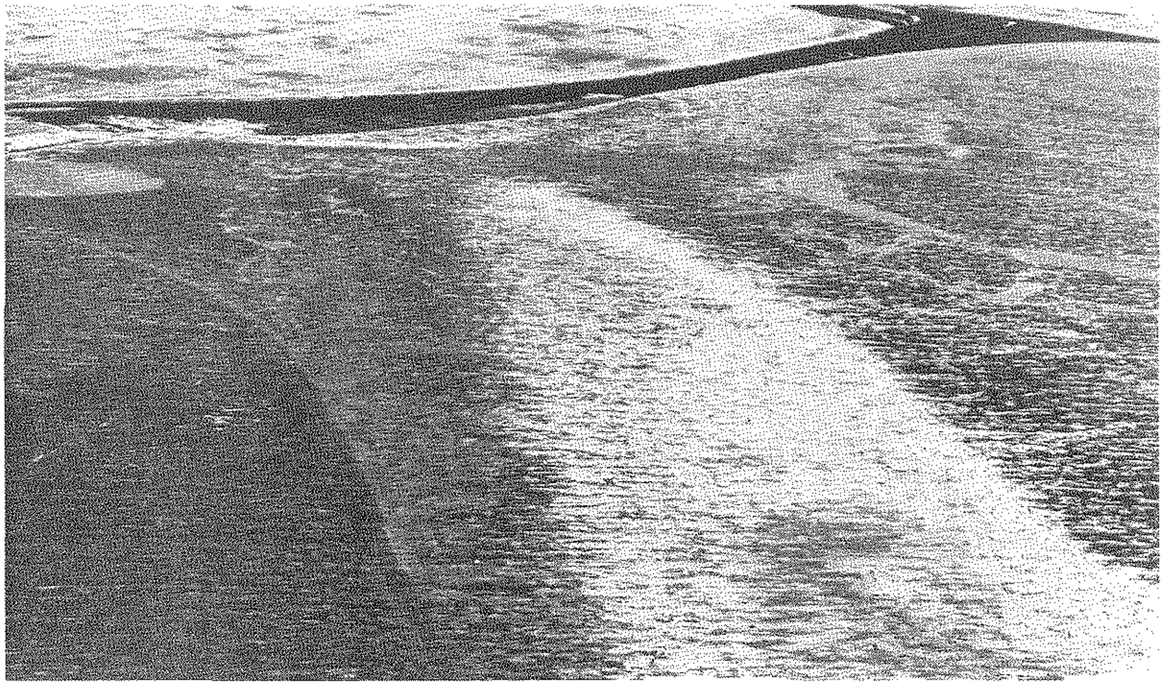


Fig. 9. An aerial oblique photograph showing the large bar of fine sands and silts which have been deposited north of Tekegakrok Point, Elson Lagoon (see Fig. 8). The bar outline is accentuated by the decaying ice. This bar protects the western coastline from Brant Point to Ikpik. Point Barrow can be seen in the right background of the photograph. The patterns made by the decaying ice are useful in the study of the near shore environments. The photograph was taken 15 June 1967.

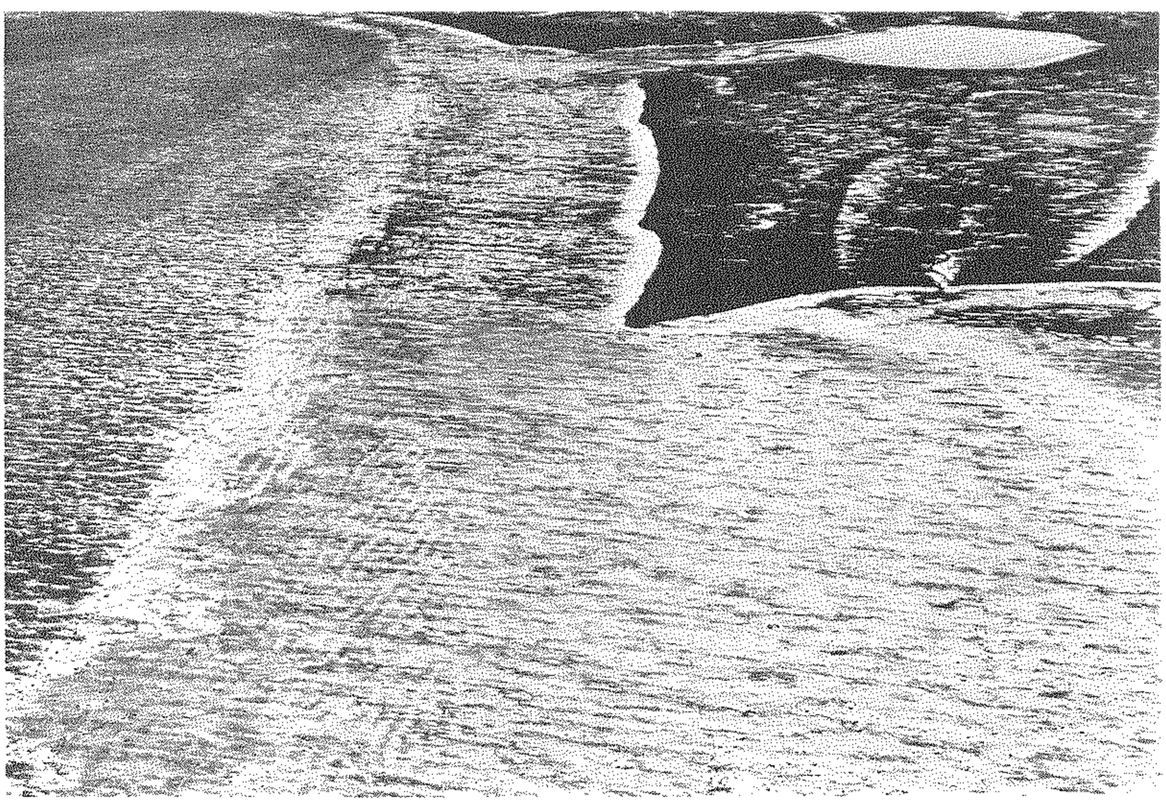


Fig. 10. Another view, looking south toward Tekegakrok Point, of the large bar in Elson Lagoon. Note the giant ripple marks on the bar. The ripple marks are accentuated by the differential thawing of the ice. The photograph was taken 15 June 1967.

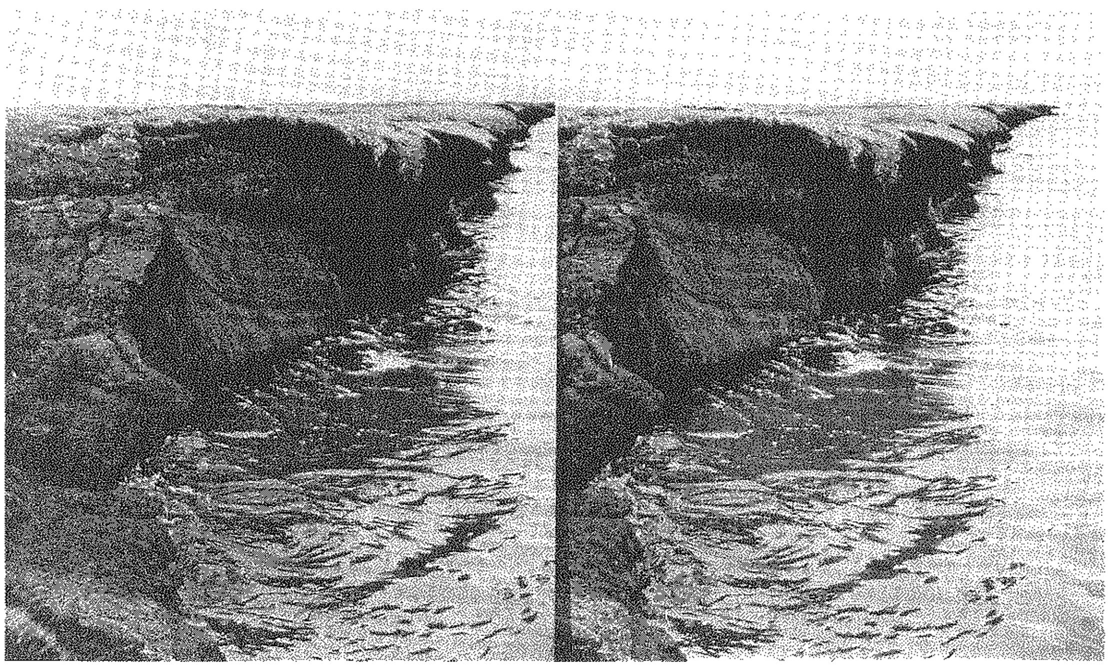


Fig. 11. A stereogram of the permafrost erosion by thermo-erosional niching along the water level. The eroding bank is 2 to 3 meters (6.6 to 10 feet) in height. The photograph was taken 16 August 1965, south of Tekegakrok Point.

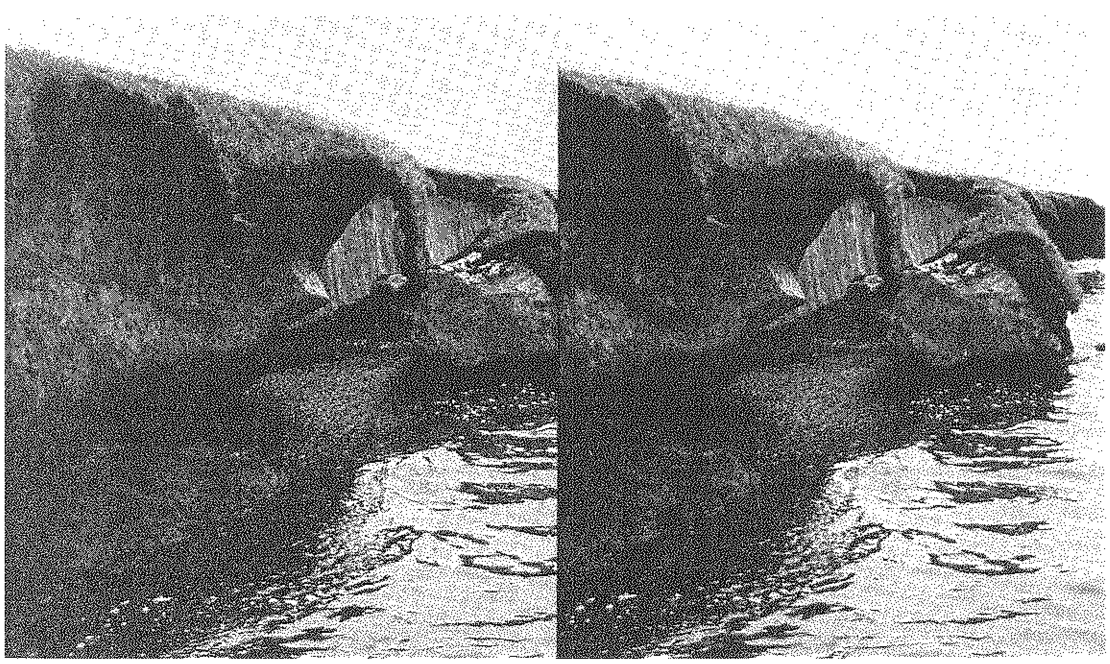


Fig. 12. A collapse block of permafrost caused by the thermo-erosional niche intersecting with a vertical vein of ice-wedge ice. This block will offer temporary protection from further niching. The photograph was taken 16 August 1965, south of Tekegakrok Point. The bank is 2 to 3 meters (6.6 to 10 feet) in height. Note the overhanging tundra vegetation mat, the organic muck in the water, the frozen silts, and ice.

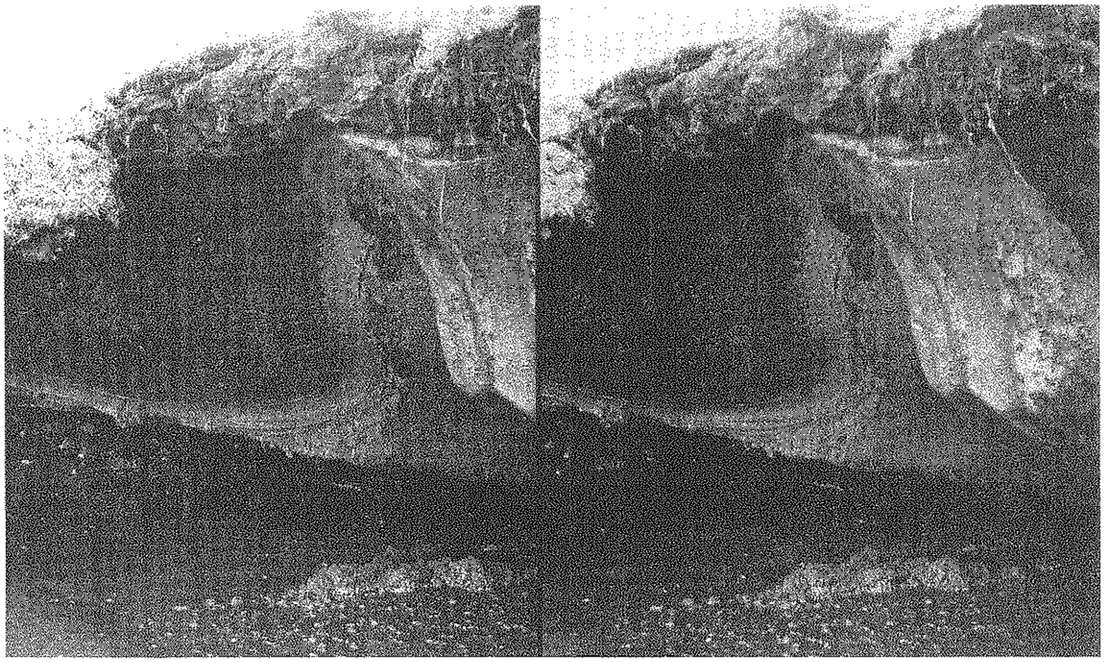


Fig. 13. An ice-wedge is visible at the right center of the stereogram. The annual contraction and expansion of the polygon deforms the adjacent soils. The soils consist of a gray silt overlain by an organic soil. The soils have a very high ice content. The seasonal thaw zone is indicated by the interval of tundra soil overlying the ice-wedge ice. Note the thermo-erosional niche and the organic muck in the water. The photograph was taken 16 August 1965, south of Tekegakrok Point.

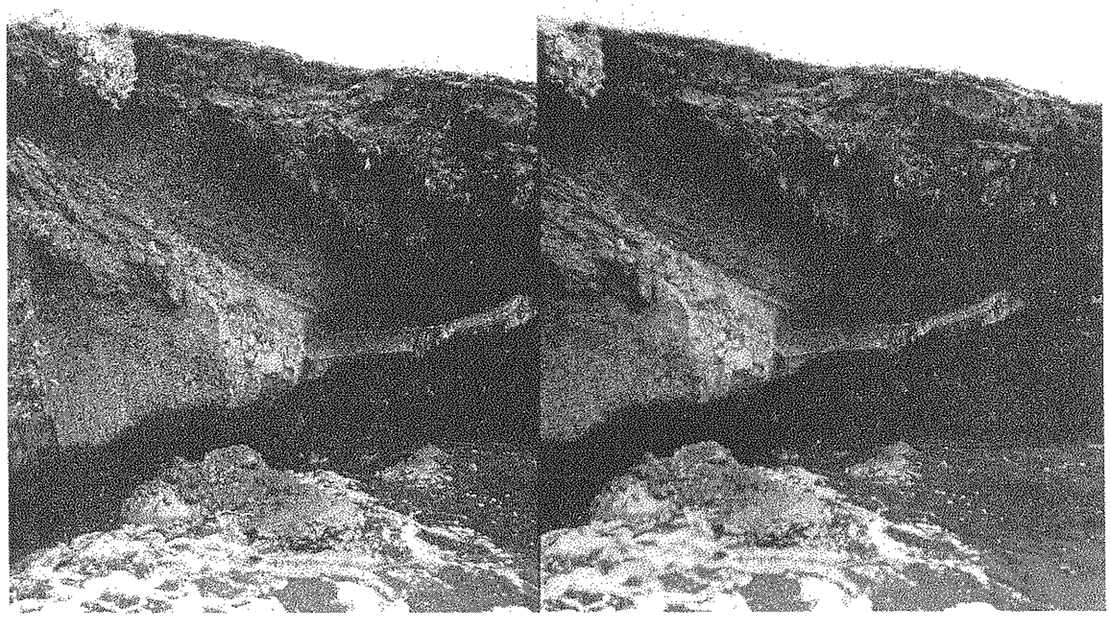


Fig. 14. This is another stereogram taken 16 August 1965, south of Tekegakrok Point. Note the thermo-erosional niche, the deformed soils, and the organic muck.

Fig. 15. A photograph taken of Point Barrow (September 1963) just before the marine storm of 3 October 1963. The normal coastline retreat is about 3 meters (10 feet) per year. Compare this photograph with Fig. 16.

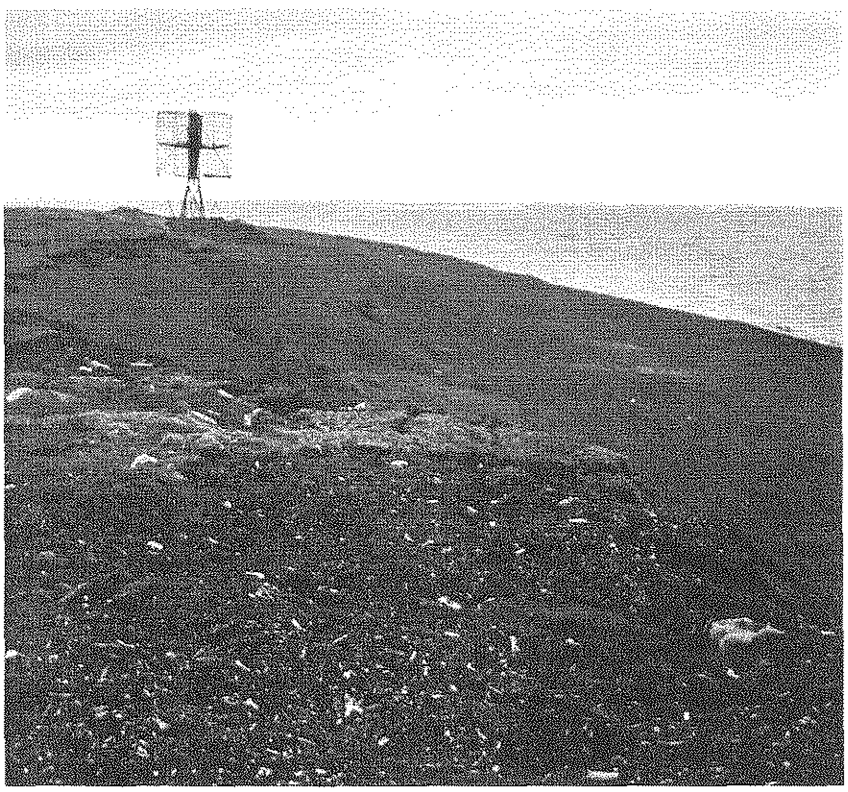


Fig. 16. Point Barrow after the storm of 3 October 1963. About 8 meters (26 feet) was eroded by this single storm. Whale bone and debris from an old Eskimo village litter the foreground. The photograph was taken 16 August 1965.

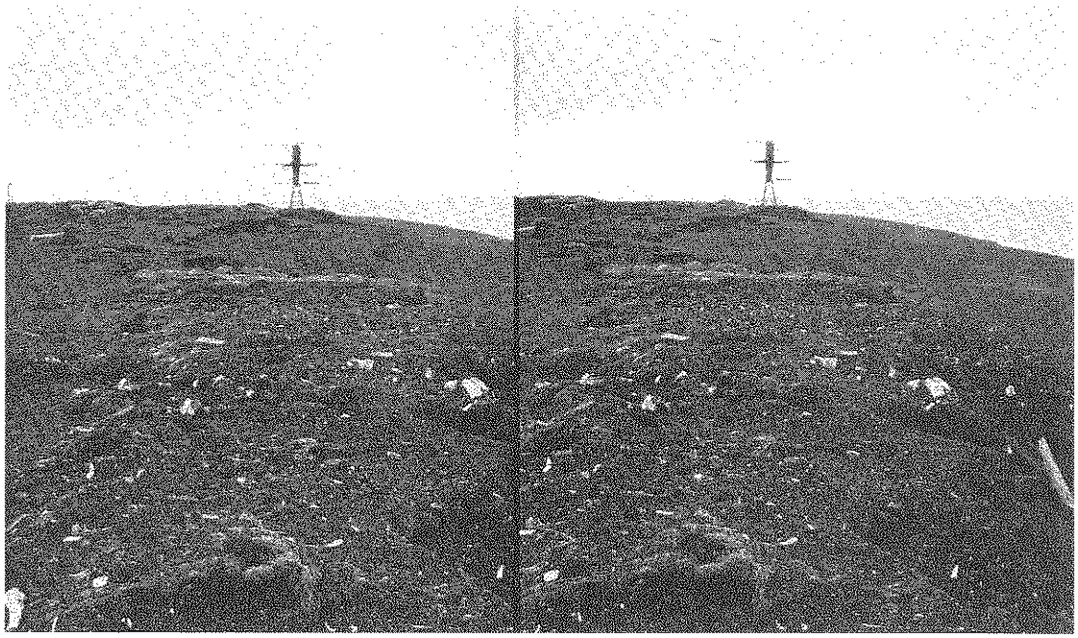


Fig. 17. A stereogram of Point Barrow taken 16 August 1965.

Fig. 18. This aerial photograph illustrates the strands of frazil ice and skim ice which form during the initial phase of the annual freeze-up. The formation of frazil and skim ice stops the erosive wave action. The photograph was taken over Brant Point, Elson Lagoon on 5 September 1956 at a scale of 1/10750.

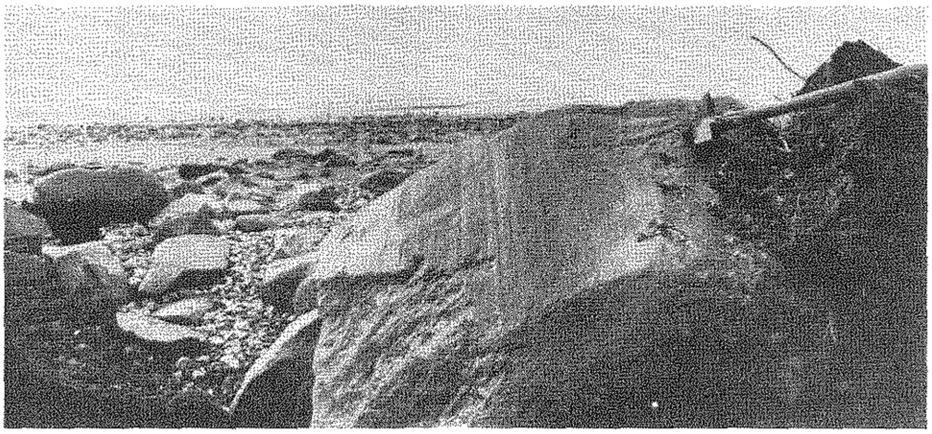


Fig. 19. A striated greenstone boulder of the Flaxman Formation (photograph by Leffingwell, 1919, Plate XVI).

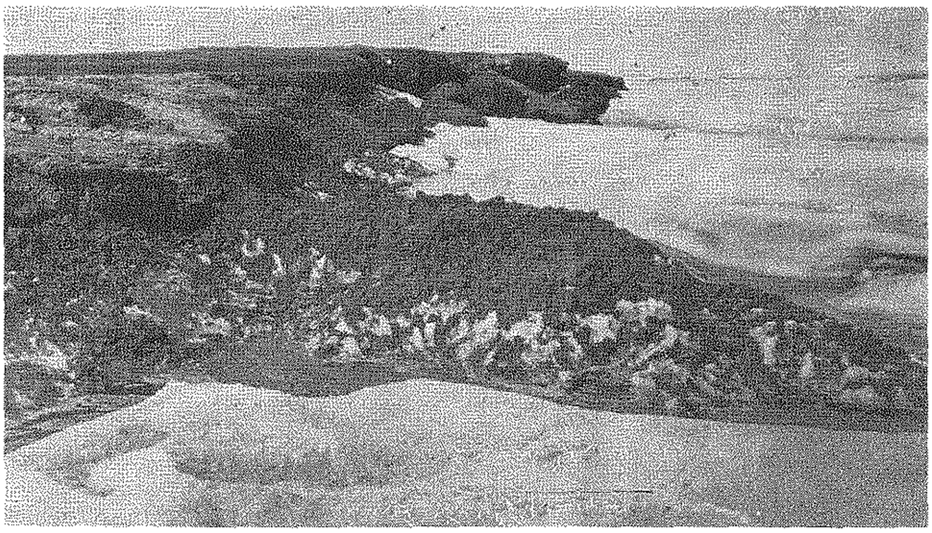


Fig. 20. Temporary preservation of sea ice under a slumping bank on Flaxman Island (photograph by Leffingwell, 1919, Plate XXVI.)

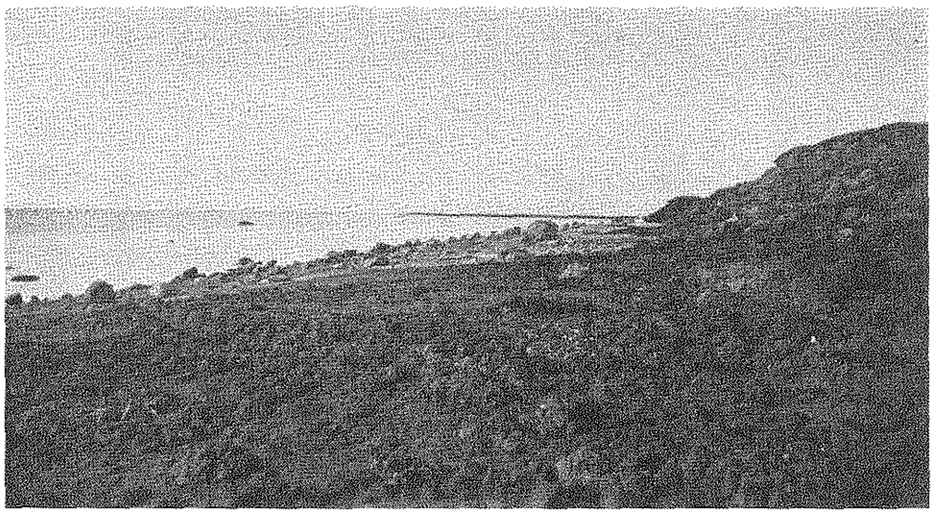


Fig. 21. Fine organic soils slumping in the foreground. Flaxman Formation boulders in the background along the Flaxman Island beach (photograph by Leffingwell, 1919).

Fig. 22. Polygon or permafrost block broken off along ice-wedge ice, north shore of Flaxman Island. An ice-wedge can be seen in the left central part of the photograph (photograph by Leffingwell, 1919, Plate XXXI).

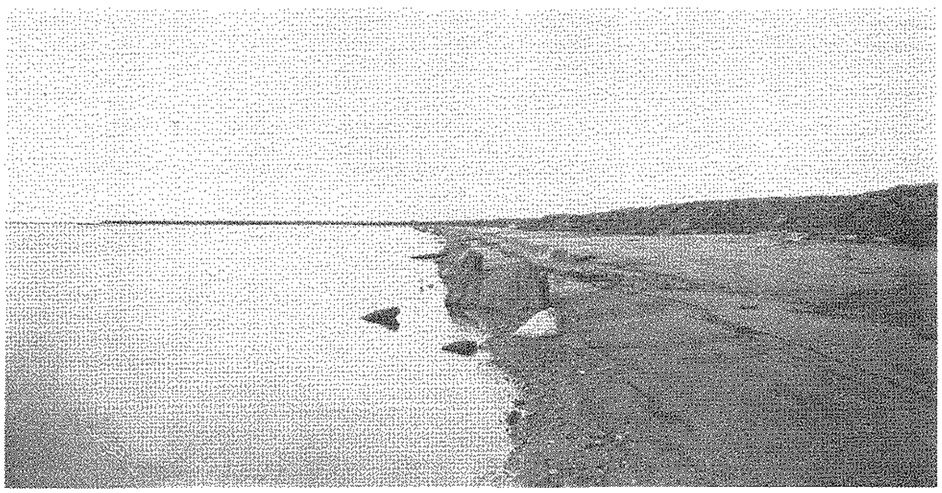
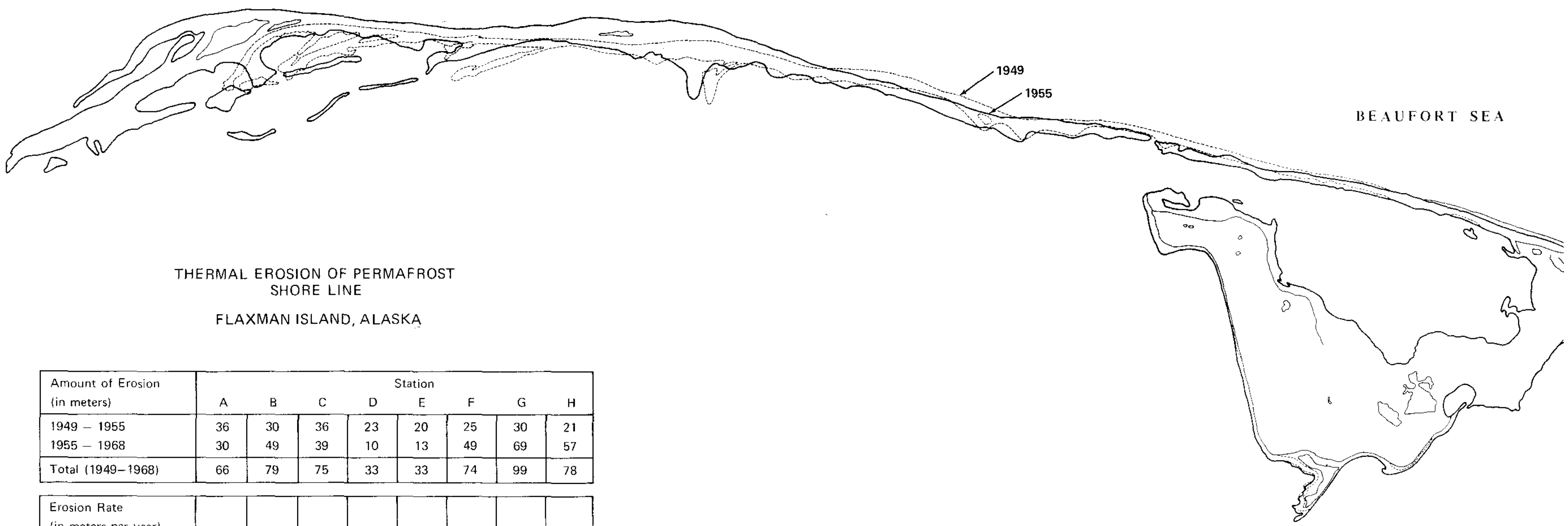


Fig. 23. Flaxman Formation glacial boulders on the beach of the west shore of Flaxman Island (photograph by Leffingwell, 1919, Plate XVI).

Fig. 24. Mound of sand, gravel, and boulders shoved up by the sea ice as the ice mounts the beach (photograph by Leffingwell, 1919, Plate XXV).



THERMAL EROSION OF PERMAFROST
SHORE LINE

FLAXMAN ISLAND, ALASKA

Amount of Erosion (in meters)	Station A	B	C	D	E	F	G	H
1949 – 1955	36	30	36	23	20	25	30	21
1955 – 1968	30	49	39	10	13	49	69	57
Total (1949–1968)	66	79	75	33	33	74	99	78

Erosion Rate (in meters per year) 1949 – 1968	3.5	4.2	3.9	1.7	1.7	3.9	5.2	4.1
Number of Years before Total Erosion	77	105	128	270	212	113	56	61

0 1 2 3 KILOMETERS

146°10′

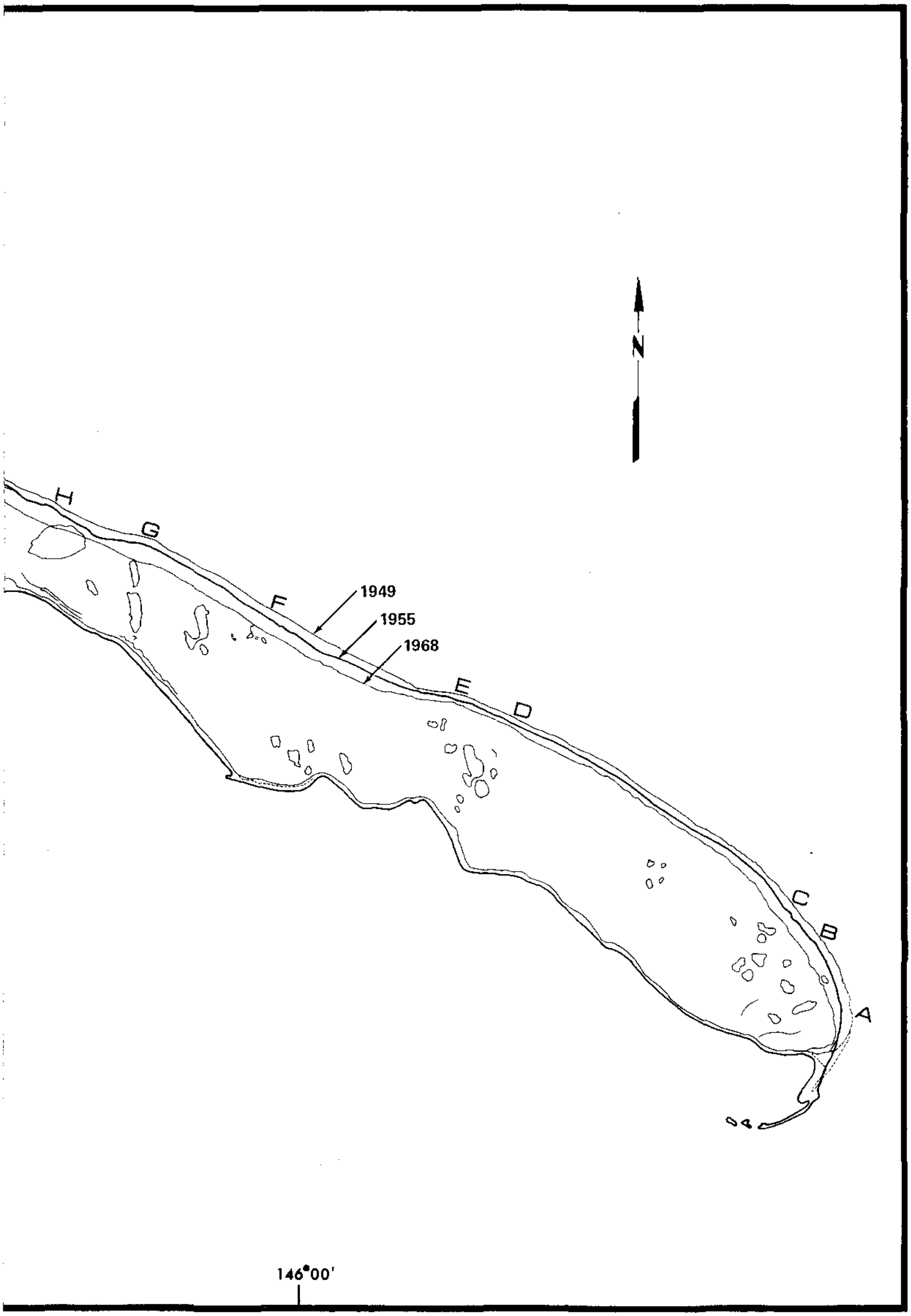


Fig. 25. Flaxman Island Erosion, 1949-1968.

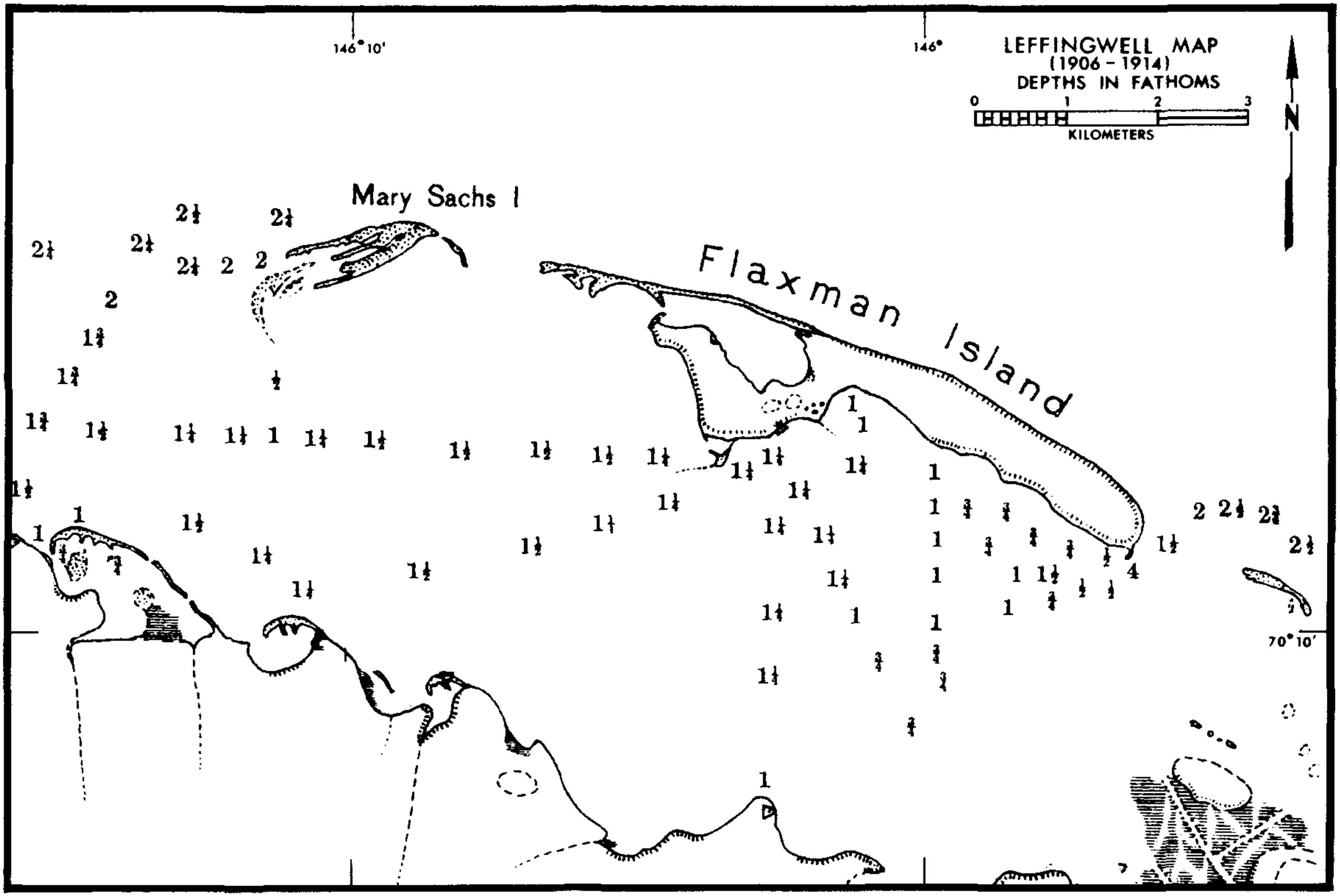


Fig. 26. Leffingwell's Flaxman Island Map, 1906-1914.

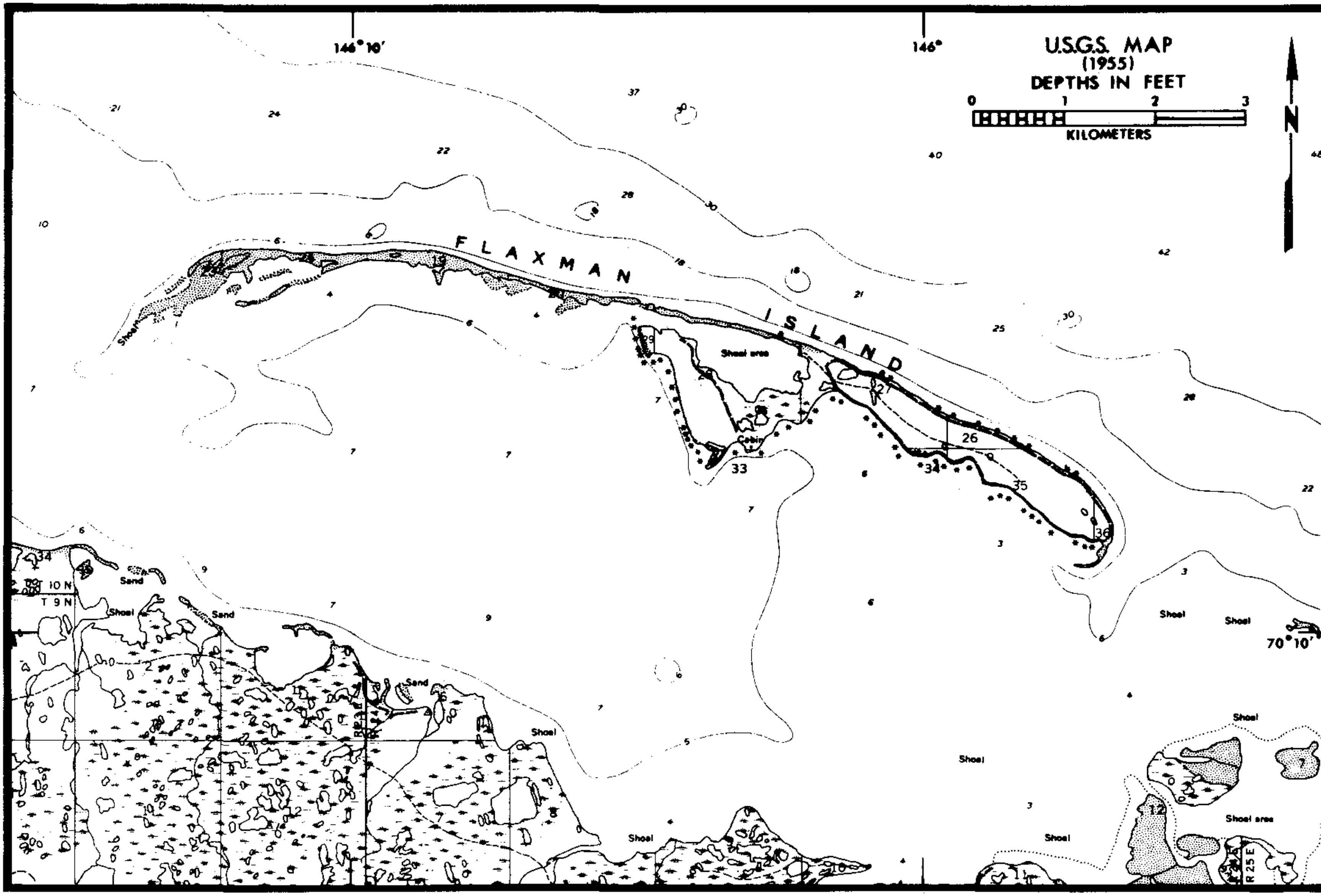


Fig. 27. U. S. Geological Survey Flaxman Island Map, 1955.

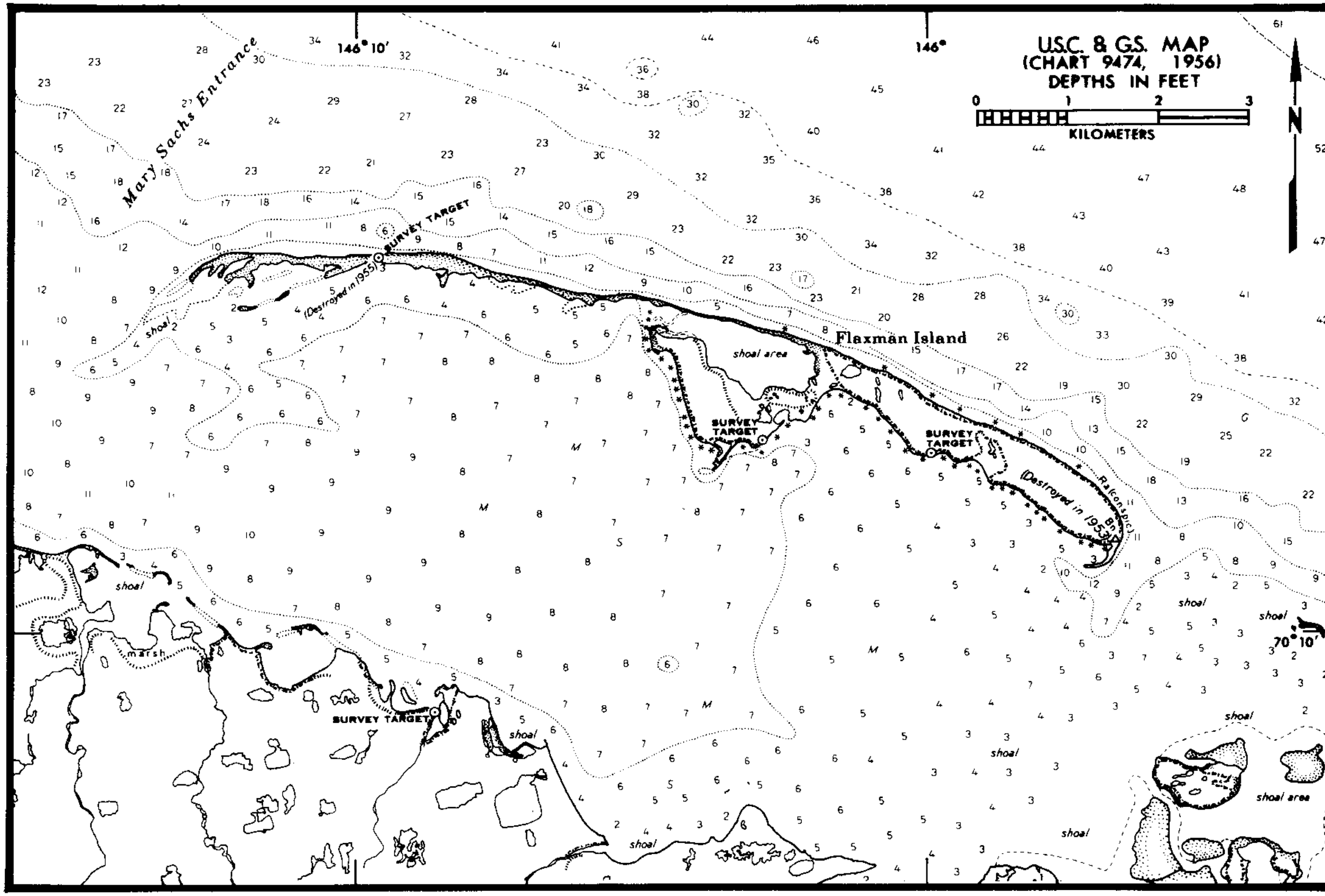


Fig. 28. U. S. Coast and Geodetic Survey Flaxman Island Map, 1956.

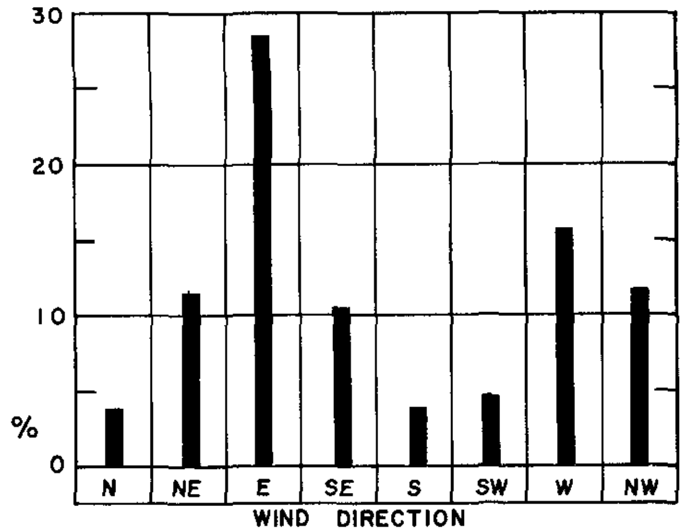


Fig. 29. Percentage frequency of wind direction for all years of record (1900-1967), July through October, Flaxman Island (Lewellen, 1969).

WIND SPEED GROUPS (KNOTS)

WIND DIRECTION	0-2	3-7	8-12	13-20	21-40	40+	TOTAL	%
N	5	48	19	7	3		82	3.9
NE	20	88	85	58	16		267	12.6
E	24	122	159	245	67	2	619	29.2
SE	12	57	86	52	13	1	221	10.4
S	4	36	26	10			76	3.6
SW	9	22	34	17	12		94	4.5
W	17	78	107	91	37	2	332	15.7
NW	8	71	82	87	18		266	12.6
CALM	161						161	7.5
TOTAL	260	522	598	567	166	5	2118	
%	12.3	24.6	28.3	26.8	7.8	0.2		100/100

Fig. 30. Frequency of wind speed groups (in knots) by wind direction for all years of record (1900-1967), July through October, Flaxman Island (Lewellen, 1969).

AIR TEMPERATURE °F	WIND DIRECTION N	NE	E	SE	S	SW	W	NW	CALM	TOTAL	%
55/59		1		2	2		2			7	0.5
50/54				1	1	4	5	1		12	0.9
45/49	2	5	18	11	5	8	15	2	3	69	5.0
40/44	6	11	37	26	8	18	49	20	10	185	13.5
35/39	20	31	99	42	18	24	60	62	38	394	28.8
30/34	18	94	233	34	7	10	87	79	54	606	44.3
25/29	8	22	18	7	1	1	5	14	3	79	5.8
20/24	3	3	3	1			1	2		13	1.0
15/19			2							2	0.2
TOTAL	57	167	400	124	42	65	224	180	108	1367	
%	4.2	12.2	29.3	9.1	3.1	4.8	16.4	13.2	7.9		100/100

Fig. 31. Air temperature classes versus wind direction for all years of record (1900-1967), July through October, Flaxman Island (Lewellen, 1969).

SEA TEMPERATURE °F	JULY	AUG	SEPT	OCT	TOTAL	%
50/49		2			2	0.1
48/47		6			6	0.3
46/45	2	35			37	1.9
44/43		29			29	1.5
42/41	7	41	6		54	2.7
40/39	16	55	7		78	3.9
38/37	37	67	4		108	5.4
36/35	44	199	6		249	12.5
34/33	107	311	36		454	22.8
32/31	62	429	185		676	34.0
30/29	19	184	72	7	282	14.2
28/27	1	4	1	1	7	0.4
<27	1	2	2		5	0.3
TOTAL	296	1364	319	8	1987	100.0

Fig. 32. Sea temperature classes by month for all years of record (1900-1967), July through October (Lewellen, 1969).

FREQUENCY OF OCCURRENCE OF WEATHER

WIND DIRECTION	RAIN	RAIN SHOWERS	DRIZZLE	FREEZING PRECIP.	FROZEN PRECIP.	FOG	HAZE SMOKE	NO WEATHER	TOTAL
N	6		2	1	4	16		24	53
NE	15		6	3	31	78		51	184
E	46		13	4	42	178	1	145	429
SE	4	1	3	4	9	60		72	153
S	2			1	2	13		26	44
SW	12		3			6		29	50
W	27	2	11	2	31	62		88	223
NW	17	1	19		36	43	2	55	173
CALM	11		2		6	65		28	112
TOTAL	140	4	59	15	161	521	3	518	1421
%	9.9	0.3	4.2	1.1	11.3	36.7	0.2	36.5	100.2

Fig. 33. Frequency of weather occurrence by wind direction for all years of record (1900-1967), July through October (Lewellen, 1969).

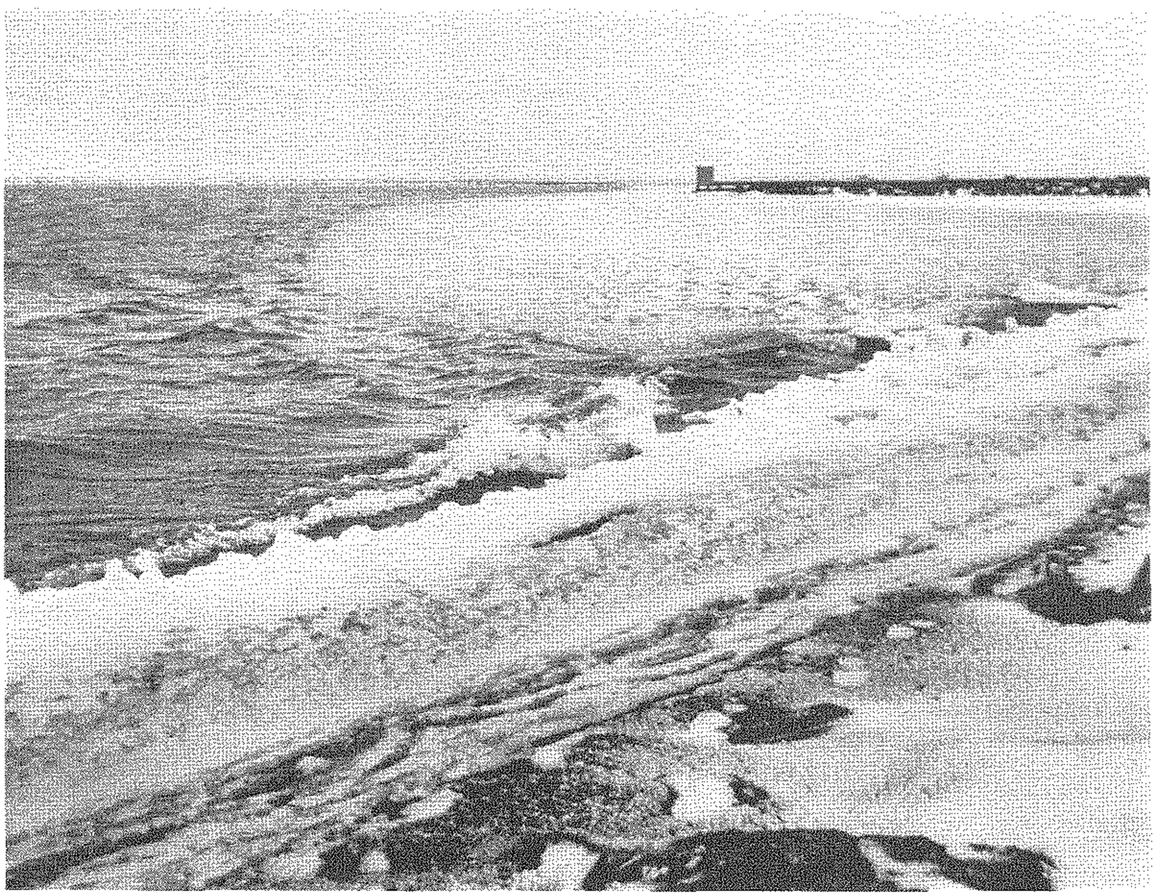
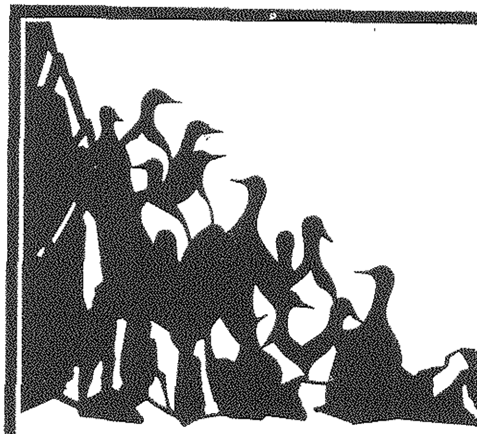


Fig. 34. Frazil ice and freezing spray accumulating along the western shore of Imikpuk Lake, Barrow, Alaska (27 September 1966). This lake is the fresh water supply for the Barrow Naval Camp. The water collection point is marked by the small building in the background of the photograph. Generally, the waves propagate about 10 to 15 meters (33 to 50 feet) into the strands of frazil ice before the waves are completely damped.

Permafrost erosion along the Beaufort Sea coast



IN THE MEMORY OF

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SEPTEMBER 30, 1974

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March 1970