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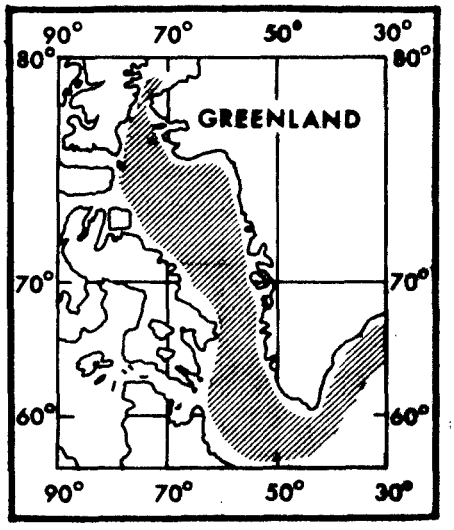
INFORMAL REPORT

OCEANOGRAPHIC CRUISE SUMMARY BAFFIN BAY—DAVIS STRAIT— LABRADOR SEA, OCTOBER 1969



APRIL 1970

NAVAL OCEANOGRAPHIC OFFICE
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INFORMAL REPORT

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ABSTRACT

The U.S. Naval Oceanographic Office conducted oceanographic operations in support of the annual East Arctic Ice Forecast Program during October 1969 aboard USCGC WESTWIND (WAGB 281). Data were collected at 61 Nansen cast stations in Baffin Bay, Davis Strait, and Labrador Sea.

Most WESTWIND station data displayed colder temperatures in the upper 40 meters than were recorded in the two previous years. An exception to this trend was observed at the northernmost station where freezing had already begun on all three surveys.

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This report has been reviewed and approved for release as an UNCLASSIFIED Informal Report.

L. B. BERTHOLF
Director, Nearshore Surveys Division

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I. INTRODUCTION

The U.S. Naval Oceanographic Office (NAVOCEANO) conducted oceanographic operations in support of the annual East Arctic Ice Forecast Program during October 1969 aboard USCGC WESTWIND (WAGB 281). Stations were occupied in Baffin Bay, Davis Strait, and the Labrador Sea (Fig. 1). These three areas are characterized by relatively warm, north-setting surface currents along the Greenland coast, and cold, south-setting surface currents along the Canadian archipelago. Surface currents within the central portions of the survey areas tend to be zonal and not as well developed as the currents along the eastern and western margins. Ingress of cold waters of Arctic Basin origin into the Baffin Bay-Labrador Sea area occurs through Jones Sound, Lancaster Sound, Smith Sound, and Hudson Strait.

Low surface temperatures and salinities are common throughout Baffin Bay, and maximum values usually are associated with waters of Atlantic origin. Temperatures range from -1.6° to 5.0°C, and salinities range from 30.0 to 34.45 o/oo.

II. OBJECTIVES OF THE SURVEY

Dual objectives were planned for the 1969 East Arctic Ice Forecast Program. The first objective was to occupy the NAVOCEANO established ice potential stations that had been taken each year since 1954 in Baffin Bay, Davis Strait, and the Labrador Sea. Standard Nansen cast data were to be taken to ascertain the salinity and thermal energy content of successive depth increments to allow long-range forecasting of ice thickness by NAVOCEANO. The second objective comprised 20 Nansen stations, extending from South Wolf Island, Labrador, to Cape Farewell, Greenland, that were to be occupied for the Coast Guard Oceanographic Unit (CGOU). Data from these stations will be further analyzed by Coast Guard oceanographers in an attempt to monitor the interchange of waters between the Labrador Sea and the North Atlantic Ocean.

III. NARRATIVE OF THE SURVEY

A survey team of three NAVOCEANO oceanographers and one CGOU Marine Science Technician boarded WESTWIND at Thule, Greenland, on 3 October 1969. Data were collected at 61 of 64 planned oceanographic stations from 4 to 29 October (Operation Number 920007). Adverse weather conditions hindered operations and finally resulted in the termination of survey operations. A station summary is presented in Table I.

IV. METHODS OF COLLECTION AND ANALYSIS

A. Temperature. Paired protected deep sea reversing thermometers, with a range of -2°C to 10°C, were used to obtain in situ water

temperatures. Agreement between temperature readings of the paired thermometers was usually 0.02°C or better.

Thermometric depths were determined by standard oceanographic techniques, utilizing meter wheel readings, wire angles, and unprotected thermometers with a range of -2° to 30°C (NAVOCEANO, 1968).

B. Bathythermographs. A 900-foot mechanical BT was used at 36 stations to obtain profiles of temperature versus depth. The necessity of maneuvering the ship on station to maintain headway during marginal operating conditions prevented BT drops on some assigned stations.

C. Salinity. Serial water samples were analyzed for conductivity with a Bisset-Berman (Model 6220) inductive salinometer, and salinity was computed with a Control Data PDP 8S computer. Duplicate determinations were run on each sample, and if the difference between determinations was greater than 0.004 o/oo, additional runs were made. The salinometer was standardized with standard sea water before and after each series of determinations. Salinity values are estimated to be accurate to within ±0.01 o/oo in most instances.

V. DISPOSITION OF DATA

The Nansen cast data are filed in the National Oceanographic Data Center (NODC) under reference number 311564. Bathythermograph data are in NODC under reference number 22882.

VI. PRELIMINARY ANALYSIS

Profiles of salinity and temperature versus depth (Figs. 2A - 2F) compare the oceanographic conditions observed in 1969 by WESTWIND with data from previous ice forecast surveys aboard USCGC EDISTO (Codispoti and Kravitz, 1967) and USCGC EASTWIND (Countryman, 1968).

Most WESTWIND station data displayed colder temperatures in the upper 40 meters than were recorded in the two previous years. An exception to this trend was observed at the northernmost station (Sta. 1) where freezing had already begun on all three surveys.

Further interpretation of the data is difficult because the station areas south of Davis Strait were subjected to near continual storm conditions for the 3-week period prior to station occupation. Thus, local conditions may confuse interpretation of annual variation from the data presented.

VII. RECOMMENDATIONS FOR ADDITIONAL WORK

A standard cross section through Davis Strait, in conjunction with direct current measurements, would assist NAVOCEANO ice forecasters

in estimating long-range ice conditions in Baffin Bay. Interchange of waters through Hudson Strait, Jones Sound, Lancaster Sound, and Smith Sound also should be investigated for possible effects on the regional heat budget.

VIII. BIBLIOGRAPHY

Codispoti, Louis A., and Joseph H. Kravitz, 1968. Oceanographic Cruise Summary, Baffin Bay-Davis Strait-Labrador Sea, Summer 1967. IR 68-23. UNPUBLISHED MANUSCRIPT. U.S. Naval Oceanographic Office, Washington, D.C.

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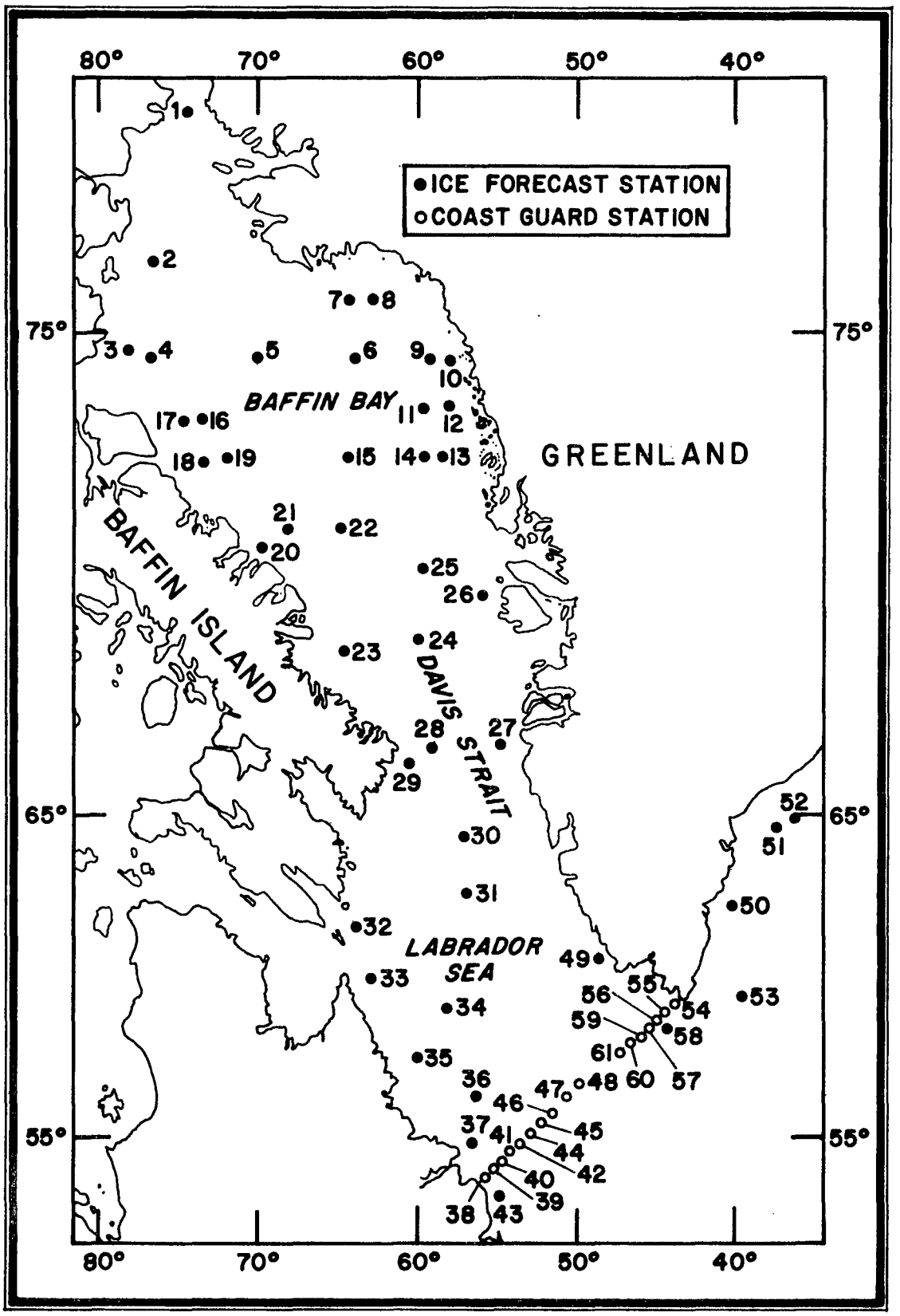

FIGURE 1. Station Locations.

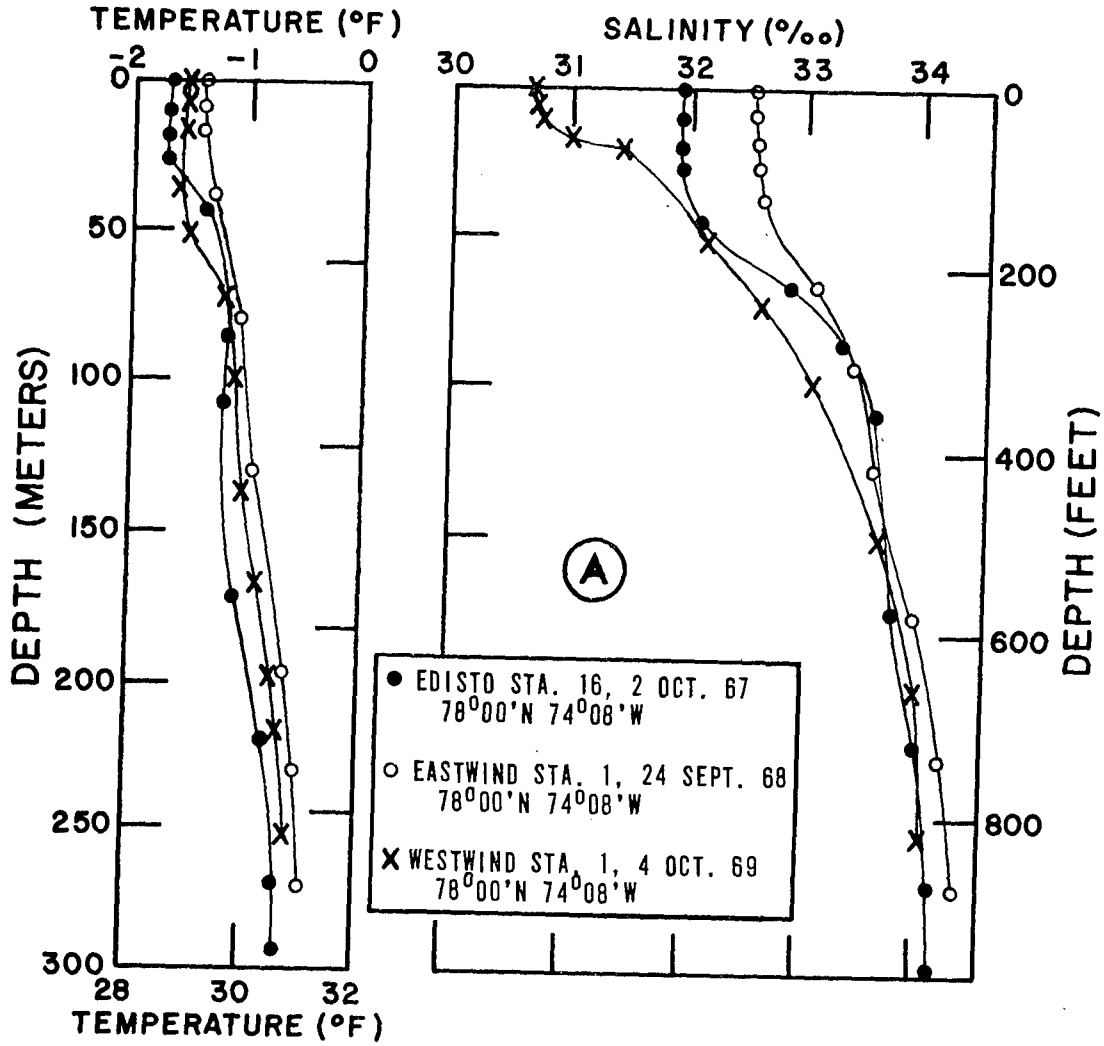

FIGURE 2. Comparison of Temperature and Salinity Profiles - 1967, 1968, and 1969.

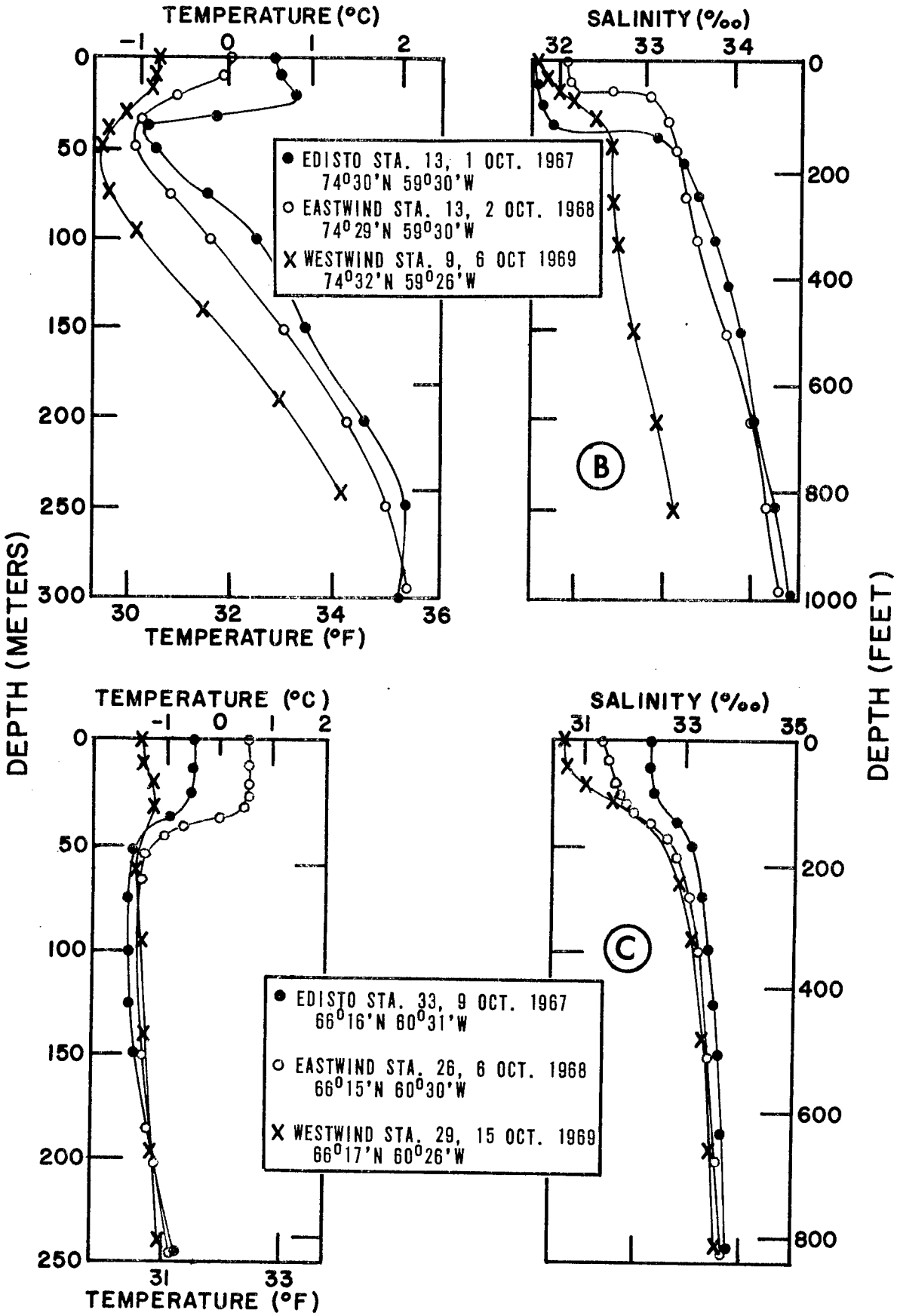

FIGURE 2 (Cont'd). Comparison of Temperature and Salinity Profiles - 1967, 1968, and 1969.

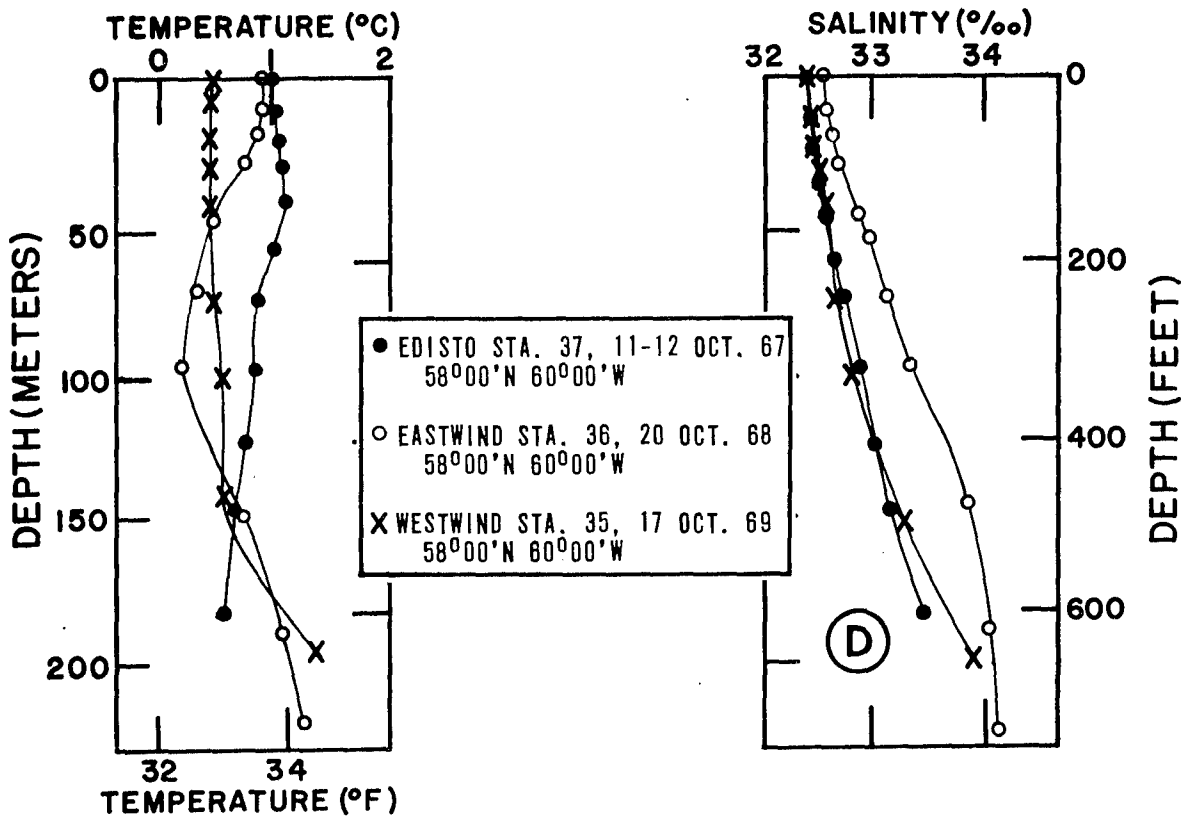

FIGURE 2 (Cont'd). Comparison of Temperature and Salinity Profiles - 1967, 1968, and 1969.

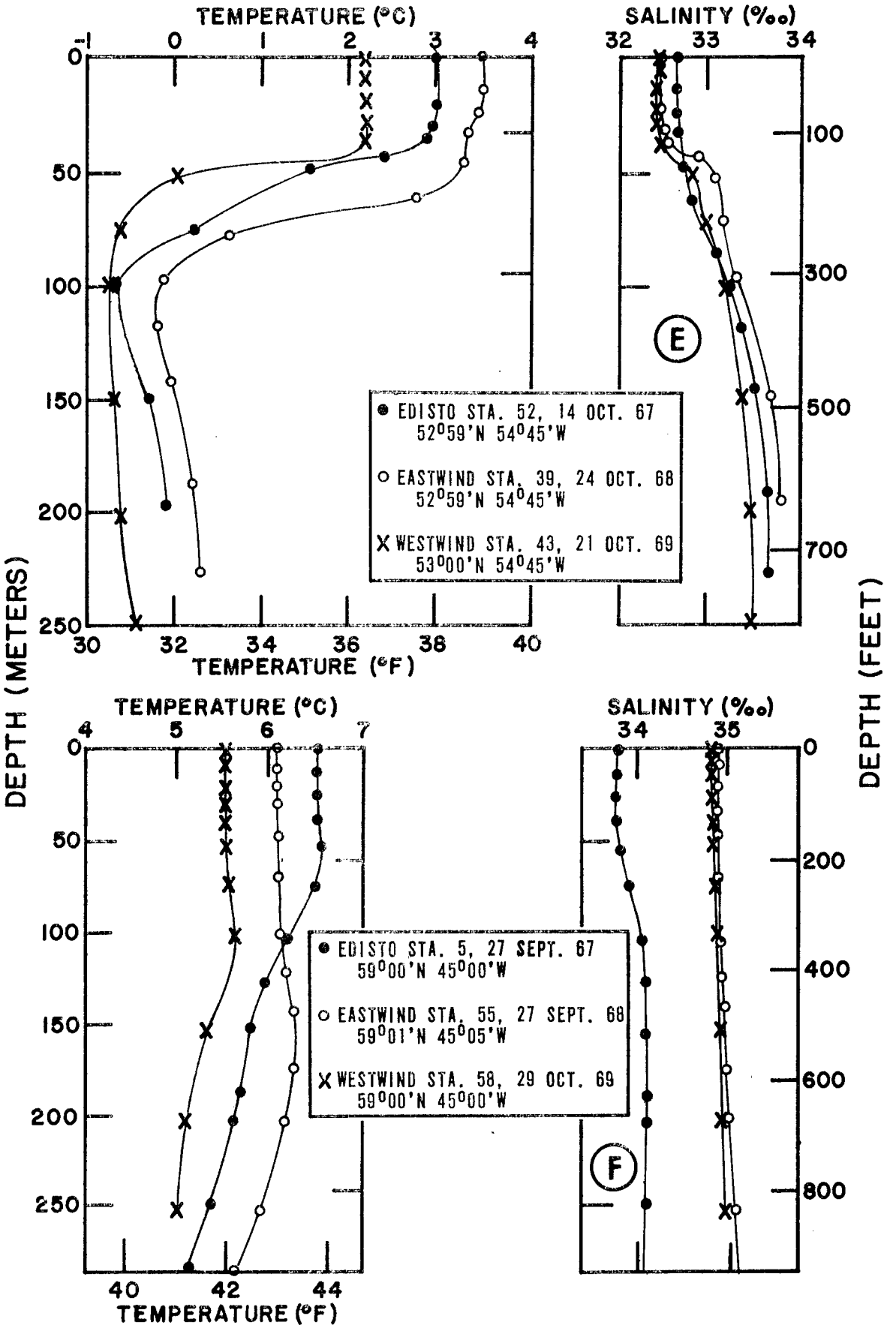

FIGURE 2 (Cont'd). Comparison of Temperature and Salinity Profiles - 1967, 1968, and 1969.

TABLE I. Station Data Summary

STA. NO.	DATE (OCT 1969)	POSIT LAT (°N)	POSIT LONG (°W)	UNCORR SONIC DEPTH (M)	SAMPLE DEPTH (M)	BT
1	4	78°00′	74°00′	448	250	×
2	4	75 56	76 28	326	250	×
3	5	74 29	77 56	589	250	×
4	5	74 30	76 46	620	250	×
5	5	74 36	70 00	1463	250	×
6	6	74 30	64 00	558	250	×
7	6	75 25	64 15	160	150	×
8	6	75 25	62 58	210	199	×
9	6	74 32	59 26	732	240	×
10	6	74 30	58 15	220	198	×
11	7	73 41	59 58	310	250	×
12	7	73 40	58 30	356	245	×
13	7	72 46	58 32	182	150	×
14	7	72 45	59 59	668	250	×
15	7	72 45	64 00	2195	250	×
16	8	73 25	73 20	896	218	×
17	8	73 24	74 46	952	245	×
18	8	72 45	73 30	825	248	×
19	8	72 45	72 00	1076	250	×
20	8	71 30	69 32	787	250	×
21	9	71 30	68 00	1820	239	×
22	9	71 24	65 06	2268	245	×
23	9	68 40	65 01	120	100	
24	10	69 00	60 02	1470	235	×
25	10	70 30	60 06	677	243	×
26	11	70 00	56 00	136	47	
27	11	66 45	54 59	58	42	×
28	15	66 29	59 01	750	248	×
29	15	66 17	60 26	439	239	
30	15	64 30	57 00	845	248	×
31	15	62 50	57 00	2300	250	×
32	16	61 59	63 43	520	121	×
33	16	60 31	63 01	357	205	×
34	17	59 46	57 59	2743	250	×
35	17	58 00	60 00	238	200	×
36	18	57 02	56 50	2770	250	×
37	18	55 00	56 45	175	150	
38	19	53 43	55 48	108	75	
39	19	53 50	55 25	100	75	
40	19	54 11	55 00	173	137	
41	20	54 17	54 50	190	161	
42	20	54 28	54 23	227	174	
43	21	53 00	54 45	274	250	×
44	22	54 44	53 58	393	349	
45	23	54 52	53 40	768	566	
46	23	54 57	53 27	1682	1017	
47	23	55 06	53 00	2560	1700	
48	23	55 31	52 26	3232	2882	
49	24	61 00	48 59	100	69	
50	26	62 25	40 45	476	250	
51	26	64 30	37 59	703	245	×
52	26	64 45	37 00	484	233	×
53	28	60 01	40 01	2392	134	
54	28	59 40	43 54	152	123	
55	28	59 32	44 06	173	124	
56	28	59 20	44 34	1300	1167	
57	28	59 13	44 49	1900	993	
58	29	59 00	45 00	2060	249	
59	29	59 00	45 23	2300	2288	
60	29	58 34	46 02	2237	2357	
61	29	58 08	47 06	3090	3093	

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EAST ARCTIC ICE FORECAST PROGRAM						
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