

UNIVERSITY OF CALIFORNIA

THE SCRIPPS INSTITUTION OF OCEANOGRAPHY  
LA JOLLA, CALIFORNIA

Oct 1st, 1951

Mr. Grote Reber  
Wailuku, Maui, T. H.

Dear Reber:

Dr. Walter Munk has asked me to send you the enclosed report which gives computed wave conditions at four Pacific Ocean locations. None of these are very near Hawaii, but they help you.

The Hydrographic Office has published monthly sea and swell charts (# 10712C for North West Pacific; # 10712D for North East Pacific) which might be of help to you. The branch of the Hydrographic Office in Honolulu can perhaps give you information about these charts.

Sincerely yours

R. S. Allen

National Advisory Committee on Oceanography

Note # 1493, 1999

"Statistical Study of Wave Conditions at Four Open Sea Localities"; Harney, Sauer, & Robinson  
Additional reference; probably one 2 have.

The one 2 have was originally  
"a Statistical Study of Wave Conditions"  
S. I. O. Wave Project Report # 53  
Contract NObs 2490  
Scripps Library # GC 3. U3 - 534W

In this study they give examples of getting wave conditions between the four points by averaging the data of computed positions. Walter Munk says this is a very doubtful process.

153	207	152	360	126	234
82	153	71	152	58	126
71	360	81	360	190	360
171	157	104	314	104	104
238	284	360	294	294	294
67	127	42	68	68	68
72	360	77	171	171	171
54	360	148	312	171	189
110	177	360	110	177	183
177	183	122	238	122	238

10-12-51

Had long talk with Walter Munk. He thinks my arithmetic is more detailed than the data warrants on wave height and length. According to him the sea and swell charts are mostly compilations of numbers from untrained observers. In the area of the Islands with big ocean waves most observers record waves as swell. Thus the wave or sea observations are near meaningless while the swell observations may have some value. Since the prevailing winds are from north of east the sets of swell values for northeast and east should be grouped together. By doing this and ignoring the sea data, he thinks something might be made out of the sea and swell charts 10712 D. I can get the swell heights converted to feet by consulting book on Wind, Waves, Breakers & Surf.

He showed me results of his data on sea slope. The distribution of slopes is near normal; that is, follows the probability function  $e^{-x^2}$ . The average slope on a slick on a calm day is  $1.5^\circ$ . This value increases to  $20^\circ$  on a high wind with white caps. If the waves were sinusoidal, as a long swell, the average slope would be independent of wave height. Since the wave shape gets more peaked on short length/height

ratios the average slope may be a function of  $L/H$ .  
They have no data on this yet. In any case his  
results on slope are of no consequence in my work  
because most all (60 to 90%) of slope is on small  
waves having a length of a foot or less and a height  
of a fraction of an inch. The big waves and swell  
contribute a negligible part of slope surface because  
usually these small waves are riding along over them.  
He came to Scripps in 1939 so has worked for them for  
a dozen years and seems quite competent. He seemed to  
think the calculations in NACA TN 1493 were much  
better than the Sea & Swell Charts HO 10712 D. He  
agreed to keep in touch with me and advise me of any  
new information on waves and sea near Hawaii.

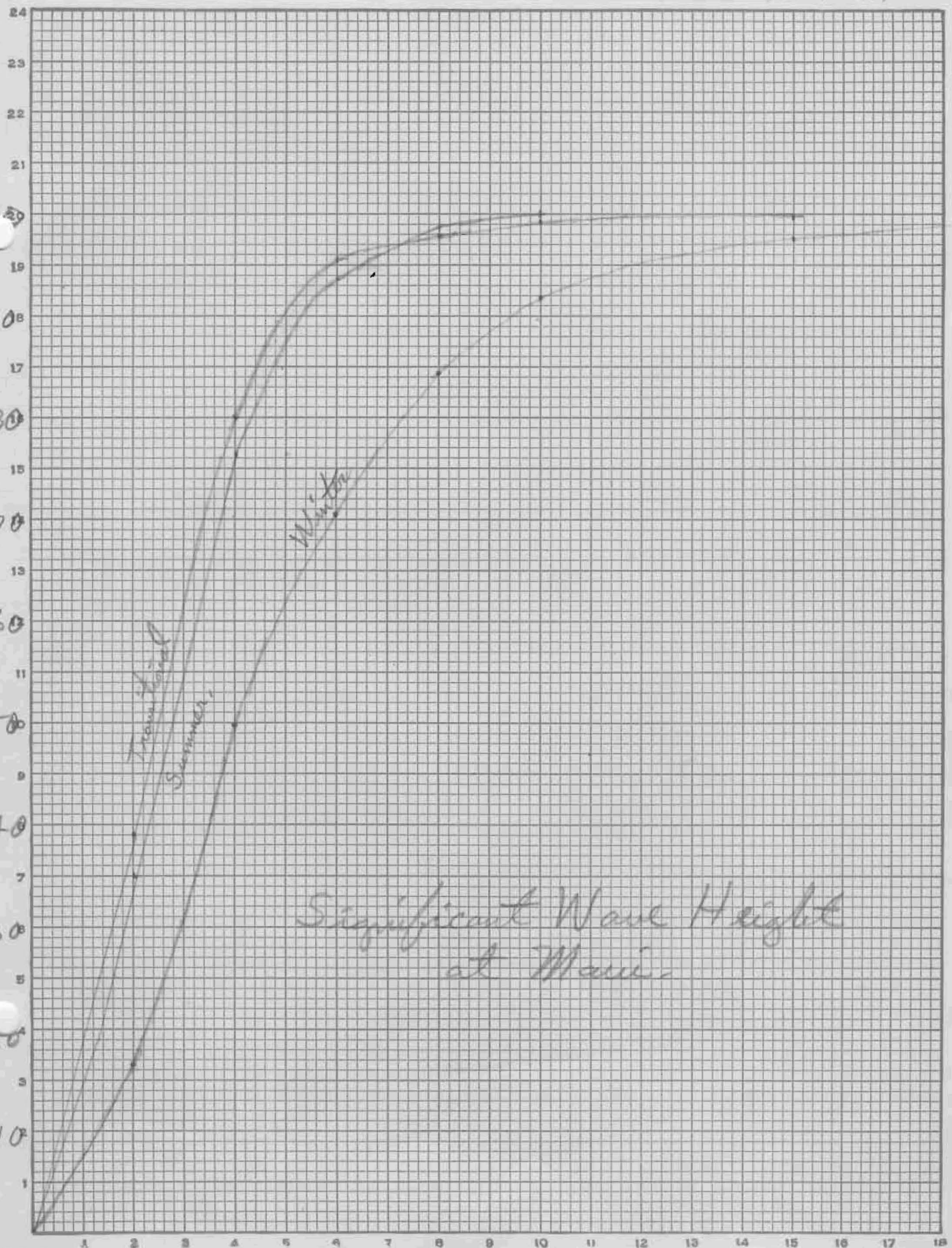






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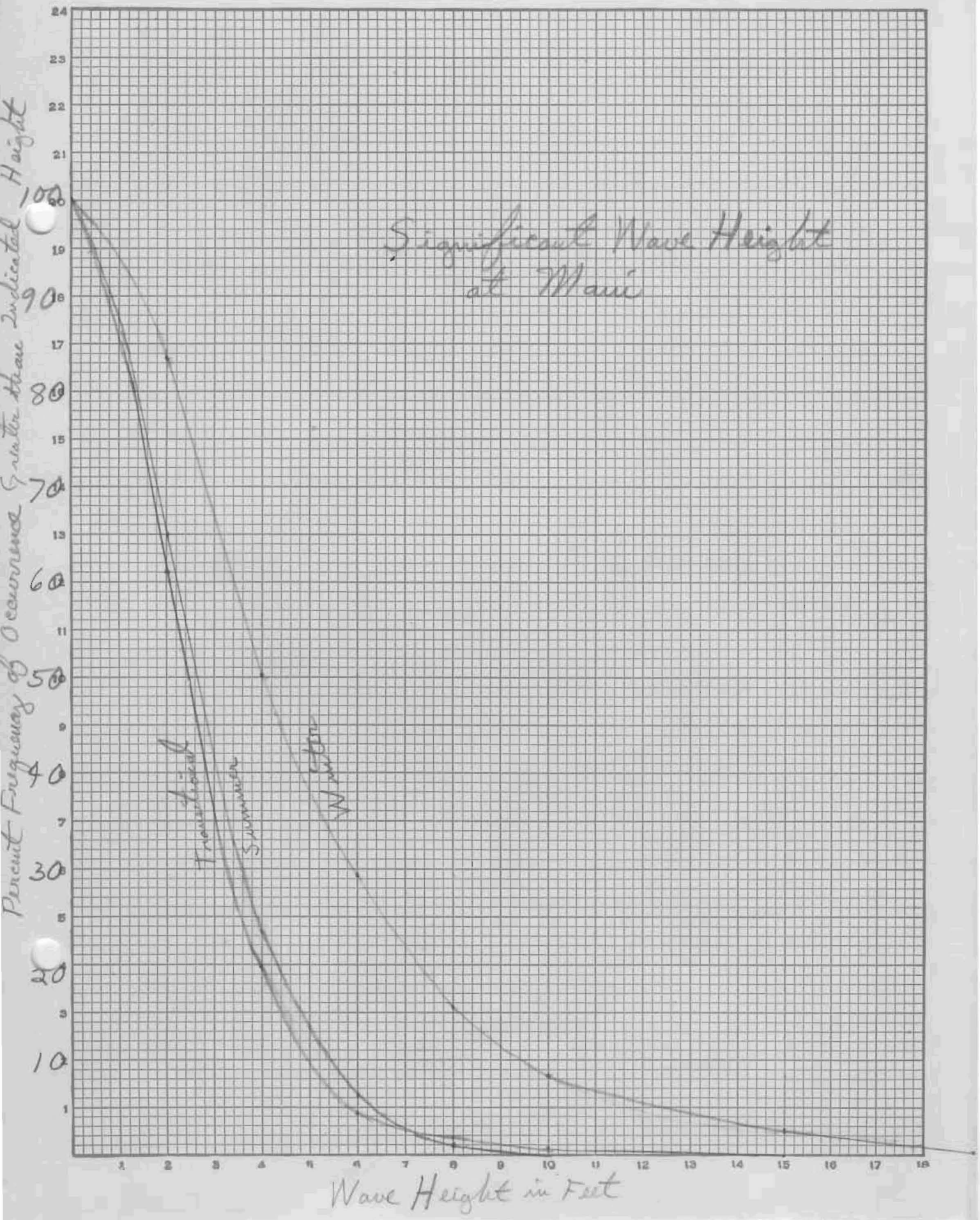
Percent Frequency of Occurrence Less than Indicated Height



Significant Wave Height at Maui

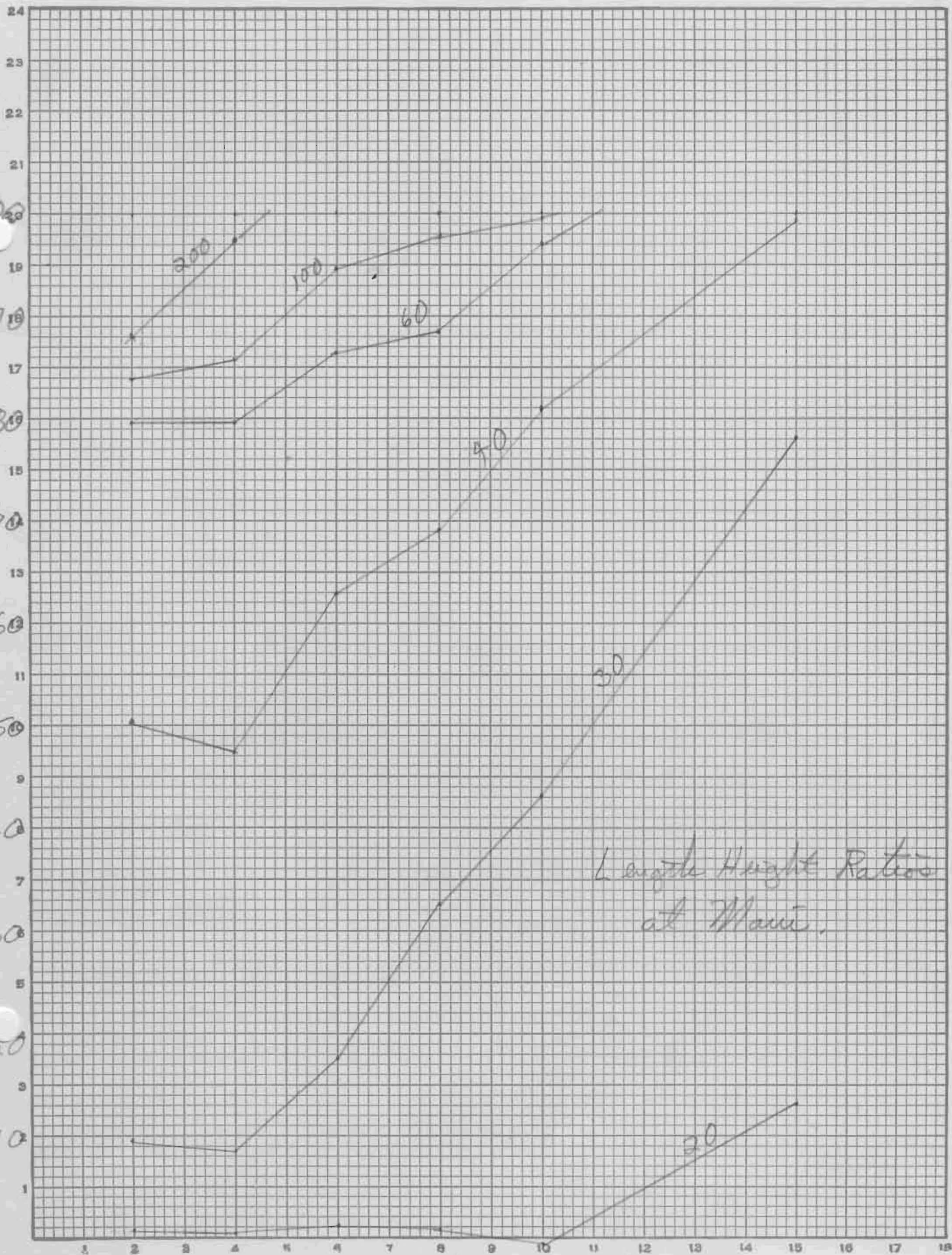
Wave Height in Feet

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Percent Frequency of Occurrence less than indicated height



Length Height Ratios  
at Maui.

Wave Height in Feet

Winter Dec thru March

				Station C	Station D	Max
Winter	remains exceed	3 feet		80%	70%	75%
"	"	"	4 feet	50	60	55%
"	"	"	6 "	30	35	33%
Remainder	"	"	2 "	60	70	65%
"	"	"	4 "	25	30	27%
"	"	"	6 "	10	10	10%

Calms are < 2 feet

Dec - Feb	< 10%
April - June	35%
July - Sept	25%?
Oct - Nov	30%

Percentage of High Seas (shorter waves)