MERENTUTKIMUSLAITOKSEN JULKAISU
HAVSFORSKNINGSINSTITUTETS SKRIFT N:o 175

THE FREQUENCY OF EXTREME HEIGHTS OF SEA-LEVEL ALONG THE FINNISH COAST

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Helsinki 1957. Valtioneuvoston kirjapaino

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1. The results for Helsinki.

Regular records concerning sea-level have been made in Helsinki (Helsingfors) over a period of more than 50 years, the recording tide gauge having been in operation since the beginning of 1904. We have thus at our disposal a very comprehensive material reflecting the variations of sea-level on the north coast of the middle part of the Gulf of Finland. This enables us to get results of more general application than would be obtainable from less extensive observations. We can therefore to some degree amplify the statistical investigations made by STENIJ and HELA on the frequencies of different sea-levels along the Finnish coast [1]). It may, for instance, be important to know for several reasons, specifically practical ones, the frequency of a definite height of sea-level for a particular month, or for some more prolonged but limited time, above all in the navigation period. STENIJ and HELA have considered this interesting problem in a figure showing the annual changes of the frequency of sea-level in Helsinki according to the observations made in the years 1904—1932. Nevertheless, additional contributions concerning more or less extreme sea-levels, covering only a minor, but important part of the observations, may be of value. With this in mind the frequencies of extreme sea-levels were computed separately for every month. As extreme sea-level we have taken in this connexion all cases in which the heights deviated by at least 50 cm from the observed mean sea-level of the corresponding year.

The records for Helsinki used in this research cover the 50 year period 1904—1953. The results for every month in consecutive heights of 5 cm are reproduced in Tables 1 and 2 showing the extremely high and the extremely low sea-levels respectively. In order to obtain a more perspicuous picture, the figures are given not as frequencies but for every month, as

[1]) STENIJ, S. E. and HELA, ILMO: Suomen merenrannikoiden vedenkorkeuksien lukuisuudet. (Frequency of the Water Heights on the Finnish Coast.) Merentutkimuslaitoksen Julkaisu/Havsforskningsinstitutets Skrift N:o 138. Helsinki/Helsingfors 1947.

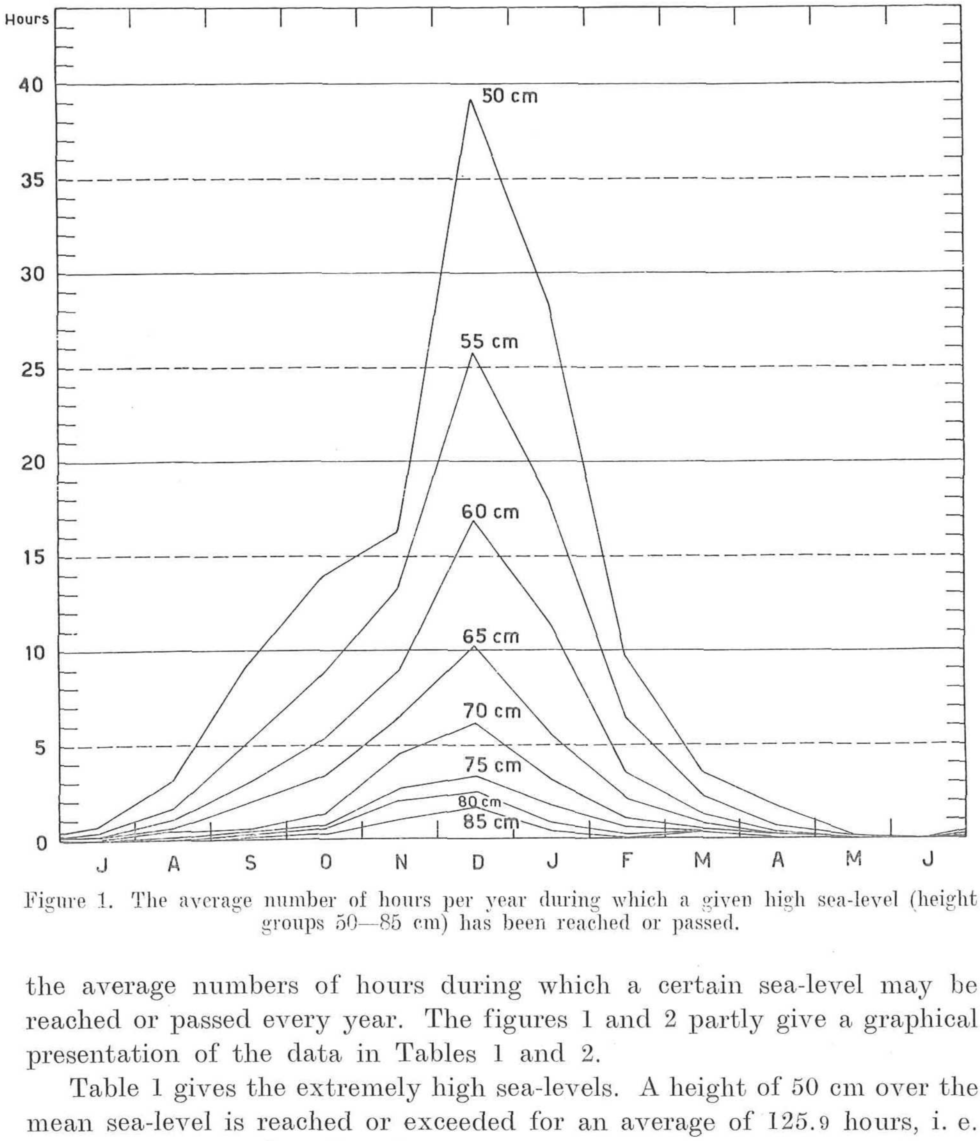

Figure 1. The average number of hours per year during which a given high sea-level (height groups 50—85 cm) has been reached or passed.

the average numbers of hours during which a certain sea-level may be reached or passed every year. The figures 1 and 2 partly give a graphical presentation of the data in Tables 1 and 2.

Table 1 gives the extremely high sea-levels. A height of 50 cm over the mean sea-level is reached or exceeded for an average of 125.9 hours, i. e. for slightly more than five days, yearly (corresponding to a frequency of 1.44 per cent only). It is obvious, however, that it would be quite incorrect to assume an even distribution of this time throughout all months. Two months only, December and January, are responsable for more than the half (53.5 per cent) of the heights in question, as can be seen from the last line but one in the table. The following figures in this line show, moreover, that the same fact is valid within rather narrow limits for practically all higher sea-levels too, the average percentage being 50.8. It is not until

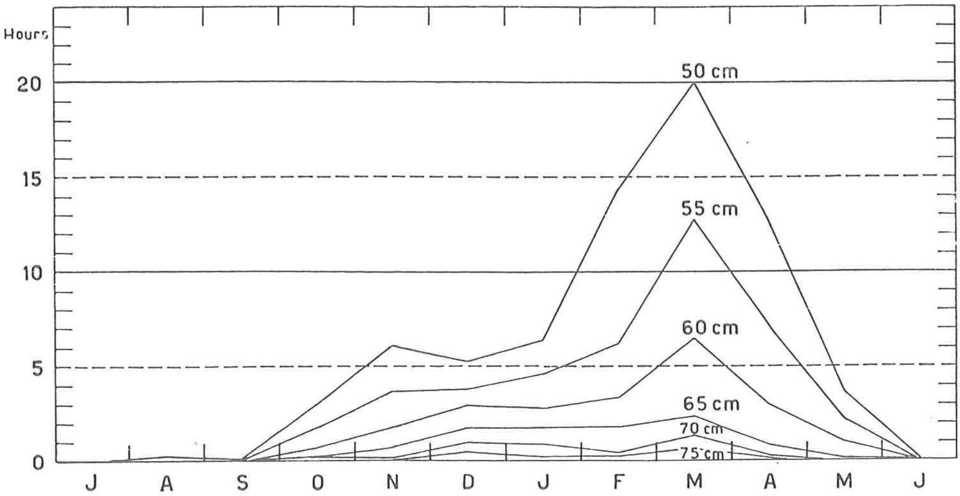

Figure 2. The average number of hours per year during which a given low sea-level (height groups 50—75 cm) has been reached or passed.

heights of or greater than 110 cm that this rule ceases to be applicable, however, owing to the rare incidence of such high sea-levels this has no practical significance.

While January and especially December are characterized by a relatively large number of cases of high sea-levels these high values seem to be practically excluded in June. They are, moreover, of no noteworthy significance in May. As a general rule it may be mentioned that during the half year from the beginning of March to the end of August heights between 50 and 100 cm above the mean sea-level have been observed on an average of 8.0 per cent only of the total incidence of such heights. These few figures above may suffice to give a distinct picture of the annual variations of high sea-levels.

Turning to low sea-levels, Table 2 shows us that these heights occur considerably less frequently than high sea-levels. Heights of at least 50 cm below the mean sea-level have occurred for an average of only 72.4 hours per year (corresponding to a frequency of 0.85 per cent). Taking more extreme heights still, the difference between high and low sea-levels becomes even more pronounced. Thus, while heights with a deviation of at least 90 cm above the mean sea-level have been observed, on an average, for 2.7 hours yearly, the same deviation below the mean sea-level has been recorded during 0.2 hours only and it represents, to the nearest 5 cm, the most extreme value of low heights.

The annual variations of low sea-levels also give a picture with very characteristic features. The frequencies reach a pronounced maximum in

March and are relatively high in February and April. The low sea-levels observed during these three months correspond, on an average, to 54.4 per cent of all the cases recorded for a definite low height group. The half year period with the smallest frequency of sea-levels below 50 cm appears about two months later than that with the high values, i. e. from the beginning of May to the end of October, corresponding, according to Table 2, to an average of 10.4 per cent of all the cases. As a general rule, then, the annual fluctuation of the frequencies is somewhat more restricted for the extremely low sea-levels than for the high ones.

There may arise on this connexion the question of the reasons for the annual course of the extreme sea-level frequencies. To some small degree a correspondence can be noted with the annual course of the mean sea-level in Helsinki. For the 50 year period 1904—1953 this mean has the following values, in cm:

J	F	M	A	M	J	J	A	S	O	N	D
4	—2	—11	—10	—13	—3	5	8	8	5	2	7

This little table shows us that the considerable frequency of low heights in early spring coincides with a low mean sea-level, while the relatively frequent high values in December and January harmonize with a secondary maximum of the mean sea-level. All the same the whole problem is considerably more complicated. The principal factor for the occurrence of extreme sea-levels must be sought in strong winds. These winds are recorded much more frequently during the winter half year than in summer. The consequence is the slight frequency of extreme sea-levels, high as well as low, during the summer months. The fact noted above that the period with a low frequency begins for the low heights two months later than the corresponding period of high values, must be ascribed, however, to the annual course of the mean sea-level which shows a very marked increasing tendency during the period in question, that is between May and August.

There seems to be still another factor which can not be neglected in this connexion. Table 1 shows that sea-levels above 100 cm have been recorded only during the months November, December and March. It is true that the number of cases with such extremely high sea-levels is very limited and their occurrence could therefore be considered quite fortuitous and of no practical importance. It is more probable, however, that the absence of these very high values in January and February is due to a more or less extensive and continuous ice cover on the sea. This ice cover must, of course, exercise a moderating influence upon the wind effect on the water surface and prevent a too pronounced piling-up of sea water caused by wind (Windstau).

Another question which can be studied on the basis of our observations is the average duration of the extreme values of sea-level. The results are given in Tables 3 and 4. The figures in these tables show the mean number of consecutive recordings for every fourth hour (2^h, 6^h, 10^h, 14^h, 18^h, and 22^h Finnish Standard time, i. e. GMT + 2 hours) when a given height of sea-level has been reached or passed. By multiplying these figures by 4 we get the approximative mean duration of the different heights in hours. A comparison of Tables 3 and 4 shows that although the low heights were less frequent than the corresponding high values their average duration has, as a rule, been considerably longer. Another feature is a correlation, though not a very pronounced one, between the annual variations of frequency and of the average duration, the two magnitudes varying at least to some degree in the same rhythm. There is, of course, a general decreasing tendency of the duration values in Tables 3 and 4 towards more extreme, values of sea-level. The course is, however, by no means smooth or uniform; on the contrary, a considerable number of exceptions to this general tendency can be noted. They are due to the fact that with increasing, respectively reducing, heights the frequency decreases rapidly and a few exceptional cases of long duration may become more and more predominant.

Besides the average duration of definite sea-levels also the maximum duration must be taken into account. The latter is a factor that can be of considerable interest in different connexions, above all practical ones. For this purpose Tables 5 and 6 give the maximum and the next to maximum number of consecutive recordings for every fouth hour for a given sea-level limit. One must thus, again, as with Tables 3 and 4, multiply all the figures by 4 in order to obtain approximately the maximum and the next to maximum duration in hours.

Table 5 shows a considerable dispersion of figures. In November there was one period of 208 hours with a sea-level of at least 50 cm and generally higher; however, the next persisting period during the same month showed a duration of 24 hours only. This shows the infrequency of really long continuous periods with extreme sea-levels. It is, moreover, characteristic of these longest periods with extreme sea-levels, that they do not show a build-up, as a rule, to a single peak; on the contrary, higher and lower sea-levels are recorded alternately. For instance, it appears quite distinctly from the group of heights of 55 and 60 cm or more for November that there were two marked peaks during the above-mentioned long period of 208 hours. The same fact can be noted also in a great many other periods. The annual course of the maximum duration of high sea-levels follows, on the whole, the annual variation of frequency. Some minor deviations are of a more or less fortuitous character.

All the above remarks are applicable also to Table 6, giving the maximum and the next longest duration of the low sea-levels.

2. Extension of the results for Helsinki to cover other tide-recording stations along the Finnish coast.

Although the data in Tables 1—6 refer to Helsinki only, they can be extended to cover other tide-recording stations in the Finnish sea area, as well. The geographical coordinates of these stations are as follows:

Kemi	65°44′ N.	24°33′ E.
Oulu/Uleåborg	65°02′	25°26′
Raahe/Brahestad	64°42′	24°30′
Pietarsaari/Jakobstad	63°42′	22°42′
Vaasa/Vasa	63°06′	21°34′
Kaskinen/Kaskö	62°23′	21°13′
Mäntyluoto	61°36′	21°29′
Rauma/Raumo	61°08′	21°29′
Degerby	60°02′	20°23′
Turku/Åbo	60°25′	22°06′
Hanko/Hangö	59°49′	22°58′
Helsinki/Helsingfors	60°09′	24°58′
Hamina/Fredrikshamn	60°34′	27°11′

More detailed studies have shown that there exists a more or less pronounced relation between the frequencies, of different sea-level heights, at different stations, and that it is the position of these stations along the coast which is of decisive importance in this connexion. In order to get the approximate frequencies, in terms of the average numbers of hours per year, for the separate tide-recording stations, the figures for Helsinki must be multiplied by a given factor. This factor, which is the same for high and low sea-levels, is given in Table 7.

A study of this table reveals, for instance, that the frequencies are identical for Helsinki and Vaasa; they are, as expected, at their lowest at Degerby, in the northern part of the Baltic proper; and they reach their highest values at Kemi, in the innermost part of the Gulf of Bothnia. The paucity of records with higher deviations than 80 cm makes it impossible to extend Table 7. Tables 8 and 9, giving for separate months the highest and the lowest sea-levels observed at the different stations during the 30 year period 1926—1955 (in so far as these stations were in operation during this time), may at least to some degree compensate this shortcoming.

When comparing the values for Helsinki in Tables 8 and 9 with those in Tables 1—6, a distinct influence of the length of the period is noted upon the results. A considerable number of the extreme cases listed in the latter tables cannot be traced in the former. The deviations in question permit one to count on a approx. 20 per cent increase in the extreme sea-levels in Tables 8 and 9, if one is to achieve more accurate results.

Table 1. The average number of hours per year during which a given high height of sea-level in Helsinki has been reached or passed. The heights refer to the observed mean sea-levels of the corresponding years

	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm	85 cm	90 cm	95 cm	100 cm	105 cm	110 cm	115 cm	120 cm
January	28.3	17.9	11.4	5.6	3.2	1.8	0.9	0.5	0.5	0.3	—	—	—	—	—
February	9.6	6.4	3.5	2.1	1.1	0.6	0.3	0.1	—	—	—	—	—	—	—
March	3.5	2.3	1.4	0.9	0.6	0.5	0.5	0.4	0.2	0.2	0.1	0.1	0.1	—	—
April	1.7	0.6	0.4	0.3	0.2	0.1	0.1	—	—	—	—	—	—	—	—
May	0.2	0.2	0.1	—	—	—	—	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	0.7	0.4	0.2	0.2	0.1	0.1	0.1	—	—	—	—	—	—	—	—
August	3.2	1.7	1.1	0.6	0.5	0.2	—	—	—	—	—	—	—	—	—
September	9.3	5.2	3.1	2.0	0.6	0.5	0.3	0.2	0.2	0.1	—	—	—	—	—
October	14.0	8.8	5.4	3.4	1.3	0.8	0.6	0.3	0.1	—	—	—	—	—	—
November	16.3	13.3	9.0	6.6	4.6	2.7	2.1	1.1	0.7	0.4	0.2	0.2	0.2	0.2	0.2
December	39.1	25.9	16.9	10.3	6.2	3.4	2.6	1.7	1.0	0.6	0.3	0.2	—	—	—
Year	125.9	42.7	52.5	32.0	18.4	10.7	7.5	4.3	2.7	1.6	0.6	0.5	0.3	0.2	0.2
December—January	67.4	43.8	28.3	15.9	9.4	5.2	3.5	2.2	1.5	0.9	0.3	0.2	—	—	—
March—August	9.3	5.2	3.2	2.0	1.4	0.9	0.7	0.4	0.2	0.2	0.1	0.1	0.1	—	—
Dec.—Jan. % / Year	53.5	53.0	53.9	49.7	51.1	48.6	46.7	51.2	55.6	56.2	50.0	40.0	—	—	—
March—Aug. % / Year	7.4	6.3	6.1	6.2	7.6	8.4	8.6	9.3	7.4	12.5	16.7	20.0	33.3	—	—

Table 2. The average number of hours per year during which a given low height of sea-level in Helsinki has been reached or passed. The heights refer to the observed mean sea-levels of the corresponding years

	—50 cm	—55 cm	—60 cm	—65 cm	—70 cm	—75 cm	—80 cm	—85 cm	—90 cm
January	6.4	4.6	2.8	1.8	0.9	0.3	0.2	0.2	0.1
February	14.3	6.2	3.4	1.8	0.5	0.3	0.2	0.1	—
March	20.0	12.8	6.5	2.4	1.4	0.7	0.6	0.2	0.1
April	12.6	7.1	2.9	0.8	0.3	0.2	0.2	0.1	—
May	3.8	2.2	1.0	0.2	—	—	—	—	—
June	0.2	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—
August	0.3	—	—	—	—	—	—	—	—
September	0.2	0.1	—	—	—	—	—	—	—
October	3.0	1.8	0.8	0.3	0.3	0.2	0.2	0.2	—
November	6.1	3.7	1.8	0.8	0.2	0.1	—	—	—
December	5.3	3.8	2.9	1.8	1.0	0.6	0.2	0.1	—
Year	72.4	42.3	22.1	9.9	4.6	2.4	1.6	0.9	0.2
February—April	46.9	26.1	12.8	5.0	2.2	1.2	1.0	0.4	0.1
May—October	7.5	4.1	1.8	0.5	0.3	0.2	0.2	0.2	—
Febr.—April % / Year	64.8	61.7	57.9	50.5	47.8	50.0	62.5	44.4	50.0
May—Oct. % / Year	10.4	9.7	8.1	5.1	6.5	8.3	12.5	22.2	—

Table 3. The average duration of high sea-levels in Helsinki. The figures show the mean number of consecutive records for every fourth hour when a given height has been reached or passed. By multiplying these figures by 4 one obtains the average duration in hours

	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm	85 cm	90 cm	95 cm	100 cm	105 cm	110 cm	115 cm	120 cm
January	3.4	3.0	2.7	2.4	2.2	1.7	1.6	1.5	1.5	2.0	—	—	—	—	—
February	2.6	2.3	1.9	1.6	1.8	1.6	1.3	1.0	—	—	—	—	—	—	—
March	2.3	2.2	1.7	2.2	1.6	2.0	2.0	1.7	1.5	1.0	1.0	1.0	1.0	—	—
April	3.5	2.7	2.2	2.0	2.0	1.0	1.0	—	—	—	—	—	—	—	—
May	2.0	2.0	1.0	—	—	—	—	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	2.2	2.5	2.0	2.0	1.0	1.0	1.0	—	—	—	—	—	—	—	—
August	2.9	1.9	2.8	2.7	2.0	1.5	—	—	—	—	—	—	—	—	—
September	2.7	2.2	1.8	1.8	1.6	2.0	1.3	2.0	2.0	1.0	—	—	—	—	—
October	3.4	2.4	1.9	1.6	1.3	1.4	1.4	1.0	1.0	—	—	—	—	—	—
November	4.1	3.7	3.4	3.1	2.4	2.8	2.4	1.8	1.6	1.2	1.5	2.0	2.0	2.0	2.0
December	4.6	3.5	3.0	2.9	2.4	3.1	3.3	3.0	2.6	1.6	1.3	1.5	—	—	—
Year	3.1	2.6	2.2	2.2	1.8	1.8	1.7	1.7	1.7	1.4	1.3	1.5	1.5	2.0	2.0

Table 4. The average duration of low sea-levels in Helsinki. The figures show the mean number of consecutive records for every fourth hour when a given height has been reached or passed. By multiplying these figures by 4 one obtains the average duration in hours

	—50 cm	—55 cm	—60 cm	—65 cm	—70 cm	—75 cm	—80 cm	—85 cm	—90 cm
January	4.7	3.6	2.7	2.6	2.2	2.0	2.0	2.0	1.0
February	6.0	4.3	3.9	2.2	3.0	4.0	3.0	1.0	—
March	6.4	7.0	4.0	2.7	4.2	3.0	2.3	3.0	1.0
April	5.1	4.4	3.3	2.5	4.0	3.0	3.0	1.0	—
May	5.2	3.4	2.0	2.0	—	—	—	—	—
June	1.0	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—
August	2.0	—	—	—	—	—	—	—	—
September	2.0	1.0	—	—	—	—	—	—	—
October	2.6	4.4	2.5	4.0	4.0	3.0	2.0	2.0	—
November	3.8	3.3	2.8	2.5	1.5	1.0	—	—	—
December	6.0	6.7	6.0	4.6	4.3	3.5	3.0	1.0	—
Year	4.1	4.2	3.4	2.9	3.3	2.8	2.5	1.7	1.0

Table 5. The maximum and next longest duration of high sea-levels in Helsinki. The figures show the mean number of consecutive records for every fourth hour when a given height has been reached or passed. By multiplying these figures by 4 one obtains the duration in hours

	50 cm	55 cm	60 cm	65 cm	70 cm	75 cm	80 cm	85 cm	90 cm	95 cm	100 cm	105 cm	110 cm	115 cm	120 cm
January	20	14	14	6	5	3	3	3	2	2	—	—	—	—	—
	16	12	9	5	4	3	2	2	2	2	—	—	—	—	—
February	9	5	4	4	2	2	2	1	—	—	—	—	—	—	—
	6	4	4	3	2	2	1	—	—	—	—	—	—	—	—
March	5	4	3	3	3	3	3	3	2	1	1	1	1	—	—
	4	3	3	3	2	2	2	1	1	1	—	—	—	—	—
April	5	4	3	2	2	1	1	—	—	—	—	—	—	—	—
	5	3	2	2	—	—	—	—	—	—	—	—	—	—	—
May	2	2	1	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
June	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
July	4	4	2	2	1	1	1	—	—	—	—	—	—	—	—
	3	1	—	—	—	—	—	—	—	—	—	—	—	—	—
August	8	5	5	4	3	2	—	—	—	—	—	—	—	—	—
	4	4	4	3	2	1	—	—	—	—	—	—	—	—	—
September	8	6	5	3	3	3	2	2	2	1	—	—	—	—	—
	6	4	3	3	2	2	1	—	—	—	—	—	—	—	—
October	20	11	10	5	2	2	2	1	1	—	—	—	—	—	—
	12	5	4	3	2	2	2	1	—	—	—	—	—	—	—
November	52	30	22	20	9	9	7	3	3	2	2	2	2	2	2
	6	14	9	5	7	4	4	2	2	1	1	—	—	—	—
December	35	24	13	10	10	9	9	8	4	3	2	1	—	—	—
	29	21	13	10	7	6	6	5	4	2	1	1	—	—	—

Table 6. The maximum and next longest duration of low sea-levels in Helsinki. The figures show the mean number of consecutive records for every fourth hour when a given height has been reached or passed. By multiplying these figures by 4 one obtains the duration in hours

	—50 cm	—55 cm	—60 cm	—65 cm	—70 cm	—75 cm	—80 cm	—85 cm	—90 cm
January	15	13	8	6	3	2	2	2	1
	11	9	6	5	3	2	—	—	—
February	29	18	17	7	5	4	3	1	—
	19	13	5	3	1	—	—	—	—
March	54	25	17	7	6	5	4	3	1
	40	19	9	5	5	2	2	—	—
April	37	30	12	5	4	3	3	1	—
	17	7	5	3	—	—	—	—	—
May	17	9	3	2	—	—	—	—	—
	16	4	2	—	—	—	—	—	—
June	1	—	—	—	—	—	—	—	—
	1	—	—	—	—	—	—	—	—
July	—	—	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—
August	2	—	—	—	—	—	—	—	—
	2	—	—	—	—	—	—	—	—
September	2	1	—	—	—	—	—	—	—
	—	—	—	—	—	—	—	—	—
October	21	10	7	4	4	3	2	2	—
	8	8	1	—	—	—	—	—	—
November	11	11	6	4	2	1	—	—	—
	7	5	4	3	1	—	—	—	—
December	40	35	15	8	7	6	3	1	—
	6	4	10	6	4	1	—	—	—

Table 7. Factors giving, for different height deviations from the average sea-level, the relation between the frequencies at Helsinki and at other-tide recording stations along the Finnish coast

Height deviations, cm	Kemi	Oulu	Raahe	Pietarsaari	Vaasa	Kaskinen	Mäntyluoto	Rauma	Degerby	Turku	Hanko	Helsinki	Hamina
50	3.5	2.5	2.0	1.5	1.0	0.8	0.6	0.5	0.4	0.6	0.6	1.0	1.5
60	5.0	4.0	3.0	2.0	1.0	0.7	0.5	0.4	0.2	0.4	0.5	1.0	2.5
70	7.0	5.0	4.0	2.0	1.0	0.7	0.5	—	—	0.4	0.4	1.0	3.0
80	13.0	9.0	6.0	2.5	1.0	—	—	—	—	—	—	1.0	5.0

Table 8. The maximum observed sea-levels (cm)

	J	F	M	A	M	J	J	A	S	O	N	D
Kemi	134	107	85	80	78	70	80	85	136	**156**	153	133
Oulu	124	108	77	62	66	54	67	86	136	**138**	131	119
Raahe	115	102	91	67	42	44	53	73	109	117	**123**	120
Pietarsaari	90	92	69	51	39	39	46	57	87	93	**113**	93
Vaasa	87	84	56	50	40	49	46	67	80	**101**	99	97
Kaskinen	83	80	62	47	32	40	49	51	68	89	**97**	89
Mäntyluoto	84	80	50	48	34	40	47	59	66	82	85	**98**
Rauma [1])	88	74	51	52	25	41	40	63	75	79	76	**99**
Degerby	73	62	55	56	31	32	36	49	54	72	70	**87**
Turku	80	85	58	56	35	48	45	57	71	82	83	**106**
Hanko [2])	84	77	61	65	37	38	43	54	76	76	76	**97**
Helsinki	103	86	98	80	44	45	51	77	83	103	101	**106**
Hamina [3])	**132**	101	122	89	54	63	61	99	107	119	130	126

[1]) The years 1933—1955 only. — [2]) The years 1926—1938 and 1943—1955. [3]) The years 1929—1955 only.

Table 9. The minimum observed sea-levels (cm)

	J	F	M	A	M	J	J	A	S	O	N	D
Kemi	—**136**	—82	—119	—105	—118	—74	—64	—72	—119	—130	—116	—113
Oulu	—132	—78	— 94	—123	—116	—79	—65	—75	— 98	—**134**	—120	—101
Raahe	—**129**	—72	—117	—114	—110	—61	—54	—60	— 86	—126	— 99	—100
Pietarsaari	—109	—76	—104	— 93	— 92	—50	—48	—49	— 64	—**110**	— 79	— 85
Vaasa	—**102**	—69	— 89	— 83	— 84	—46	—46	—42	— 49	— 83	— 74	— 74
Kaskinen	— **88**	—62	— 70	— 82	— 81	—42	—37	—39	— 58	— 65	— 60	— 73
Mäntyluoto	— **80**	—65	— 67	— 82	— 68	—41	—33	—36	— 51	— 59	— 59	— 70
Rauma [1])	— 62	—64	— 62	— 80	— 53	—40	—28	—36	— 49	— 54	— 57	— **69**
Degerby	— 55	—**63**	— 57	— 72	— 47	—32	—23	—32	— 36	— 38	— 40	— 58
Turku	— **73**	—70	— 65	— 75	— 53	—37	—25	—35	— 39	— 49	— 47	— **73**
Hanko [2])	— 62	—**75**	— 64	— 79	— 50	—36	—26	—37	— 39	— 37	— 47	— 73
Helsinki	— 78	—80	— 84	— 89	— 55	—40	—31	—38	— 42	— 58	— 76	— **89**
Hamina [3])	—101	—88	—111	— 84	— 64	—51	—39	—43	— 63	— 87	—**113**	—100

[1]) The years 1933—1955 only. — [2]) The years 1926—1938 and 1943—1955. — [3]) The years 1929—1955 only.