THE PRINCIPAL FISHING GROUNDS—*continued.*

Week ending	Iceland.	Faeroe.	Rona and Sule Skerry.	Other Western Grounds.	Shetland and North and North-east Grounds.	Fisher Bank.	Other North Sea Grounds.	Residue principally from Near Grounds.	Total Supply.
1904.									
Jan. 2 ... ..	...	...	200	5,980	6,700	4,846	1,209	5,100	24,042
„ 9 ... ..	...	765	200	6,300	1,905	3,775	2,463	5,400	20,793
„ 16 ... ..	...	...	107	590	11,592	1,162	3,317	2,600	19,355
„ 23 ... ..	...	561	448	700	12,850	1,123	...	7,400	23,108
„ 30 ... ..	...	470	738	...	11,525	977	4,210	3,700	21,632
Feb. 6 ... ..	...	424	1,899	582	7,141	1,814	1,858	2,800	16,523
„ 13 ... ..	...	1,414	2,215	1,373	9,607	2,904	2,903	3,100	23,514
„ 20 ... ..	...	157	...	861	10,275	1,941	2,280	3,900	19,316
„ 27 ... ..	...	...	1,363	3,330	9,698	2,633	1,385	1,800	20,045
Mar. 5 ... ..	...	...	1,184	3,473	9,001	3,507	3,130	7,100	27,466
„ 12 ... ..	...	...	787	4,946	8,175	2,702	2,028	5,800	24,494
„ 19	1,126	444	...	4,604	10,574	3,371	1,705	4,000	25,860
„ 26 ... ..	...	...	93	2,017	16,057	1,000	...	2,700	21,840
Apr. 2	1,028	1,028	...	2,761	10,434	...	527	5,800	21,602
„ 7	2,556	617	...	...	12,000	1,000	...	2,800	17,392
„ 16 ... ..	...	1,455	...	1,291	11,482	...	537	5,200	20,003
„ 23 ... ..	...	3,049	451	3,203	10,704	1,221	...	6,000	24,668
„ 30	2,467	3,547	1,211	891	3,690	4,167	3,876	3,545	23,394
May 7	588	5,758	2,044	1,200	6,779	3,456	...	5,100	24,934
„ 14	4,732	4,184	5,459	593	3,028	3,239	526	2,600	24,381
„ 21	490	5,363	5,476	660	2,156	4,519	1,632	2,200	22,317
„ 28	722	4,100	14,500	600	975	3,900	...	2,900	27,723
June 5	13,000	3,500	13,500	1,700	770	4,845	...	1,200	38,575
„ 12	3,600	6,300	10,000	1,200	...	5,200	...	1,800	30,463

ABERDEEN MARKET, 1903-1904. ESTIMATED PERCENTAGES OF TRAWL-CAUGHT FISH RECEIVED FROM THE PRINCIPAL GROUNDS.

Week ending	Iceland.	Faeroe.	Rona and Sule Skerry.	Other Western Grounds.	Shetland and North and North-east Grounds.	Fisher Bank.	North Sea Grounds.	Residue principally from Near Grounds.
1903.								
June 20	...	10·6	10·75	...	...	53·3	...	25·25
„ 27	...	8·6	8·7	0·4	0·4	43·7	0·4	38·7
July 4	...	10·4	8·5	7·1	5·6	34·2	...	34·3
„ 11	...	16·6	7·8	10·1	...	21·2	...	44·2
„ 18	...	16·3	14·0	2·1	1·7	27·2	...	37·7
„ 25	...	20·25	19·4	3·2	1·0	13·4	...	42·4
Aug. 1	22·7	19·0	9·3	...	...	14·3	2·3	32·1
„ 8	...	10·6	20·3	2·9	...	19·2	...	46·6
„ 15	...	14·3	12·0	...	1·1	24·3	...	48·3
„ 22	...	4·7	14·6	2·5	...	29·8	...	45·7
„ 29	5·0	2·4	16·1	1·8	3·2	36·0	...	35·5
Sept. 5	...	2·1	5·3	4·3	4·3	23·9	7·2	52·6
„ 12	15·9	0·0	4·2	6·7	6·2	15·7	17·6	30·9
„ 19	7·3	3·5	18·3	8·7	31·5	31·0
(No information.)								
Nov. 21	...	0·7	0·0	1·2	24·1	38·1	3·4	32·2
„ 28	17·2	49·0	...	35·0
Dec. 15	2·4	...	27·8	30·4	16·2	23·0
„ 12	2·2	...	27·8	48·3	...	21·7
„ 19	39·2	38·5	...	22·2
„ 26	...	0·4	0·4	20·9	30·3	25·8	0·8	21·2

ABERDEEN MARKET. ESTIMATED PERCENTAGES OF TRAWL-CAUGHT FISH RECEIVED FROM THE PRINCIPAL GROUNDS—*continued.*

Week ending	Iceland.	Faeroe.	Rona and Sule Skerry.	Other Western Grounds.	Shetland and North and North-east Grounds.	Fisher Bank.	North Sea Grounds.	Residue principally from Near Grounds.
1904.								
Jan. 2	...	...	0.8	24.9	27.9	20.2	5.0	21.2
" 9	...	3.7	1.0	30.3	9.1	18.2	11.8	25.0
" 16	...	...	0.5	3.0	59.9	6.0	17.7	13.4
" 23	...	2.4	1.9	3.0	55.6	4.9	..	32.0
" 30	...	2.2	3.4	...	53.3	4.5	19.5	17.1
Feb. 6	...	2.6	11.5	3.5	43.2	11.0	11.2	17.0
" 13	...	6.0	9.4	5.8	40.8	12.3	12.3	13.2
" 20	...	8.1	...	4.5	53.2	10.0	11.8	20.2
" 27	...	...	6.8	16.6	48.4	13.1	6.9	9.0
Mar. 5	...	...	4.3	12.6	32.8	12.8	11.4	25.9
" 12	...	...	3.2	20.2	33.4	11.0	8.3	23.7
" 19	4.4	1.7	...	17.8	40.9	13.0	6.6	15.5
" 26	...	...	0.4	9.2	73.5	4.6	...	12.4
April 2	4.8	4.8	...	12.8	48.3	...	2.4	26.9
" 9	14.7	3.5	...	...	69.0	5.8	...	16.1
" 16	...	7.3	...	6.5	57.4	...	2.7	26.0
" 23	...	12.4	1.8	13.0	43.4	4.9	...	24.3
" 30	...	...	...	...	...	..	...	...
May 7	2.4	23.1	8.2	4.8	27.2	13.8	...	20.5
" 14	19.4	17.2	22.4	2.4	12.4	13.3	2.2	10.7
" 21	2.2	24.0	24.5	3.0	9.7	20.2	7.3	9.9
" 28	2.6	14.8	52.3	2.2	3.5	14.1	...	10.5
June 5	33.7	9.1	35.0	4.4	2.0	12.6	...	3.1
" 12	11.8	20.7	32.8	3.9	...	17.1	...	5.9
TOTAL	4.1	7.0	9.4	6.3	23.4	19.6	5.4	24.5

THE SPECIAL TRAWL STATISTICS FOR 1901-1903.

The statistics dealt with in the preceding pages are, for the most part, the ordinary commercial statistics, such as the Fishery Board has collected through its officers around Scotland for many years. Like other similar statistics, collected for the sake of commercial information, they record simply the quantities of fish caught and the number of vessels engaged; but they do not tell us anything about the place where, or the season when, the fish were caught, nor do they enable us to measure the time or labour spent, in different times and places, in the catching of a given quantity of fish.

In a subsequent part of this Report (pp. 358-444) are set forth another series of statistics which, for as large a part of the Aberdeen fleet as possible, supplement the ordinary statistics of the market in regard to the points mentioned above. The keeping of these special statistics was begun at Dr. Fulton's instigation in January, 1901, but information was not collected until the following April as to the time actually spent in fishing; from that date onwards the statistics are of great interest and value. In a well-known paper by Dr. Fulton, published in the Twentieth Annual Report of the Fishery Board for Scotland, the initiation of this work is described and the first year's instalment of the statistics themselves is printed. The collection and tabulation of these statistics now forms part of the work of our International North Sea Investigations.

The responsible duty of compiling the returns is in the hands of Mr. James Ingram, Fishery Officer at Aberdeen, and the actual work in the market has been from the beginning in the hands of one of his assistants, Mr. James Robb, who deserves very great credit for the manner in which he has performed and continues to perform it. The masters of the vessels give voluntary information as to the places where they have been fishing, the number of hauls of the trawl or the number of lines shot, and the number of hours spent in actual fishing; the quantities of fish obtained, and in many cases their sizes according to the market estimate, are recorded by the clerk in charge as the catch is laid out on the quay for sale. Since the information asked of the Captains is wholly voluntary, since no details of individual catches are published, and since such use as we do make of the statistics is only published long after the fishing was carried on, there is no temptation whatsoever to the giving in of anything but a true and correct return, and the figures themselves, the more we study them, bear witness to the accuracy of the information given us. The precise information that our purpose requires is furnished by the Captains of about one-third* of the trawlers, of nearly all the steam-liners, and of a certain number of the large sailing-liners that frequent the Port of Aberdeen, and we have, accordingly, large figures to deal with; but, whatever value the statistics have, they would be immensely more valuable if we received similar reports from all the Captains of the fleet, and this we hope to do as soon as it shall have been shewn that the statistics serve a good and useful purpose and that there is really something to be learned by studying them.

The following is the method that is now used in tabulating the returns. They are entered by Mr. Robb upon separate sheets, each sheet recording the catch of a vessel during a single voyage; and these sheets are passed on to another assistant, Captain C. E. Brown, Dundee, whose business it is to plot upon a large chart the position of the ship when the catch was made. The chart is divided, according to a system instituted by Dr. Fulton, into a number of squares; each record as it is entered on the chart is numbered according to the square with which it corresponds, and the sheets are then sorted out and the items totalled so as to bring together for each month the results of all the fishing in each particular square. Finally, the whole mass of figures is reduced, with the help of a Brunsviga calculating machine, to a system of averages; the quantities obtained of each fish are divided by the number of hours spent in trawling, or by the number of lines shot; so that in the end is shewn *the average quantity of each kind of fish taken per 100 hours' trawling (or per 100 lines shot), for each month and for each area of the sea.*

* I record, with great satisfaction, that at the date of going to press (May, 1905) this number has increased to nearly two-thirds.

Let us next consider the areas themselves. The chart of the North Sea was in the first instance divided by Dr. Fulton for the purpose of this work into forty-eight squares, numbered consecutively, each square corresponding to 2° in latitude and 1° in longitude, the western boundary at first selected being the meridian of 4° W. There is nowadays a great fishing to the westward of this boundary, especially at Rona and Sule Skerry, hence it has been necessary to deal with additional areas ; the numbering of the original areas has not been changed, but new areas A, B, C, and D have been added to the chart. Of these four the two that lie furthest north are of no importance, being unfrequented by fishermen ; the other two we shall usually speak of as " Rona and Sule Skerry " and the " Minch " respectively. In another year's Report we shall find it necessary to deal in still greater detail and over a greater extent, with the West Coast fishings.

The fisherman will see at a glance from the annexed small chart (Fig. 1) the position and nature of the various areas into which it is divided ; a larger chart, published in Dr. Fulton's paper already referred to, exhibits them in greater detail.

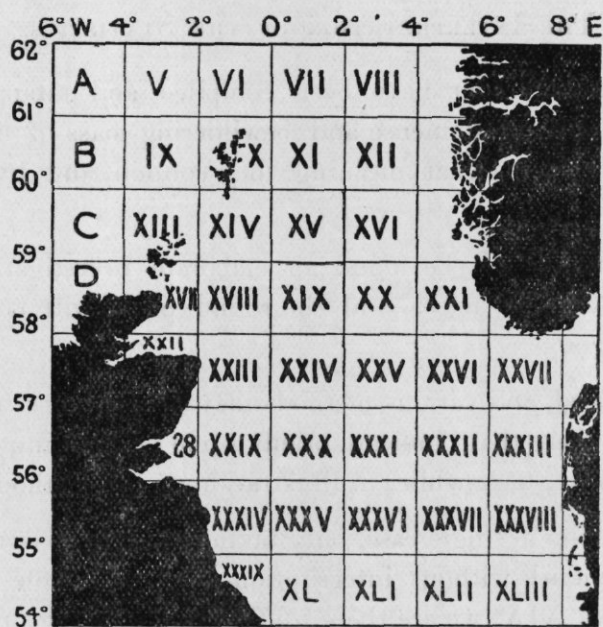


FIG. 1. Statistical Areas of the North Sea.

The areas that were originally numbered I to IV lie to the north of the parallel of 62°, in deep water which only at the eastern fringe of area IV is less than 200 fathoms. They lie outside the region where trawling is carried on, and have accordingly been omitted from the small charts which illustrate this Report. Areas A, B, and V in like manner are a region unfrequented by fishermen, and lie wholly or almost wholly outside the 200-fathom line.

Under present conditions, as has been already said, trawling is to all intents and purposes limited by the 100-fathom line, though off the Portuguese and some other southern coasts it is already carried on at considerably greater depths ; with us, while work in 70-80 fathoms is not uncommon, anything beyond that is rare and exceptional. The 100-fathom line passes in a north-easterly direction about 50 miles to the west of Shetland ; it extends as far or a little further north than the parallel of 61°, nearly in the latitude of Bergen, and then, turning southward, follows more or less the contour of the Norwegian coast, to turn at length into the Skager Rack, into which also the other main contour lines of the North Sea converge. Between the coast of Norway and this 100-fathom line lies the deep channel known as the Norwegian Channel or Norwegian Gut, which connects the Skager Rack with the deep waters of the North Atlantic. Such, then, is the boundary of our North Sea trawling grounds, to the north-west, north, and north-east.

To the southward, the parallel of 56° , or roughly speaking, a line drawn from the Scotch border to the opposite coast of Denmark, may be taken as the southern limit of the more important operations of the Aberdeen fleet. Such a line runs just north of the Dogger, and crosses the Horn Reef Grounds off the coast of Jutland. To these latter grounds go a certain number of Aberdeen trawlers, especially in autumn, but they are few in comparison with those at work further to the northward, or with the great English fleets which frequent the southern grounds. To the south of 55° , which line runs from Newcastle to the Sylt, and crosses the middle of the Dogger, trawling is very seldom carried on from the port of Aberdeen, and, though we have given stray records of such fishings in our Tables, it has not been found necessary to extend the charts on which we show the monthly positions of the Aberdeen fleet further to the southward. We may take it then that the Aberdeen market is almost wholly supplied from waters lying to the northward of the latitude of the Scottish border; and that for all comprehensive information as to the fish supply of more southerly waters we must look to other investigations, and to the returns from English and Continental ports.

THE INTERPRETATION OF THE STATISTICS.

When we look at the statistics that have been compiled and tabulated in the way that I have described, we see at first sight only an immense and bewildering mass of figures, and it is high time to ask what use is to be made of these, what meaning they contain, and by what methods their use and meaning may be made evident.

In another part of this Volume will be found an elaborate investigation by Dr. Fulton into these statistics so far as they relate to the flat fishes, and the round fishes will be dealt with in turn by me in the next volume of these Reports.

Various methods may be used, and various methods may be necessary, to elucidate the whole of these statistics; we need do no more here than indicate briefly some of the simplest of these, not for the sake of the facts they teach, but simply, meanwhile, in illustration of the method.

Let us take, almost at random, a single case, only taking care to select one to begin with where we possess information month by month without interruption over our whole period of nearly three years. Taking the Table on p. 420, area XIX, we are there told that the average number of hundredweights of Catfish caught by the Aberdeen trawlers on the area in question, which is situated about midway between the north of Scotland and the Norwegian coast, over what is known as the Whitch Grounds, was as follows:—

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
1901 ...	...	...	...	1.5	1.18	2.68	0.0	0.0	0.16	0.0	0.06	0.0
1902 ...	0.03	0.2	0.31	2.6	1.85	0.65	0.84	0.33	0.0	0.0	0.0	0.05
1903 ...	0.18	1.8	1.1	3.1	1.1	0.6	1.6	1.2	0.94	0.4	0.27	0.18

In this case the quantities dealt with are not very large, about 3 cwt. per 100 hours' trawling being the most that the Table shows, that is to say, about 3 lbs. per hour or very much less than one single fish, as the produce of the great otter trawl with a head line of over 100 feet. But, nevertheless, small though the quantities are, they are sufficient to show changes from month to month of a well-marked kind. It is obvious that the numbers are comparatively large from about April to June, and very small indeed for the winter months. To enable the eye to see these gradual changes, to grasp the relation of one number to another, we next set them out in another way, namely in the form of points upon a sheet

of paper whose heights above a base line represent the quantities caught, and which follow one another at regular intervals corresponding to the succession of the months and years. Then drawing a continuous line from point to point we get the following result :—

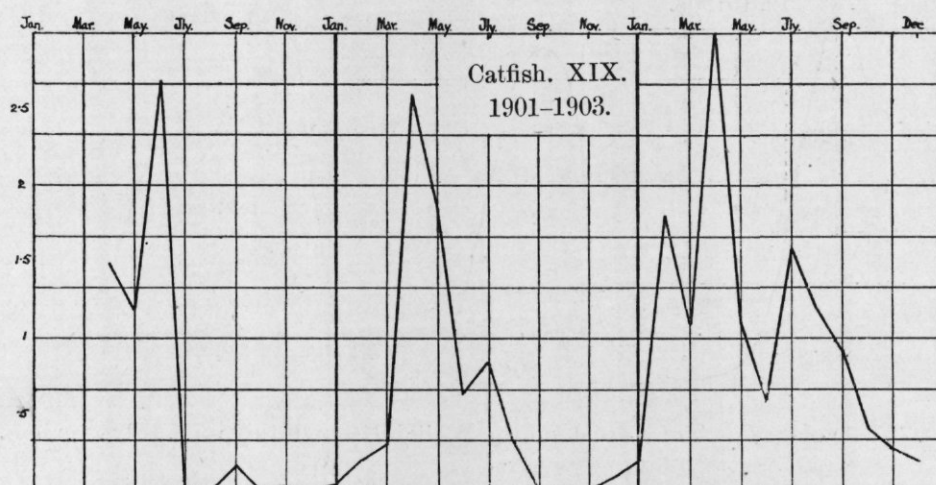


FIG. 2. Average Catch of Catfish on the White Ground, from April, 1901, to December, 1903. The numbers at the left-hand side of the diagram represent cwts. per 100 hours' trawling.

The crooked line in Fig. 2 shows us clearly at a glance that the Catfish on this particular ground were fluctuating in abundance, and that the fluctuation was on the whole a steady one, obedient to a definite law, a law of gradual increase in springtime and of gradual diminution when summer had begun.

But the line drawn in the foregoing figure, though it is sufficient to show us a series of waves, shows us these waves drawn as it were with a shaky hand. That the line is broken and crooked in this irregular way is due to accident, to the uncertainties of chance or luck: it would be a much smoother line if we were dealing with the average catches of a large fleet of vessels instead of some half-dozen or even less, as was the case in some months during our period; or the same result might be obtained by summing together such statistics as the above over a long period of years, the small irregularities of chance or luck in one year balancing those in another, while the real law that governs the fluctuations (if there be one) remained clear. In the present case we have only got three years, or rather less than three years, to go upon; but there is still left for us another method of clearing up the irregularities, or of "smoothing the curve." The monthly periods that we have taken are artificial periods, and may have been well or ill chosen for our purpose. If we had tried to set down the catch day by day, the result would certainly have been so irregular that the discovery of a law would be almost hopeless; had we only recorded the catch year by year the law of increase in spring and decrease in winter would not have been shown at all. Let us try the effect of taking three-monthly averages; and we can obviously take these not merely four times a year, but twelve times a year, averaging first January, February, and March, then February, March, April, and so on. This method is called the method of "three-monthly averages taken monthly." The result is given below, and it is now interesting and even surprising to see how smooth and regular our curve has become, and how clear and obvious is the law which dominated our original figures. The new curve tells us several things. It tells us what we have already seen, that the Catfish on the White grounds undergo a periodic annual fluctuation; that they reach their greatest abundance there in each year somewhere about the month of March; that the time of greatest abundance does not last long, but that the time of greater scarcity lasts considerably longer; that the season when they were most abundant was (apparently) a little earlier in 1903 than in either of the former years; lastly, that there was little or no appreciable difference in their abundance in the three years in question, for the curve rises to nearly the same high level and falls to nearly the same low level in each annual wave.

The curve in this case is a more complicated one, and more difficult to interpret than was either of the other two.

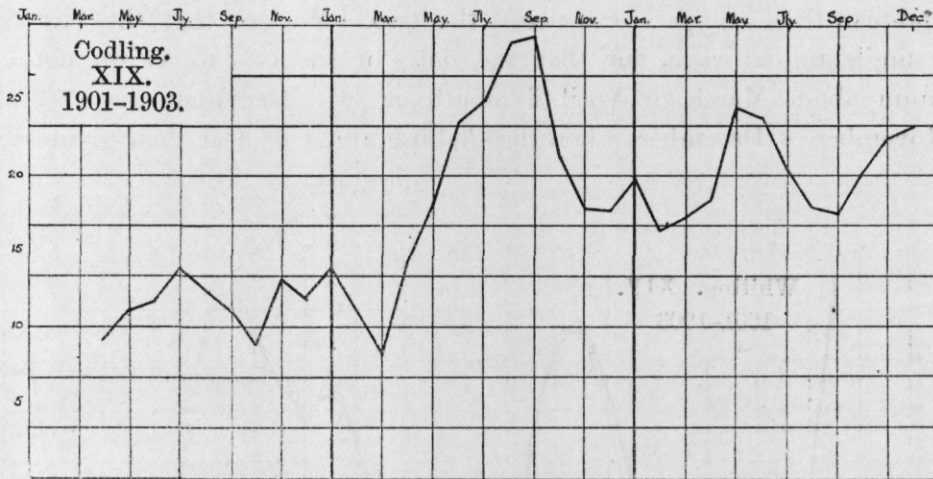


FIG. 5. Average Catch of Codling on the Whitch Grounds, monthly averages.

We see now, in this case, that there are two annual maxima, one in summer and one in winter every year. They are somewhat irregular in height, that for August, 1902, greatly overtopping the rest ; but it is at least obvious that they are fairly regular in their period, and show an increase of Codling on the ground about June, July, or August every year, and another, probably a smaller increase, about November, December, or January.

There is something radically different then in the seasons of the Codling on these two different grounds ; they move to and from the one ground once a year, and apparently to and from the other ground twice a year. In short, without any longer explanation, it is obvious that by these methods, if we only had statistics enough, we could mark down accurately for each fish the time of its coming at every position in the North Sea, and then, weaving all the facts together, show the route followed in the migration of every species of fish.

The next figure (Fig. 6) illustrates how, by drawing two curves together, we may easily compare the periodic fluctuations of two different fish, or as in this particular case, between two sizes or ages of the same fish.

This figure shows the curve for Codling on area XXIX, the region immediately to the southward of area XXIII, for which the curve has already been drawn (Fig. 4). It will be seen, as we should naturally

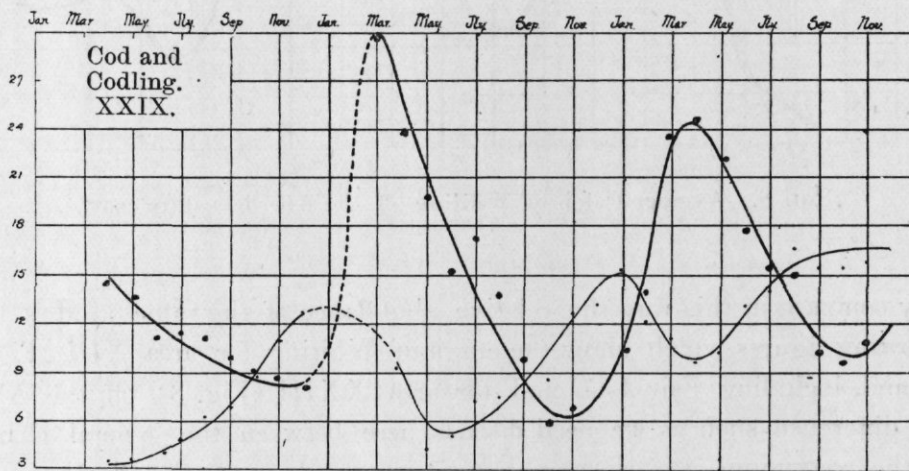


FIG. 6. Average Catch of Cod and Codling, southward of the Aberdeen Grounds, 1901-1903, smoothed from three-monthly averages. Thin line, Codling ; thick line, Cod.

expect, that the curves are very nearly identical, that is to say, that the phenomena are very much the same on these two similar and adjacent areas. But in this figure we have added also the curve for large Cod to that of Codling, and can thus compare or contrast the two. We see that the big Cod as well as the Codling come in a single annual wave, but that the dates of the two waves do not coincide. The Cod reach their maximum about March or April, a month or two later than the Codling, and reach their minimum about November or December, when the Codling are at or near their greatest abundance.

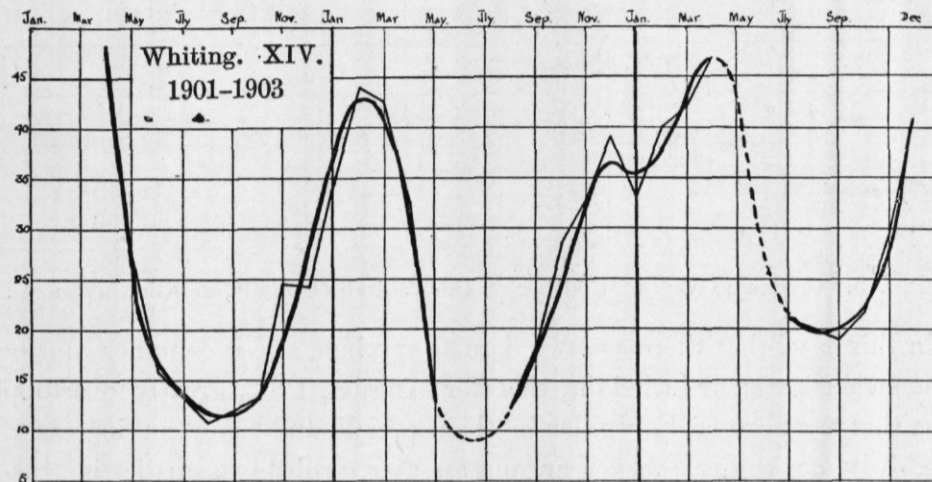


FIG. 7. Average Catch of Whiting to the south of Shetland.

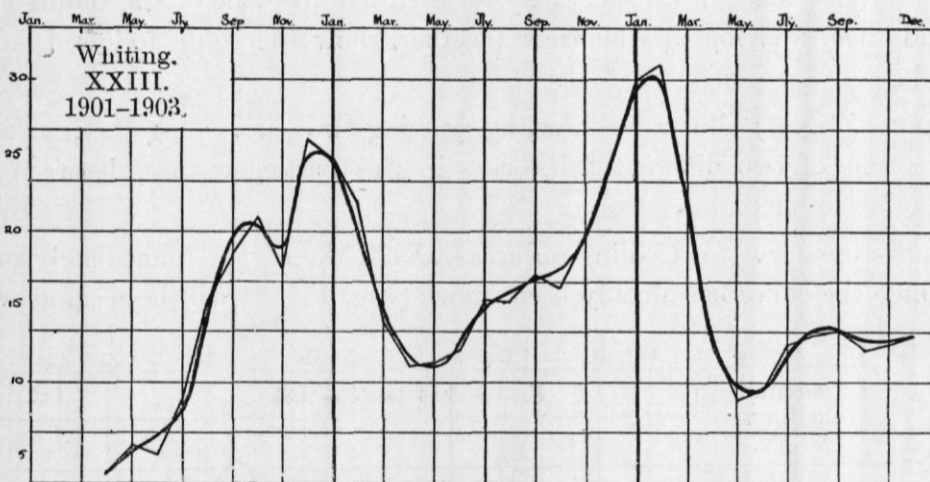


FIG. 8. Average Catch of Whiting off the Aberdeenshire coast.

Again, we may compare in this way the relative abundance of the same kind of fish upon different areas as in the following figures which show the curve of Whiting for area XIV (Fig. 7), the region to the south of Shetland, including Fair Isle, and for area XXIII (Fig. 8) off the Aberdeenshire coast. There is no great difference such as we need discuss here between the general characters of the two curves, save that the maximum is earlier on the Southern than on the Northern Ground, but they clearly show a greater abundance of the fish on the latter than on the former.

STATISTICS OF THE LINE FISHERY.

It is not our purpose to attempt to deal at present with the statistics of the line-fishing industry so fully as with the trawlers : and that owing to several difficulties. In the first place, as has been explained already, it is not possible for us to discriminate as yet between the fish caught by the steam-liners and by the smaller sailing boats ; and, again, as the boats may be used both for herring-drifting and for line-fishing, it is difficult to apportion the increasing number of steam-vessels between the two industries.

There are some economic aspects, for instance the distant areas accessible and the small number of hands employed in proportion to the catch, from which the steam-liner seems to us more comparable to the trawler than to the sailing boat : in short, the distinction between trawl-fishery and line-fishery, which for years past has chiefly interested us, deserves now to be supplemented by another statistical element, namely, by a distinction between the yield of steam-craft and of sailing-craft. Nevertheless, in spite of these difficulties, I think it worth while to bring together in the following Tables a few facts that may be gleaned from the last twelve Annual Reports of the Fishery Board.

In the first of these Tables are shown the number and value of steam-fishing vessels (excluding trawlers) employed (1) from Aberdeen and (2) in all Scotland since the year 1893. It will be seen that the number has increased, somewhat unsteadily, but of late rapidly, in Scotland, but has increased much more slowly of recent years at Aberdeen. This, together with the fact that the value of the lines has for the last four years increased comparatively slowly in the Scottish fleet as a whole, reminds us that the recent rapid increase of steam-fishing vessels has been chiefly for the purposes of the Herring fishery.

Table shewing the Number and Value of Steam Fishing Vessels (excluding trawlers), and the Value of their Lines employed, from *Aberdeen* and in *all Scotland* :—

Year.	Aberdeen.			Scotland.		
	Number.	Value.		Number.	Value.	
		Boats.	Lines.		Boats.	Lines.
1893	13	£ 24,330	£ 644	38	£ 51,980	£ 1,839
1894	17	37,550	842	44	67,506	1,904
1895	18	39,410	1,034	46	72,030	2,300
1896	30	70,150	1,872	53	117,290	3,286
1897	28	66,550	1,495	57	125,480	3,345
1898	18	43,700	1,099	41	84,535	2,557
1899	19	42,750	1,520	44	82,780	2,900
1900	36	86,250	2,792	70	145,490	4,186
1901	47	105,250	3,758	97	200,910	6,480
1902	44	101,600	3,358	100	205,620	6,399
1903	50	113,550	4,002	156	355,915	7,165
1904	52	98,600	4,342	204	453,095	8,271

The next Table shows the total quantity and value of line-caught fish landed, by steam and sailing vessels alike, (1) at Aberdeen and (2) in all Scotland. The steady increase of the catch until 1896, and its steady and great fall until about 1902-1903, followed by a very considerable rise in 1904, are all evident.

Table shewing the Total Quantity and Value of *Line-caught* Fish landed at *Aberdeen* and in *all Scotland* :—

Year.	Aberdeen.		All Scotland.		Percentage at Aberdeen.	
	Quantity.	Value.	Quantity.	Value.	Quantity.	Value.
1893	Cwts. 133,286	£ 67,833	Cwts. 1,292,626	£ 531,156	Cwts. 10·3	£ 12·8
1894	156,352	78,791	1,387,460	525,340	11·3	15·0
1895	190,057	87,551	1,479,654	548,629	12·9	16·0
1896	235,283	110,218	1,589,204	581,746	14·8	18·9
1897	227,278	116,350	1,416,237	570,031	16·0	20·4
1898	197,173	105,566	1,058,993	470,113	18·6	22·5
1899	187,590	108,161	939,362	439,851	20·0	24·6
1900	169,378	103,279	757,416	371,173	22·4	27·8
1901	170,936	104,873	696,019	341,892	24·6	30·7
1902	166,089	100,834	608,750	318,308	27·3	31·7
1903	146,744	93,953	602,603	315,955	24·4	29·7
1904	197,041	106,830	753,740	361,185	26·1	29·6

Table shewing the Length in yards of Great Lines in use on Steam-vessels and Sailing-vessels in Aberdeen, on the East Coast generally, and in all Scotland :—

Year.	Sailing-Vessels.			Steam-Vessels.		
	Aberdeen.	East Coast.	Scotland.	Aberdeen.	East Coast.	Scotland.
1893	253,440	19,969,200	31,291,045	411,840	909,840	922,800
1894	184,320	20,115,820	31,269,310	538,560	1,053,360	1,066,320
1895	240,000	21,104,230	31,168,530	620,160	1,243,740	1,285,500
1896	192,000	19,105,520	28,987,780	1,123,200	1,833,320	1,900,520
1897	96,000	18,857,860	28,286,600	879,840	1,859,440	1,907,440
1898	120,000	18,446,720	28,213,640	669,120	1,474,380	1,492,380
1899	108,000	17,238,720	27,125,880	729,600	1,444,860	1,496,700
1900	108,000	15,777,820	25,915,180	1,340,160	2,050,380	2,102,220
1901	108,000	15,106,760	25,308,060	1,803,840	3,186,540	3,238,380
1902	108,000	14,011,020	23,752,560	1,611,840	3,133,140	3,147,540
1903	108,000	13,501,940	21,503,780	1,920,960	3,526,260	3,540,660
1904	120,000	13,310,640	21,382,320	2,084,160	4,214,100	4,228,500

Lastly, as the best available mode of showing the proportion of line-fishing done by steam-vessels to that done by sailing craft, I give a Table showing the Fishery Board's official estimate of the length of line in use on board the Scottish steam and sailing liners, distinguishing (1) the port of Aberdeen, (2) the East Coast, and (3) Scotland as a whole.

We see from this Table, firstly, how completely steam has come to predominate in the great-line fishing from the port of Aberdeen ; secondly, how largely the Scottish steam-line fishery is restricted to the East Coast ports. Next, we see how steadily the lines on board the sailing liners have diminished in quantity both on the East Coast and in Scotland as a whole ; and how rapid, in spite of certain fluctuations, has been the increase of those in use by the steam-liners in Aberdeen and on the East Coast generally. This Table does not take account of the Small or Haddock lines, of which none are used by the steam-liners ; the total quantity of Small and Hand-lines in use in Scotland at the present time on board the smaller sailing craft is somewhat greater than the quantity of great-lines in use on steam liners and sailing liners together. It is plain that the steam liner does not enter directly into competition with the inshore fisherman, but, on the other hand, tends to compete more and more with the sailing liner, and even with the trawler, in the capture of Cod, Halibut, and other of the larger fish.

SPECIAL STATISTICS OF LINE-CAUGHT FISHES. ABERDEEN MARKET, 1903.

While special statistics have been kept, so far as possible since the beginning of 1901, of the place of capture and of the quantity of each species caught by Aberdeen steam-trawlers, it was only in the beginning of 1903 that a similar record began to be kept for the line-caught fish.

The Tables to be found on pp. 456-469 have been compiled mainly from the catches of steam-liners landing their catches on the Aberdeen market, a few also of the large great-line sailing boats being included in the return. The bulk of these statistics is much less than in the case of the trawlers, and the total quantity of fish dealt with much less, but it bears a larger proportion than in the case of the trawlers to the whole Aberdeen catch.

The liners fish for the most part in fleets, all or many of them being at one and the same time on the same ground, as a glance at our monthly charts will show ; and hence there is neither need nor possibility of secrecy in regard to their movements, and information is more readily obtained from them than from the trawlers in regard to the actual place of fishing.

Moreover it will be found that owing to the same cause, though as a rule fewer areas are represented in any one month's statistics, yet for many, if not most of these areas, we have a considerable number of returns, while in the case of the trawlers we were troubled with very many cases where an area in a given month was represented, for instance, by a single catch, on the evidence of which but little weight could be laid.

In dealing with the trawling statistics a certain number of returns have been set aside when the reported position lay so near to the boundary of two adjacent areas that it could not clearly be assigned to one or other ; in the case of liners such returns and a considerable number of others, which, in the case of trawlers would have been put into one area or the other, have been separately classified as intermediate between the two adjacent areas. The result of this is that the classification according to locality is more detailed in the case of the line than of the trawl statistics. The whole fleet of lines of a steam-

liner, or great-line sail boat, is many miles long, and cases are, therefore, common where one end of the line is in one of our conventional areas and one in another ; and as a matter of fact it will be found in the course of studying the Tables that these intermediate returns are distinctly useful in extending and confirming the information which we have for the main areas.

The lines of the Aberdeen steam-liners are as a rule 480 fathoms long, each carrying 135 hooks ; the vessel carries usually 42 lines, each fisherman having 7 ; this shoot of lines can be shot in from three to three and a half hours, and in the work of hauling 20 to 30 minutes may be allowed for each line. In the case of the relatively small number of large sailing liners whose returns are incorporated in the Tables, their lines have been brought to the same standard of length. At the present time, a steam liner making one trip a week may, if sufficient bait be available, have out at *one* shot a stretch of nearly 23 miles of line.

CHARTS SHEWING THE FISHING GROUNDS OF THE ABERDEEN FLEET DURING 1903.

To this Report is appended a set of twelve Charts shewing, from month to month during the year 1903, the position of the vessels from whose work our special statistics are drawn, and corresponding accordingly with the statistics set forth in the pages immediately following. They include the North Sea area alone, or rather that portion of the North Sea southward of which our Aberdeen vessels seldom fish. The West Coast fishing, at Rona and Sule Skerry, in the Minch and elsewhere, though it had begun to be important in 1903, is not represented here, but its increasing importance will call for an enlargement of the Charts in our next Report.

As has been said, these special returns are, or were in 1903, obtained from about one-third of the trawlers and most of the steam-liners entering Aberdeen ; the number is large enough to give a fair idea of the distribution of the fleet and of the changes from season to season of the grounds frequented.

The Charts* explain themselves, and it is not necessary to add more than a very few words of comment upon them.

We are struck by the fact, already noted, that the liners are much less dispersed than are the trawlers, fishing in fleets, most of them on or near the same ground at the same time. In January and February the liners were at work off the mouth of the Moray Firth working gradually outwards ; in March and April they were getting southwards to the neighbourhood of the Long Forties, off the coast of Aberdeen ; in May we find them proceeding farther to the east, and from that month until August we find many, or most of them, fishing near the middle of our Chart, along a line near the eastern border of the Witch Ground and the Gut ; in June this line is seen to extend northwards to "Bergen," a fishing ground lying a little to the south of Bressay Shoal ; by September the fishing ground has shifted still further to the east, to the "Reef," which lies 200 miles N. by E. of Aberdeen, not far from the 100-fathom line, and a few boats resorted there until November : this is the region in which, as Dr. Fulton told us not long ago, we have the unusual phenomenon of an autumn spawning of the Cod ; by December all the vessels were back in Scottish waters, from the Aberdeenshire coast to westward of the Pentland Firth.

* If the reader happen to discover that the number of positions represented on the Charts does not precisely correspond with the returns made use of in the statistical Tables, the chief reasons are that when a skipper has fished in two places on one voyage, or when he has omitted to record the numbers of hours spent in fishing, the positions are marked upon the Chart though the returns cannot be made use of for the statistics. The scantiness of the returns for February is due to illness of the Clerk in charge.

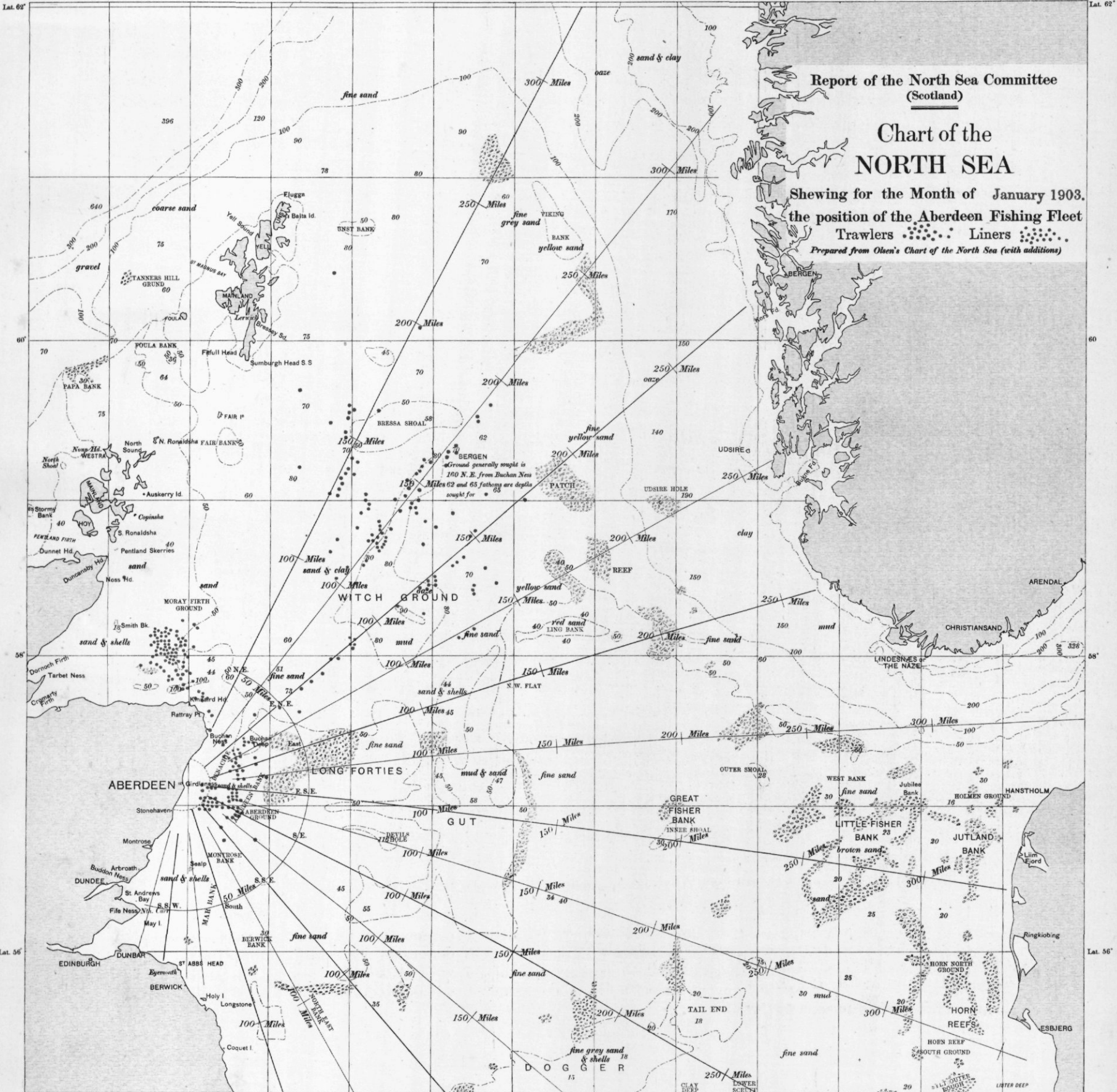
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Report of the North Sea Committee (Scotland)

Chart of the NORTH SEA

Shewing for the Month of January 1903. the position of the Aberdeen Fishing Fleet Trawlers Liners

Prepared from Olen's Chart of the North Sea (with additions)



Prepared & Printed at the O.S.O., Southampton



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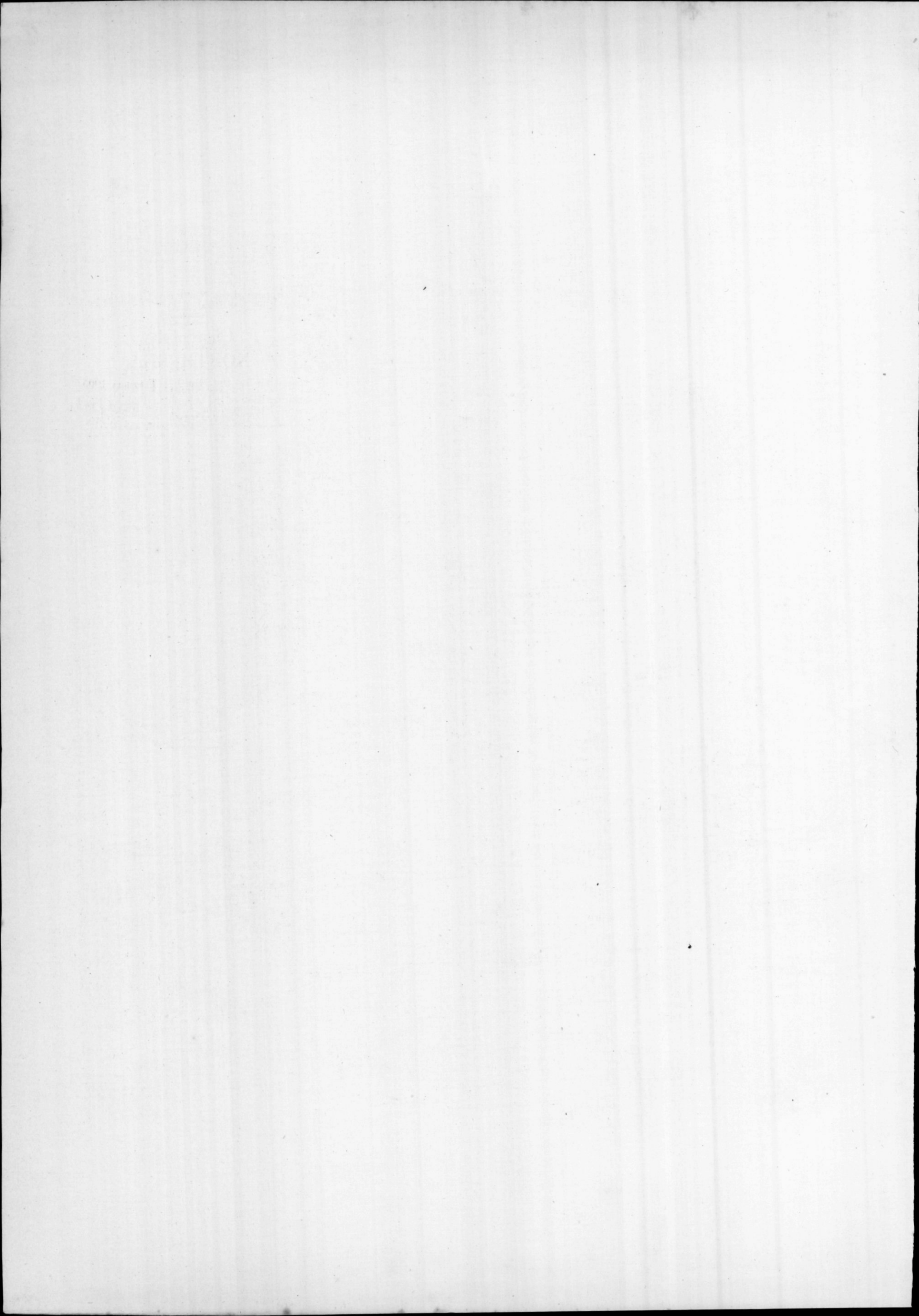
Report of the North Sea Committee
(Scotland)

Chart of the
NORTH SEA

Shewing for the Month of February 1903.
the position of the Aberdeen Fishing Fleet
Trawlers Liners
Prepared from Owen's Chart of the North Sea (with additions)



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Report of the North Sea Committee
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Chart of the
NORTH SEA

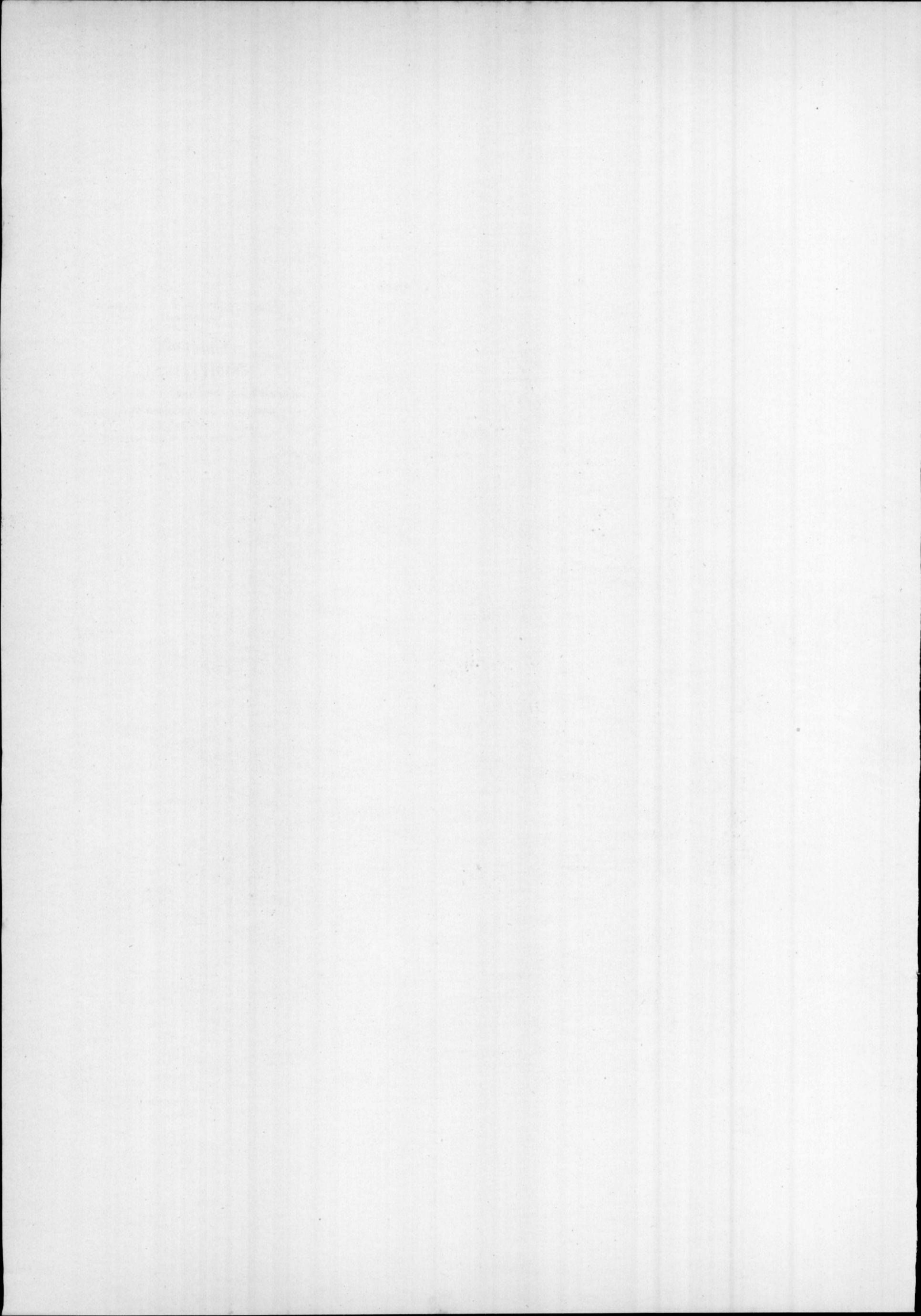
Shewing for the Month of March 1903.
the position of the Aberdeen Fishing Fleet

Trawlers Liners

Prepared from Olsen's Chart of the North Sea (with additions)



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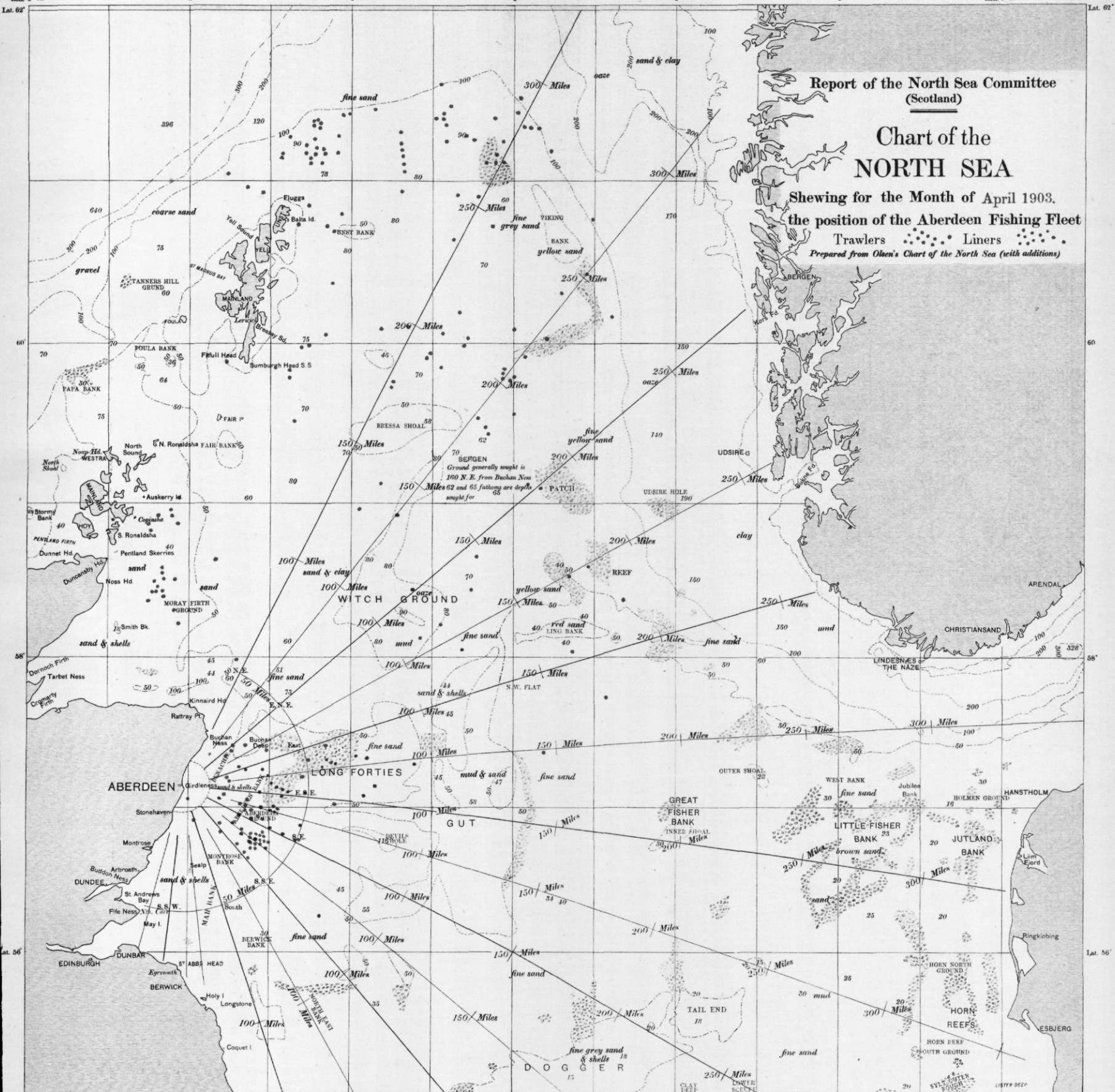


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Report of the North Sea Committee
(Scotland)

Chart of the
NORTH SEA

Shewing for the Month of April 1903.
the position of the Aberdeen Fishing Fleet
Trawlers Liners
Prepared from Olen's Chart of the North Sea (with additions)



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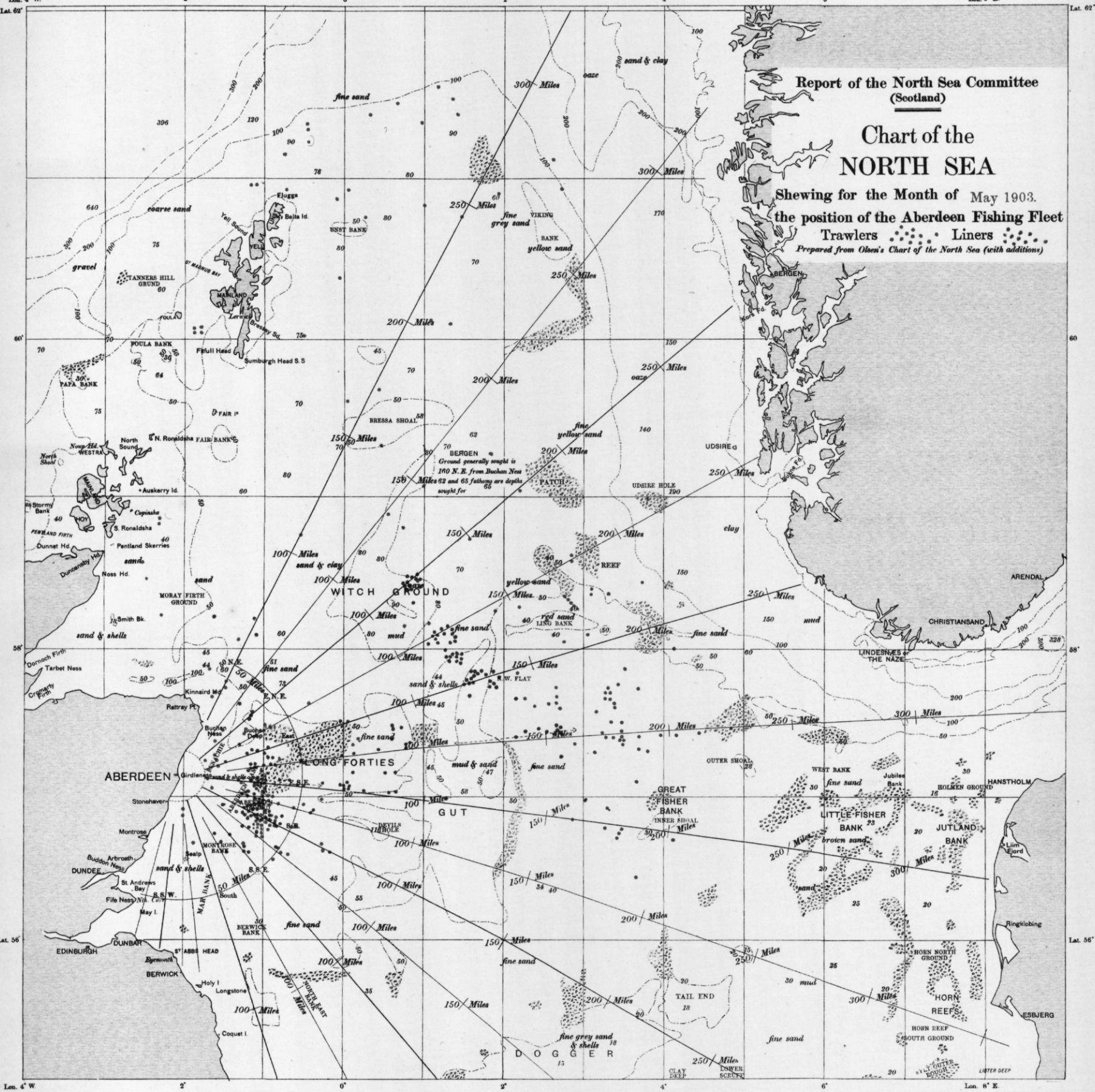
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Report of the North Sea Committee (Scotland)

Chart of the NORTH SEA

Shewing for the Month of May 1903. the position of the Aberdeen Fishing Fleet Trawlers Liners

Prepared from Olsen's Chart of the North Sea (with additions)



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Report of the North Sea Committee (Scotland)

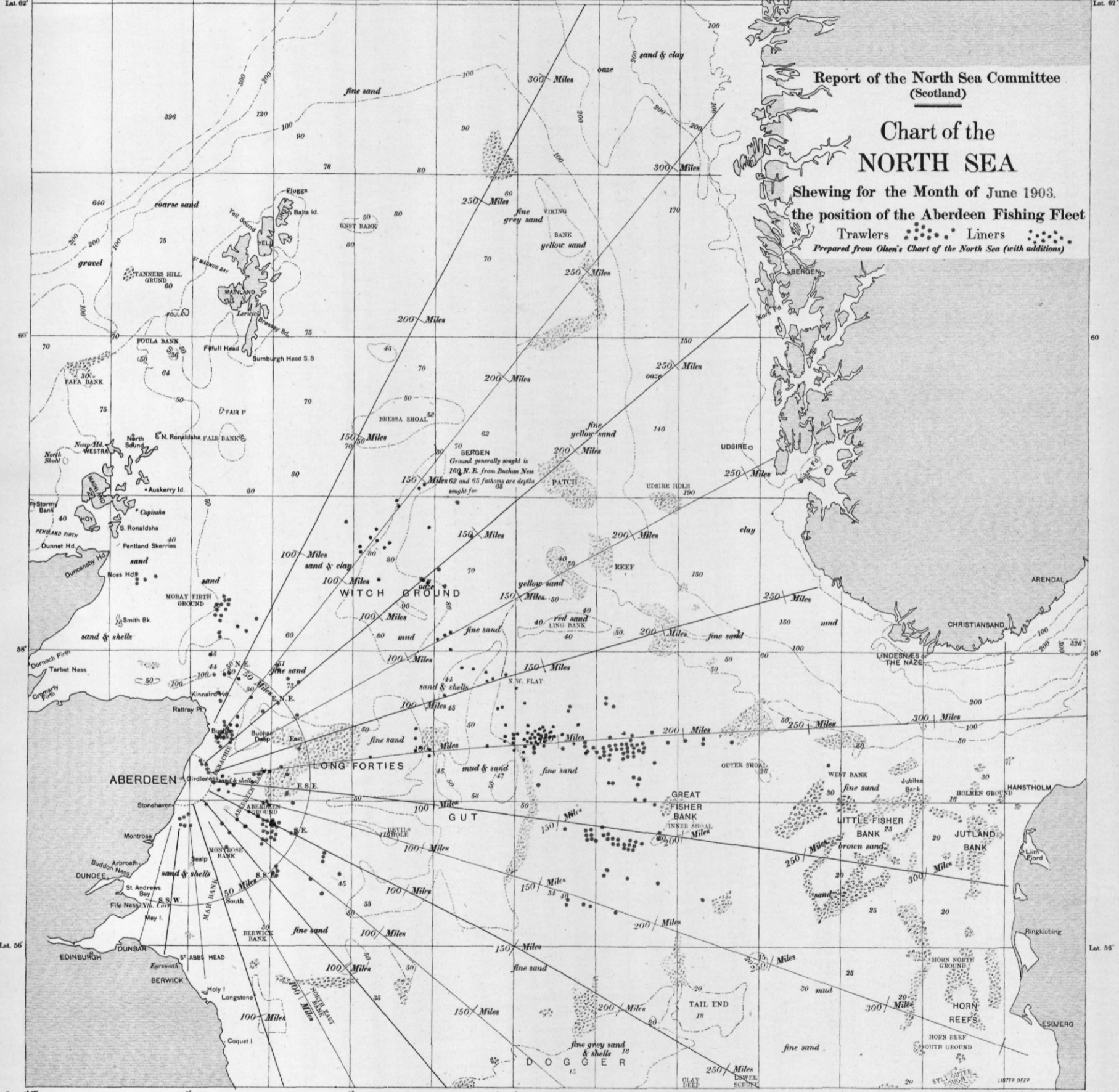
Chart of the NORTH SEA

Shewing for the Month of June 1903.

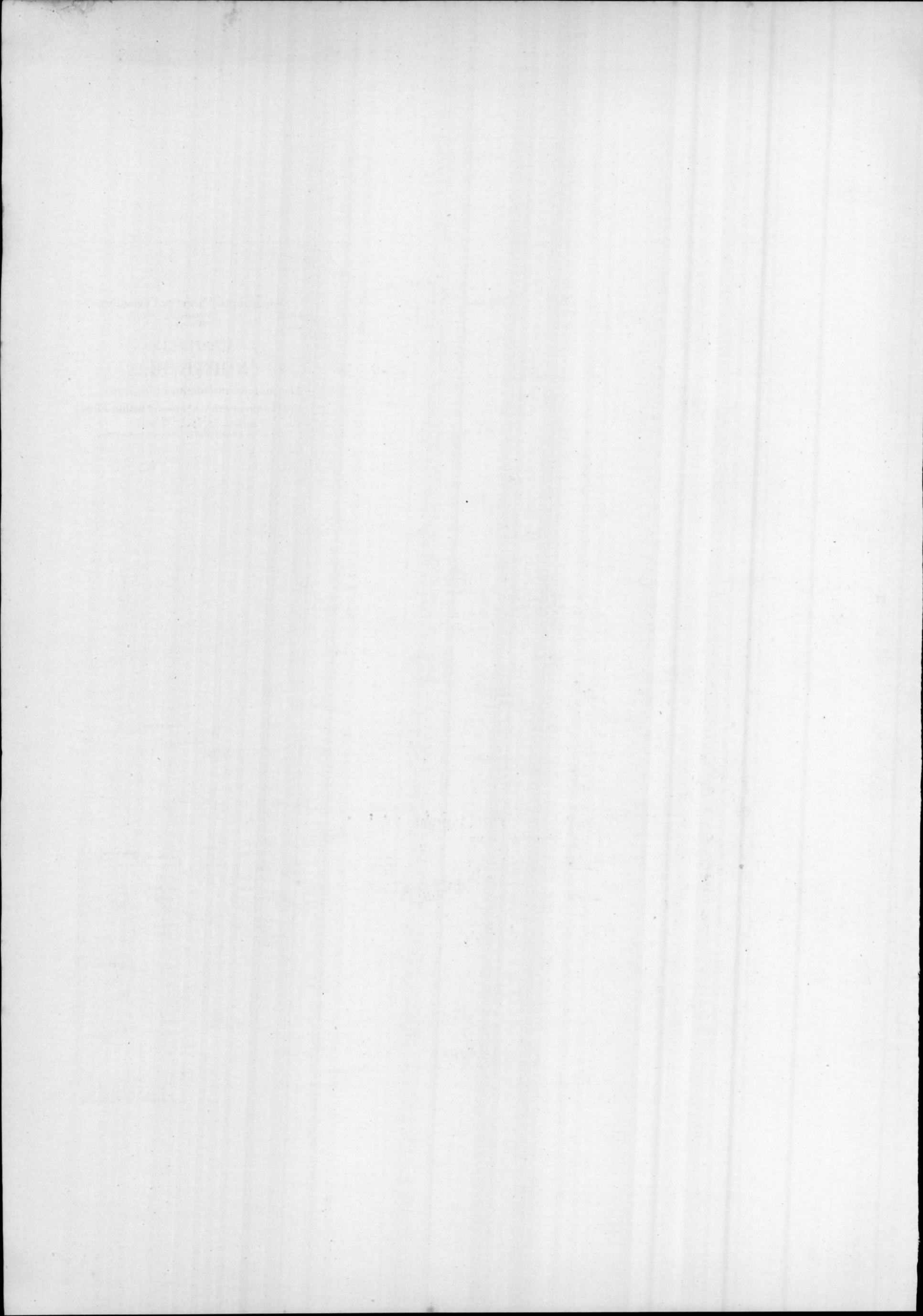
the position of the Aberdeen Fishing Fleet

Trawlers Liners

Prepared from Olsen's Chart of the North Sea (with additions)



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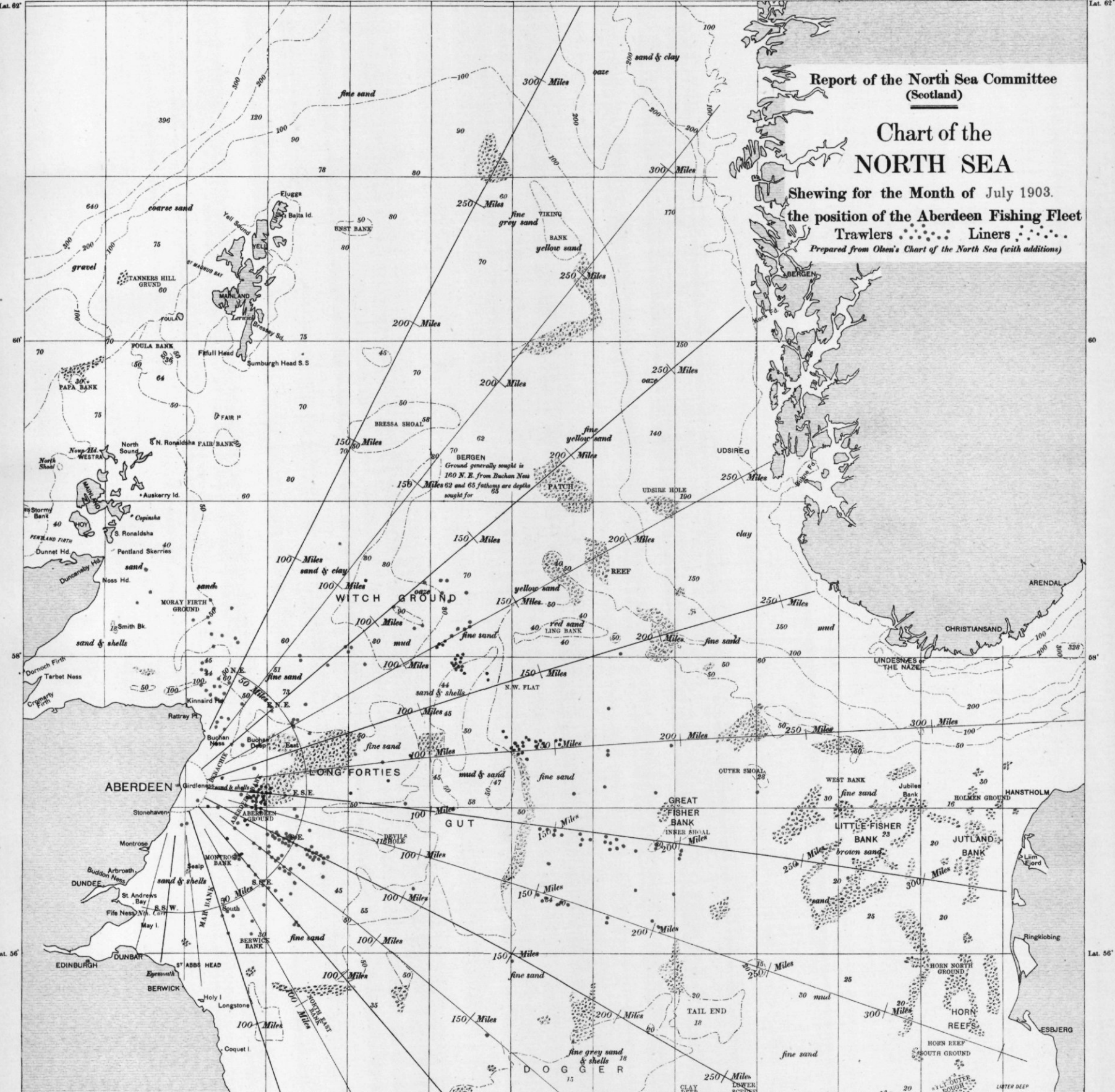


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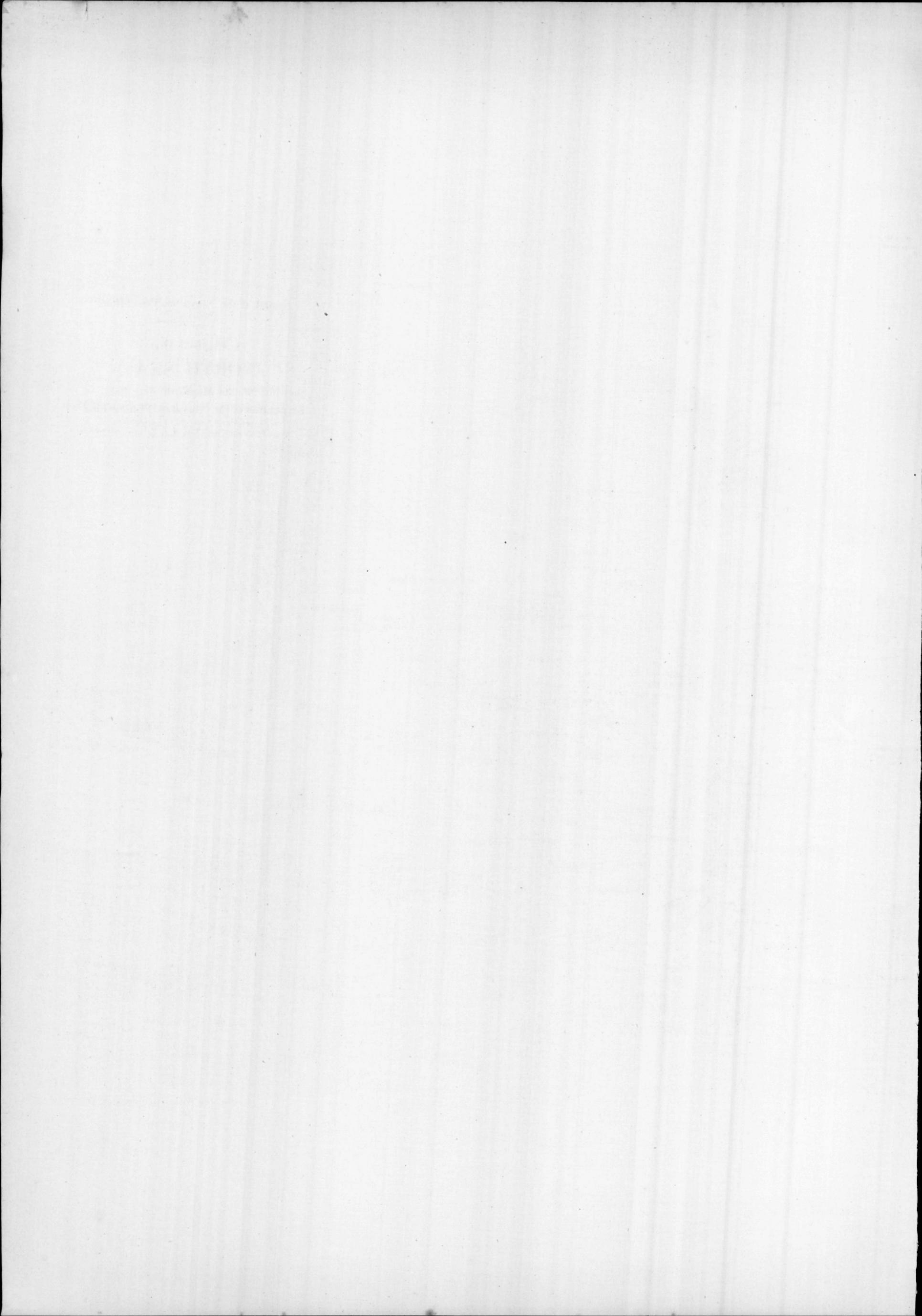
Report of the North Sea Committee (Scotland)

Chart of the NORTH SEA

Shewing for the Month of July 1903. the position of the Aberdeen Fishing Fleet Trawlers Liners Prepared from Olsen's Chart of the North Sea (with additions)



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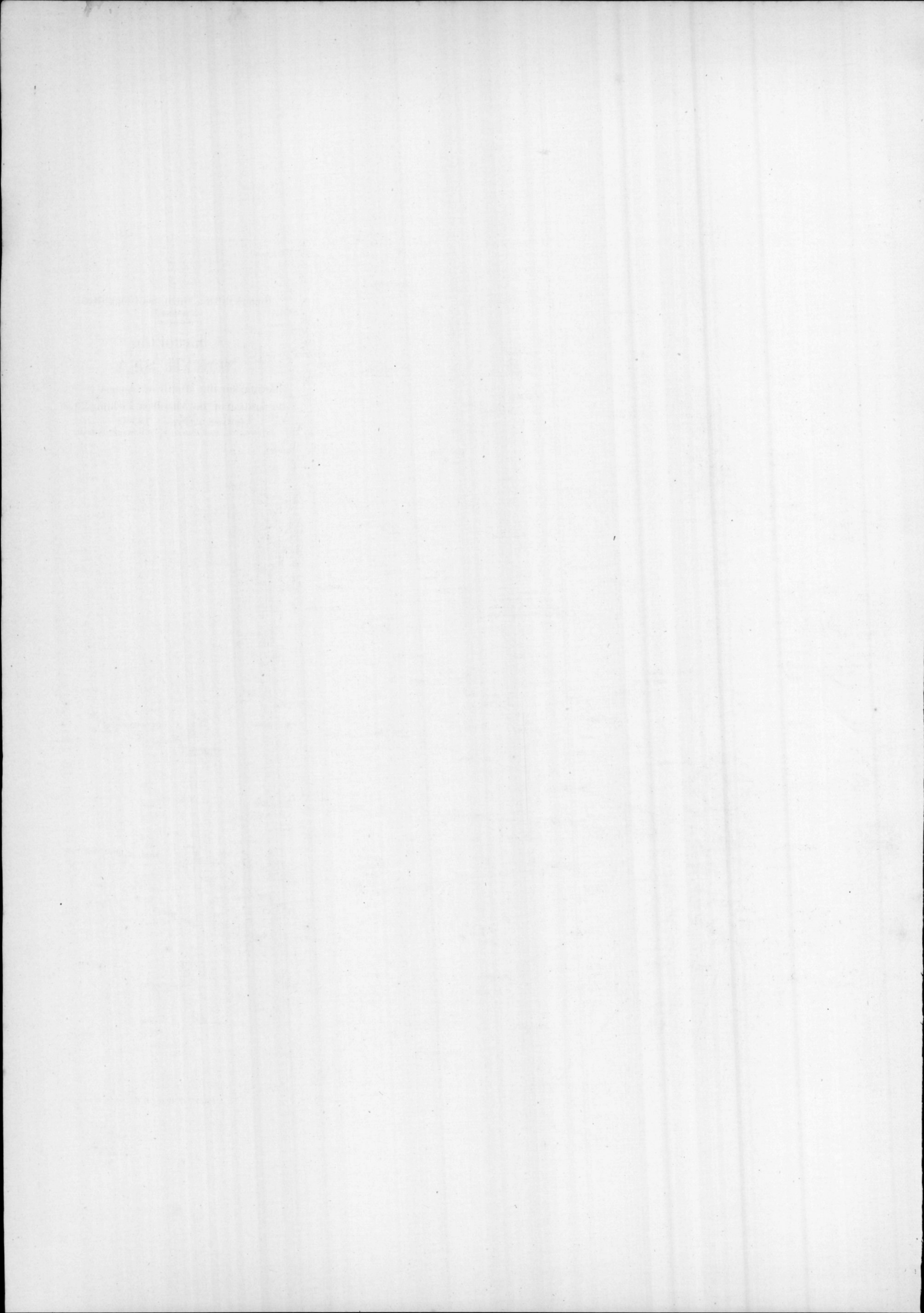
Report of the North Sea Committee (Scotland)

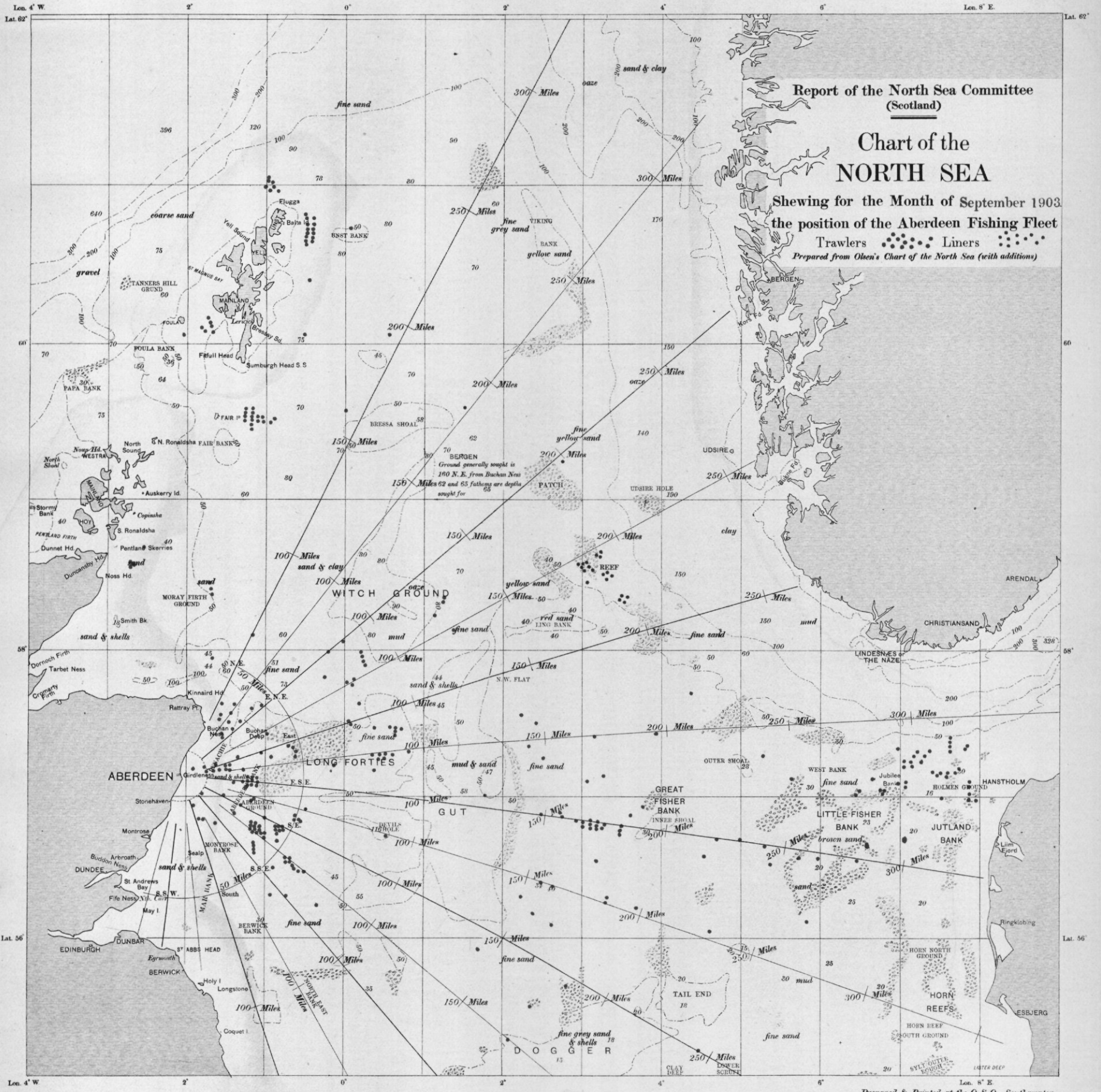
Chart of the NORTH SEA

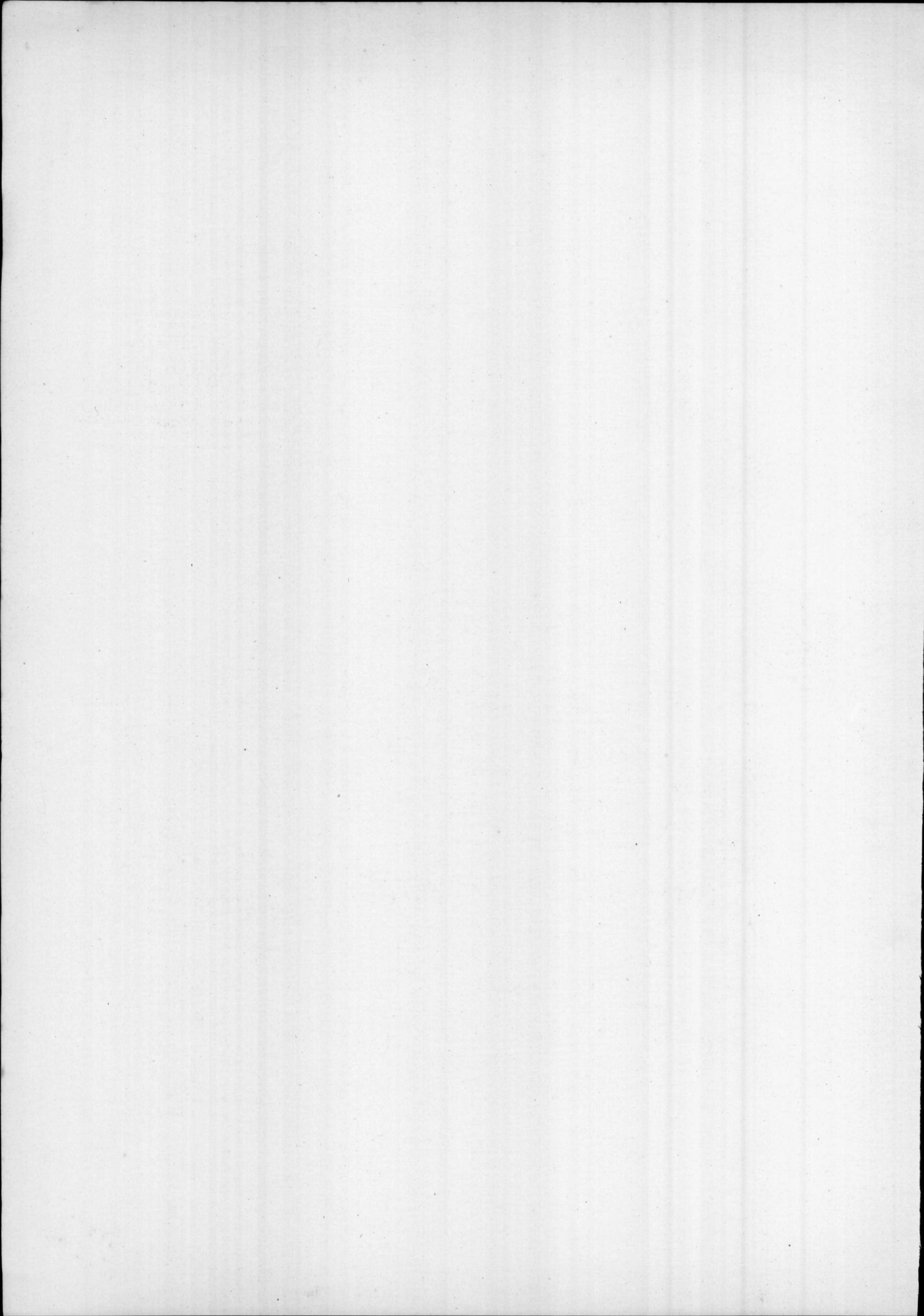
Shewing for the Month of August 1903. the position of the Aberdeen Fishing Fleet Trawlers Liners Prepared from Owen's Chart of the North Sea (with additions)



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**Report of the North Sea Committee
(Scotland)**

**Chart of the
NORTH SEA**

Shewing for the Month of November 1903,
the position of the Aberdeen Fishing Fleet
Trawlers Liners
Prepared from Olsen's Chart of the North Sea (with additions)



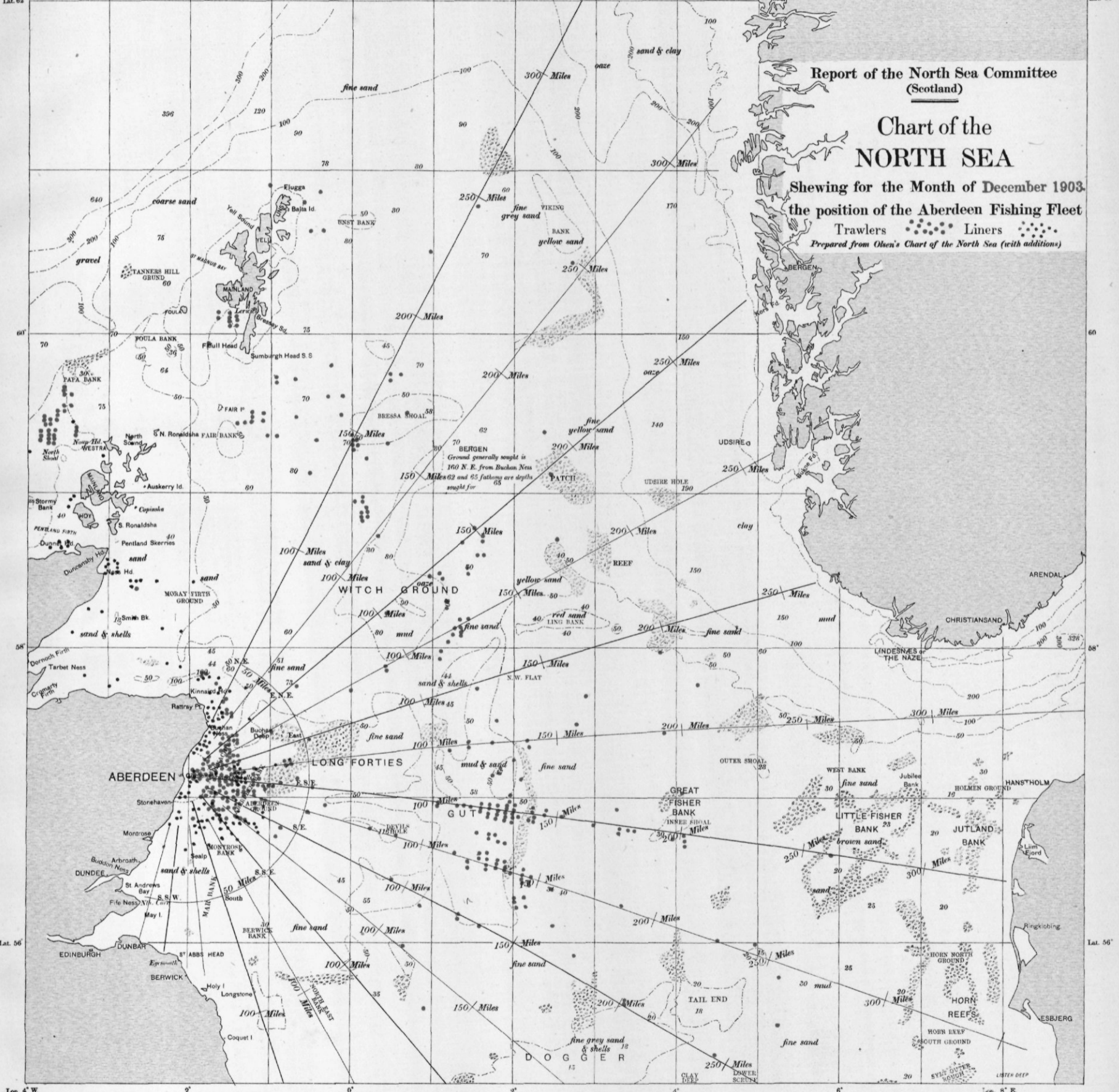
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Report of the North Sea Committee (Scotland)

Chart of the NORTH SEA

Shewing for the Month of December 1903 the position of the Aberdeen Fishing Fleet Trawlers Liners Prepared from Olsen's Chart of the North Sea (with additions)



Prepared & Printed at the O.S.O., Southampton



As regards the trawlers, we see throughout the year a fleet more or less crowded upon the "Near Grounds" of our own eastern coast. As for the rest, we find them in January and February scattered more or less to the north-eastward, from the Witch Ground to Bressay Shoal. In March they are still to the north of 58° , some off Orkney and the Shetlands, others scattered along the eastern edge of the North Sea plateau from the Viking Bank southward to the Reef. From March to April, but chiefly in April, is the season when the far northern grounds are frequented, north of 61° , near the extreme northern limit of the plateau. By May many are turning south, towards the Fisher Bank, where we see the predominant fishing in June, a tendency being perceptible during that month and July to proceed still farther south. In August the fleet is seen to be scattering, some southward to the Dogger, some eastward to the Holmen Ground; and in September we see an important fishing here in the eastern part of the North Sea, on the Holmen and the Little Fisher Bank. At the same time the fishing off Fair Isle and Shetland is increasing. By October, and still more by November, the fishing is seen to be greatly scattered well-nigh all over the North Sea from the Fisher Bank to Shetland. In December we recognise a tendency to forsake the grounds farthest to the eastward, and to concentrate along a curved line somewhere about 150 miles distant from Aberdeen, and reaching from the southern portion of the Gut north and west to Shetland.

These and many other points are easily to be seen from an inspection of the charts. The knowledge of where fish are to be found at the appropriate season is the outcome of old experience and also of persistent experiment on the part of skilled and adventurous fishermen. I will not attempt to pursue this subject further at present, but will only venture to remark that the facts which the fishermen have discovered are of the highest and most obvious scientific interest. If we succeed in reducing the complicated migrations of the fish to simple rules, as I believe we are within sight of doing, and of shewing the causes which govern them and the means by which they may be in part foreseen, such a result will be in chief part due to the many laborious discoveries which the fishermen themselves have made.