CHAPTER 8

NATIONAL DATA BUOY CAPABILITIES AND REQUIREMENTS

8.1. General.

8.1.1. Automated Reporting Stations. The National Data Buoy Center (NDBC) maintains automated reporting stations in the Gulf of Mexico, in the coastal areas and deep ocean of the Atlantic and Pacific Oceans, and in the Great Lakes. These data acquisition systems obtain measurements of meteorological and oceanographic parameters for operations and research purposes. Moored buoy station locations and configurations are given in Table 8-1. The locations of Coastal-Marine Automated Network (C-MAN) stations are listed in Table 8-2. Figures 8-1 through 8-3 show the locations of all moored buoys and C-MAN stations. Figure 8-4 is a detailed chart of the network in the Gulf of Mexico and along the southeast U.S. coast. The operational status and measurement capability of stations can be obtained from NDBC *Operations Branch*, Stennis Space Center, MS 39529-6000, phone 228-688-*3134*, or on-line via NDBC's home page on the World Wide Web (www) at http://www.ndbc.noaa.gov.

8.1.2. Data Acquisition. Moored buoy and C-MAN stations routinely acquire, store, and transmit data every hour; a few selected stations report more frequently. Data obtained operationally include sea-level pressure, wind speed and direction, peak wind, and air temperature. Sea-surface temperature and wave spectra data are measured by all moored buoys and a limited number of C-MAN stations. Relative humidity is also measured at several stations.

8.1.3. Drifting Buoys.

8.1.3.1. NDBC. NDBC is capable of acquiring, preparing, and deploying drifting buoys; however, a *NOAA* operational drifting buoy requirement has not been identified or funded. Research interests should contact NDBC directly with drifting buoy requirements.

8.1.3.2. Navy. *Since 1998, the Naval Oceanographic Office (NAVOCEANO) has deployed meteorological drifting buoys to report surface meteorological and oceanographic measurements, for operational purposes, as tropical systems move through data sparse regions tracking toward the U.S. East Coast. Additionally, Navy drifting buoys have been deployed in the Intertropical Convergence Zone (ITCZ). The drifting buoy measurements, which are available to tropical forecasters, provide invaluable input for defining tropical storm movement and intensity, improve forecast model initialization, and give tropical forecasters a much better sense of storm characteristics and track as they approach the fleet concentration areas of Jacksonville, FL, and Norfolk, VA. Drifting buoys typically have a life span of 1 to 2 years, and the data are available through the NAVOCEANO homepage and through standard World Meteorological Organization (WMO) data sources.*

NAVOCEANO acquires, prepares, and deploys drifting meteorological buoys based on operational requirements identified by Commander-in-Chief, Atlantic Fleet (CINCLANTFLT).

Currently, CINCLANTFLT has identified the Navy's drifting buoy support as a standing requirement to support fleet safety, assist in fleet sortie decisions, and enhance tropical weather preparedness.

8.2. Requests for Drifting Buoy Deployment. NDBC drifting buoy deployments should be coordinated with the Department of Commerce (DOC), through the National Oceanic and Atmospheric Administration (NOAA). NOAA will initiate a request through the Office of the Federal Coordinator for Meteorology (OFCM). The request for deployment support will then be sent to the 53rd Weather Reconnaissance Squadron (53 WRS) through HQ Air Force Reserve Command (AFRC). Deployments in advance of a U.S. land-threatening hurricane require a 36- to 48-hour notification. All requests will include specific information, regarding onloading base, accompanying technicians, desired pickup times, reimbursement funding, and other pertinent data.

8.2.1. Tropical Prediction Center/National Hurricane Center (TPC/NHC). TPC/NHC forecasters will issue through the Tropical Cyclone Plan of the Day (TCPOD) an alert or outlook for drifting buoy deployment 48 hours prior to the planned deployment. Hard tasking for the deployment will be issued 14 hours prior to the event via the TCPOD.

8.2.2. Deployment Buoys. DOC may request the deployment of up to four drifting buoys between 185 and 333 km (100 and 180 nm) from the storm center, depending on the dynamics of the storm system. DOC will ensure the buoys and mission-related DOC personnel are available for pickup by AFRC aircraft. The specific DOC request for placement of the buoys will depend on several factors, including:

- Characteristics of the storm, including size, intensity, and velocity.
- Storm position relative to the coast and population centers.

8.2.3. Deployment Position. The final deployment position will be provided before the flight crew briefing. Two examples of possible buoy deployment patterns are shown in Figure 8-5.

8.3. Communications. Moored buoy and C-MAN data are transmitted via the Geostationary Operational Environmental Satellite (GOES) to the National Environmental Satellite, Data, and Information Service (NESDIS) and then are relayed to the NWS Telecommunications Gateway (NWSTG) for processing and dissemination. Moored buoy observations are formatted into the World Meteorological Organization (WMO) FM 13-IX SHIP code. The SHIP code is defined in Federal Meteorological Handbook No. 2, Surface Synoptic Codes. C-MAN measurements are formatted into C-MAN code, which is very similar to the WMO FM 12-IX SYNOP code. Code forms are shown in Table 8-3. The C-MAN code is contained in the C-MAN Users' Guide, which is available from NDBC. Drifting buoy data are sent through NOAA's polar-orbiting environmental satellites (POES) to the U.S. Argos Global Processing Center, Largo, MD. Service Argos processes and formats the data into the WMO FM 18 BUOY code defined in the WMO *Manual on Codes*, Volume I. The messages are then routed to the NWSTG for distribution.

Table 8-1. Moored buoy locations and configurations

SITE	STATION ID	LOCATION	HULL SIZE (m)	ANEMOMETER HEIGHT (m)
GULF OF MEXICO	42001	25.9°N 89.7°W	10	10
	42002	25.9°N 93.6°W	10	10
	42003	25.9°N 85.9°W	10	10
	42007	30.1°N 88.8°W	3	5
	42019	27.9°N 95.4°W	3	5
	42020	26.9°N 96.7°W	3	5
	42035	29.2°N 94.4°W	3	5
	42036	28.5°N 84.5°W	3	5
	42039[1]	28.8°N 86.0°W	3	5
	42040[1]	29.2°N 88.2°W	3	5
	42054	*26.0 °N 87.7 °W*	*12*	*10*
ATLANTIC OCEAN	41001	34.7°N 72.6°W	6	5
	41002	32.3°N 75.2°W	6	5
	41004	32.5°N 79.1°W	3	5
	41008	31.4°N 80.9°W	3	5
	41009[1]	28.5°N 80.2°W	3	5
	41010[1]	28.9°N 78.5°W	6	5
	44004	38.5°N 70.7°W	6	5
	44005	42.9°N 68.9°W	6	5
	44007	43.5°N 70.1°W	3	5
	44008	40.5°N 69.4°W	3	5
	44009	38.5°N 74.7°W	3	5
	44011	41.1°N 66.6°W	6	5
	44013	42.4°N 70.7°W	3	5
	44014[1]	36.6°N 74.8°W	3	5
	44025	40.3°N 73.2°W	3	5
PACIFIC OCEAN (SOUTH OF 45°N)	46002	42.5°N 130.3°W	6	5
	46006	40.8°N 137.5°W	6	5
	46011	34.9°N 120.9°W	3	5
	46012	37.4°N 122.7°W	3	5
	46013	38.2°N 123.3°W	3	5
	46014	39.2°N 124.0°W	3	5
	46022	40.8°N 124.5°W	3	5
	46023[1]	34.7°N 121.0°W	3	5
	46025	33.8°N 119.1°W	3	5
	46026	37.8°N 122.8°W	3	5
	46027	41.9°N 124.4°W	3	5
	46028	35.7°N 121.9°W	3	5
	46029	46.1°N 124.5°W	3	5
	46030	40.4°N 124.5°W	3	5
	46042	36.8°N 122.4°W	3	5
	46047	32.4°N 119.5°W	3	5
	46050	44.6°N 124.5°W	3	5
	46053	34.2°N 119.8°W	3	5
	46054[1]	34.3°N 120.4°W	10	10
	46059	38.0°N 130.0°W	6	5
	46062[1]	35.1°N 121.0°W	10	10
	46063	34.3°N 120.7°W	6	5
	51001	23.4°N 162.3°W	6	6
	51002	17.2°N 157.8°W	6	6
	51003	19.2°N 160.7°W	6	6
	51004	17.4°N 152.5°W	6	5
	51028[1]	0.0°N 153.9°W	3	5

[1]Temporary site established with other special funding.

Table 8-2. C-MAN sites

SITE	STATION ID	LOCATION	STATION NAME
GULF OF MEXICO	BURL1	28.9°N 89.4°W	Southwest Pass, LA
	CDRF1[1]	29.1°N 83.0°W	Cedar Key, FL
	CSBF1	29.7°N 85.4°W	Cape San Blas, FL
	DPIA1	30.3°N 88.1°W	Dauphin Island, AL
	DRYF1[1]	24.6°N 82.9°W	Dry Tortugas, FL
	GDIL1	29.3°N 90.0°W	Grand Isle, LA
	KTNF1[1]	29.8°N 83.6°W	Keaton Beach, FL
	LONF1[1]	24.8°N 80.9°W	Long Key, FL
	PTAT2	27.8°N 97.1°W	Port Aransas, TX
	SRST2	29.7°N 94.1°W	Sabine, TX
	VENF1	27.1°N 82.4°W	Venice, FL
ATLANTIC OCEAN	ALSN6	40.5°N 73.8°W	Ambrose Light, NY
	BUZM3	41.4°N 71.0°W	Buzzards Bay, MA
	CHLV2	36.9°N 75.7°W	Chesapeake Light, VA
	CLKN7	34.6°N 76.5°W	Cape Lookout, NC
	DSLN7	35.2°N 75.3°W	Diamond Shoals, NC
	DUCN7	36.2°N 75.8°W	Duck Pier, NC
	FBIS1	32.7°N 79.9°W	Folly Island, SC
	FPSN7	33.5°N 77.6°W	Frying Pan Shoals, NC
	FWYF1[1]	25.6°N 80.1°W	Fowey Rocks, FL
	IOSN3	43.0°N 70.6°W	Isle of Shoals, NH
	LKWF1	26.6°N 80.0°W	Lake Worth, FL
	MDRM1	44.0°N 68.1°W	Mt. Desert Rock, ME
	MISM1	43.8°N 68.9°W	Matinicus Rock, ME
	MLRF1	25.0°N 80.4°W	Molasses Reef, FL
	SANF1[1]	24.5°N 81.9°W	Sand Key, FL
	SAUF1	29.9°N 81.3°W	St. Augustine, FL
	SMKF1	24.6°N 81.1°W	Sombrero Key, FL
	SPGF1	26.7°N 79.0°W	Settlement Point, GBI
	TPLM2	38.9°N 76.4°W	Thomas Point, MD
EASTERN PACIFIC OCEAN (SOUTH OF 45°N)	CARO3	43.3°N 124.4°W	Cape Arago, OR
	NWPO3	44.6°N 124.1°W	Newport, OR
	PTAC1	39.0°N 123.7°W	Point Arena, CA
	PTGC1	34.6°N 120.6°W	Point Arguello, CA

[1]Temporary site established with other special funding.
[2]*Station is expected to be moved offshore approximately 2 nm south of its present location by 6/1/01.*

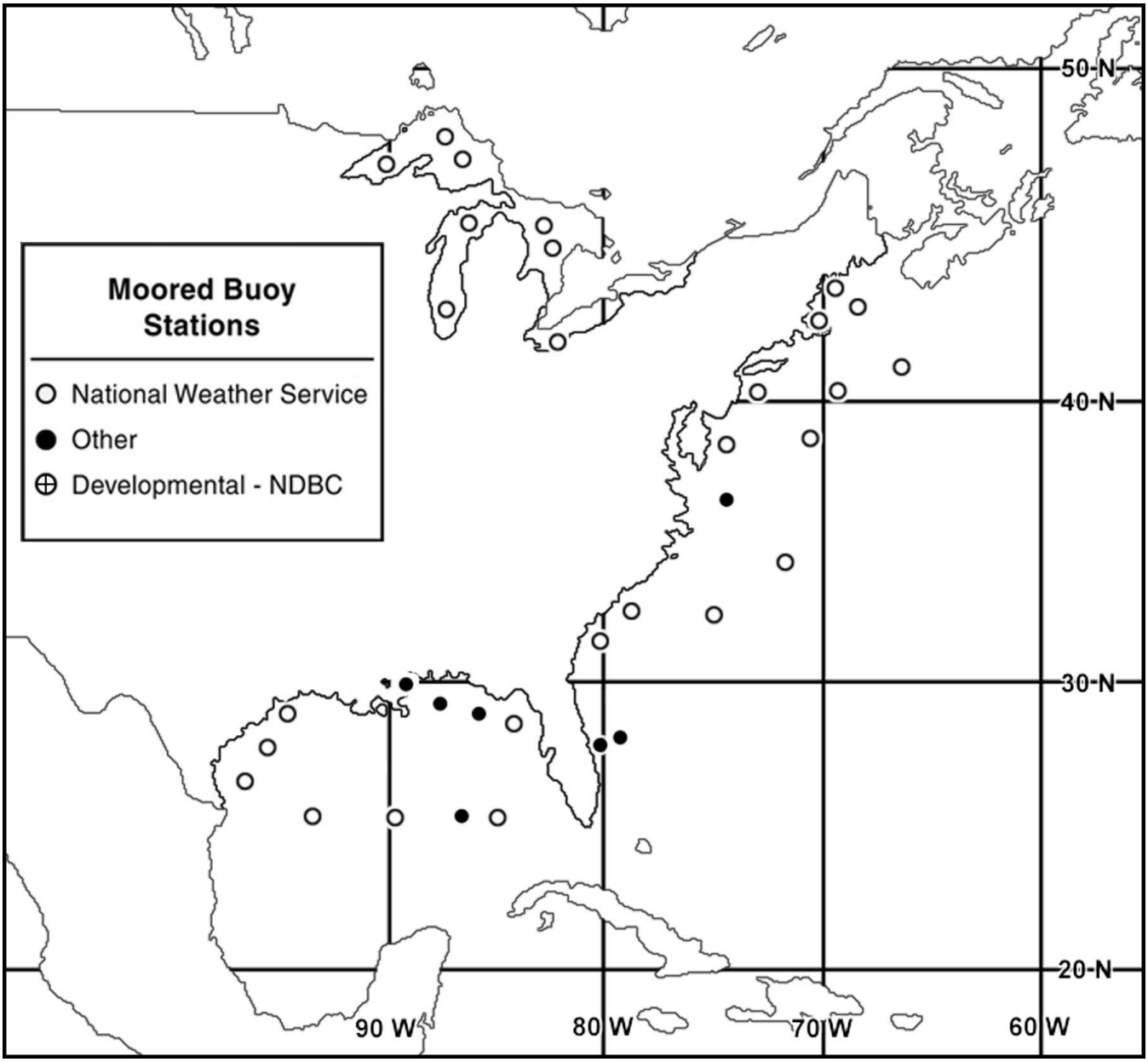

Figure 8-1. NDBC moored buoy locations in the Atlantic Ocean, the Gulf of Mexico, and the Great Lakes

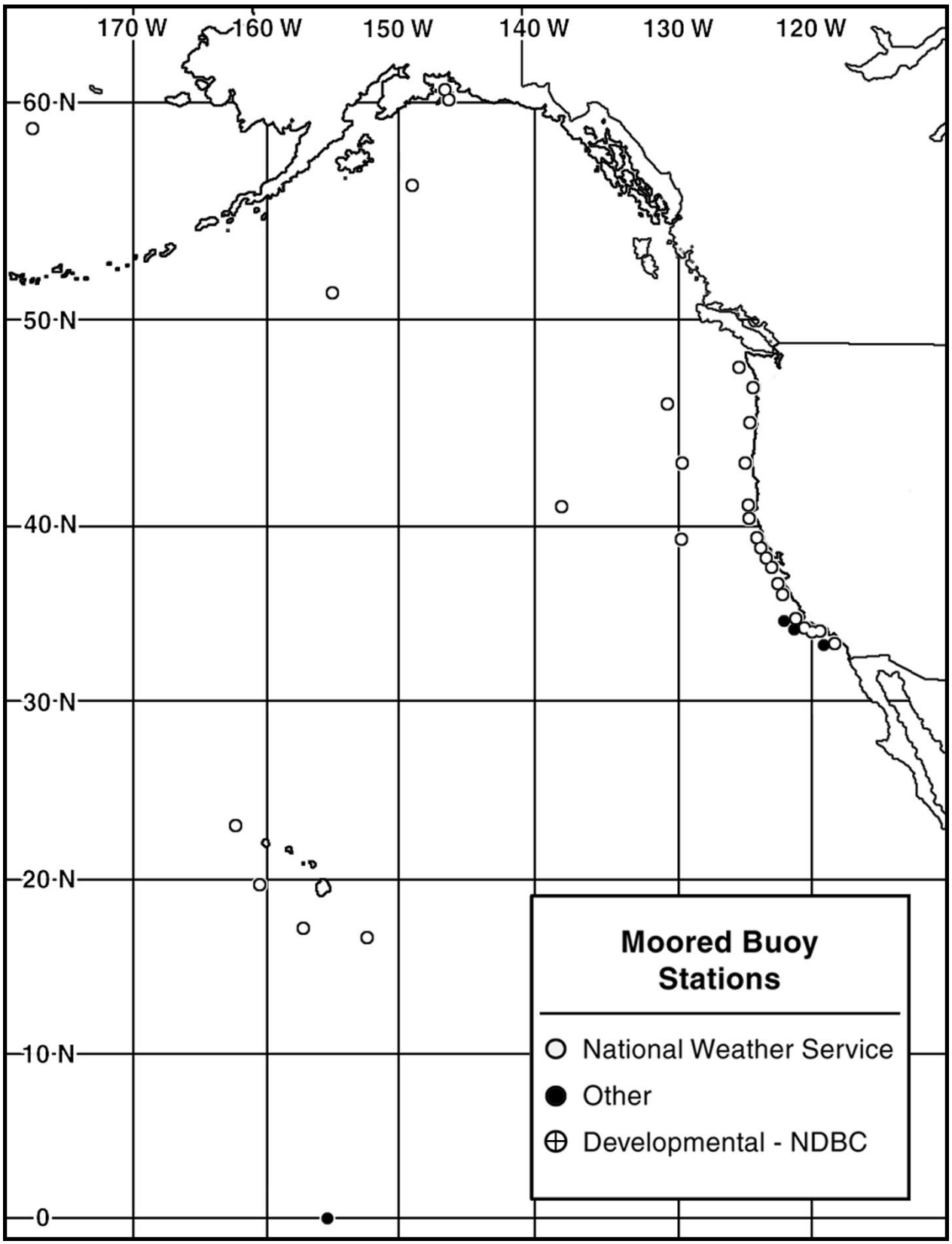

Figure 8-2. NDBC moored buoys in the Pacific Ocean

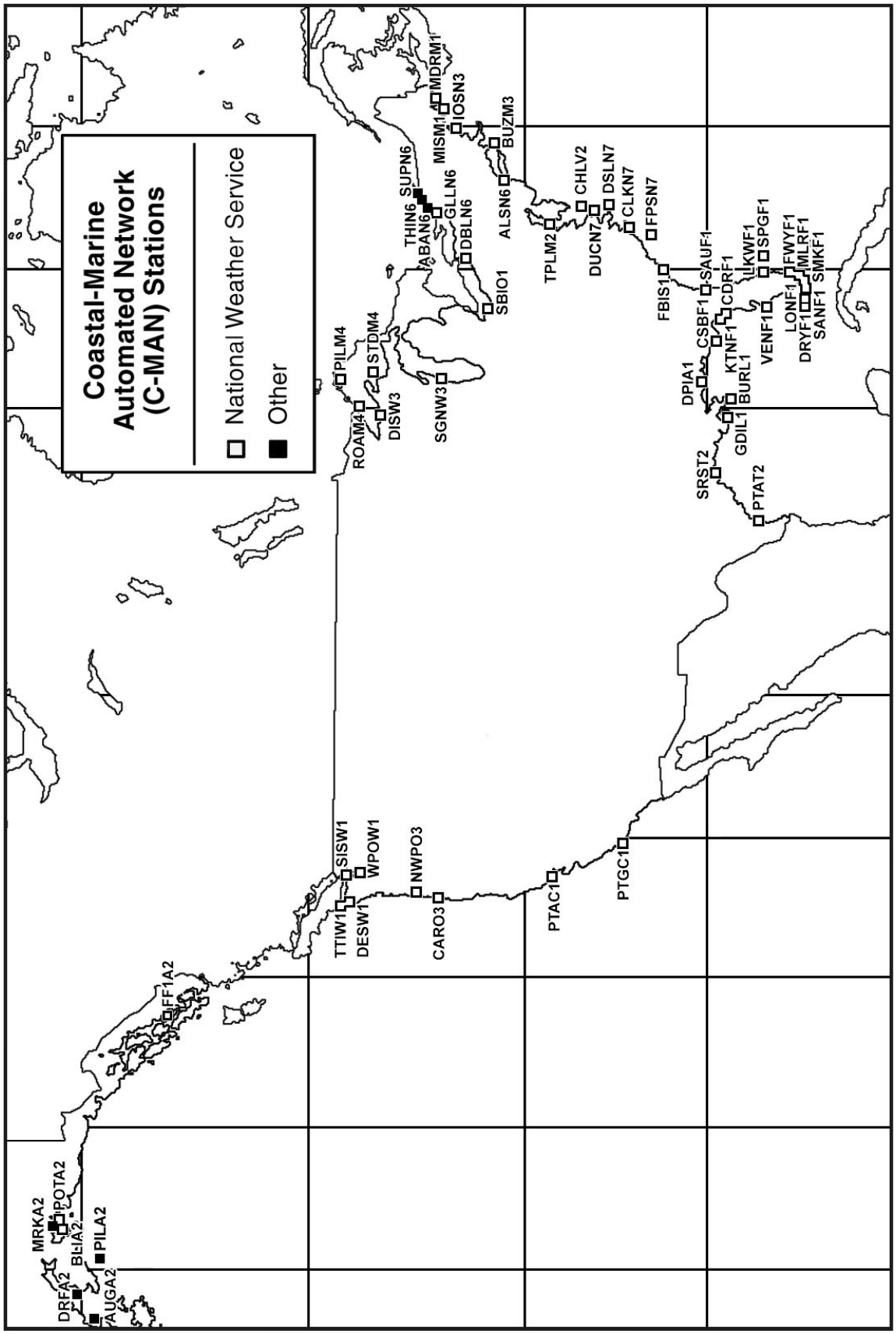

Figure 8-3. C-MAN stations in the coastal U.S.

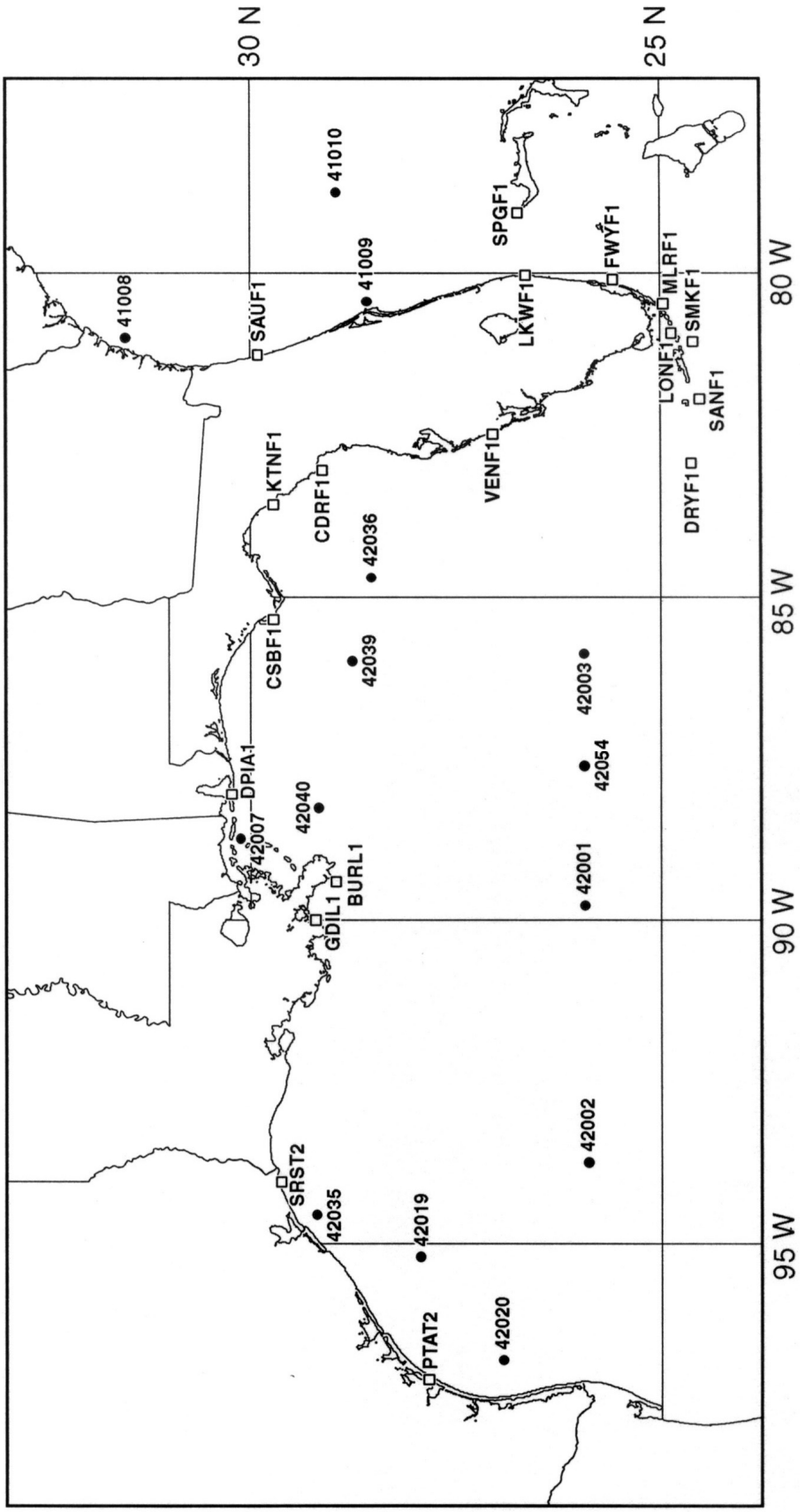

Figure 8-4. NDBC planned and current Gulf of Mexico moored buoy network

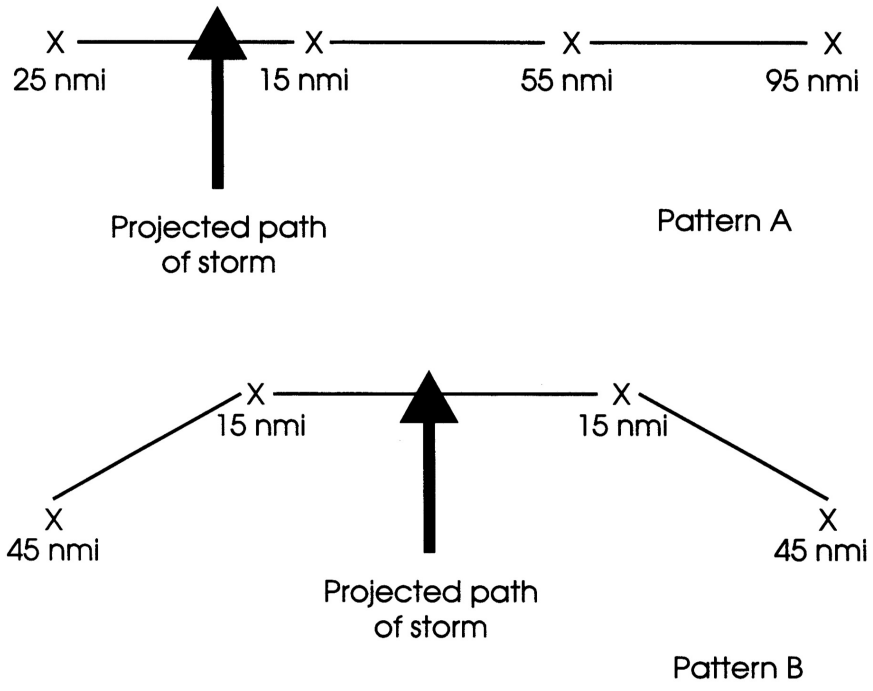

Figure 8-5. Drifting data buoy deployment patterns

Table 8-3. Code forms for moored data buoys, C-MAN stations, and drifting buoys

FORM	CODE
FM 13-IX (SHIP) REPORT OF SYNOPTIC SURFACE OBSERVATION FROM A SEA STATION (AUTOMATIC WEATHER STATION)	$M_iM_iM_jM_j$ $A_1b_wn_bn_bn_b$ YYGGi_w 99$L_aL_aL_a$ $Q_cL_oL_oL_oL_o$ i_ri_x/// /ddff 1s_nTTT (2$s_nT_dT_dT_d$) *3$P_0P_0P_0$* 4PPPP 5appp 9GGgg 22200 Q$s_s$$T_wT_wT_w$ 1$P_{wa}P_{wa}H_{wa}H_{wa}$ 70 $H_{wa}H_{wa}H_{wa}$ 333 912ff (00fff) 555 11fff 22fff (3GGgg 4ddf_mf_m) (6$G_cG_cg_cg_c$ $d_1d_1d_1f_1f_1f_1$ $d_6d_6d_6f_6f_6f_6$) $d_2d_2d_2f_2f_2f_2$ $d_3d_3d_3f_3f_3f_3$ $d_4d_4d_4f_4f_4f_4$ $d_5d_5d_5f_5f_5f_5$
U.S. NATIONAL (C-MAN LAND STATION) MODIFIED FM 12-IX	CMAN YYGGi_w XXXXn_t i_Ri_xhVV Nddff (00fff) 1s_nTTT 2$s_nT_dT_dT_d$ 3$P_0P_0P_0$ 4PPPP 5appp 6RRRt_R 9GGgg 222// 0$s_n$$T_wT_wT_w$ 1$_{wa}P_{wa}P_{wa}H_{wa}H_{wa}$ 70$H_{wa}H_{wa}H_{wa}$ 333 912ff (00fff) 444 1$P_{av}P_{av}P_{av}$/ 555 11fff 22fff (3GGgg) (4dd$f_mf_mf_m$) (6$G_cG_cg_cg_c$ $d_1d_1d_1f_1f_1f_1$ $d_6d_6d_6f_6f_6f_6$) $d_2d_2d_2f_2f_2f_2$ $d_3d_3d_3f_3f_3f_3$ $d_4d_4d_4f_4f_4f_4$ $d_5d_5d_5f_5f_5f_5$ (TIDE1111)
FM 18 BUOY REPORT OF A DRIFTING BUOY OBSERVATION	Section 0: ZZYY $A_1b_wn_bn_bn_b$ *YYMMJ* GGggi$_w$ $Q_cL_aL_aL_aL_aL_a$ $L_0L_0L_0L_0L_0L_0$ YYMMJ 6$Q_1Q_tO_d$/ Section 1: <u>111</u>Q_dQ_x 0ddff (<u>1</u>s$_n$TTT) [(2$s_nT_dT_dT_d$) or (<u>29</u>UUU)] (<u>3</u>$P_oP_oP_oP_o$) (<u>4</u>PPPP) (<u>5</u>appp) Section 2: <u>222</u>Q_dQ_x (<u>0</u>$S_nT_wT_wT_w$) (<u>1</u>$P_{wa}P_{wa}H_{wa}H_{wa}$) (<u>20</u>$P_{wa}P_{wa}P_{wa}$) (<u>21</u>$H_{wa}H_{wa}H_{wa}$) Section 3: <u>333</u>$Q_{d1}Q_{d2}$ (8887k_2 2$z_0z_0z_0z_0$ 3$T_0T_0T_0T_0$ 4$S_0S_0S_0S$ .... 2$z_nz_nz_nz_n$ 3$T_nT_nT_nT_n$ 4$S_nS_nS_nS_n$) (66$k_6$9k_3 2$z_0z_0z_0z_0$ $d_0d_0c_0c_0c_0$ .... 2$z_nz_nz_nz_n$ $d_nd_nc_nc_nc_n$) Section 4: <u>444</u> *(<u>1</u>$Q_pQ_2Q_{tw}Q_4$) (<u>2</u>Q_nQ_L//) [($Q_cL_aL_aL_aL_aL_a$ $L_0L_0L_0L_0L_0L_0$ or (YYMMJ GGgg/)] (8$V_iV_iV_iV_i$) (9$i_dZ_dZ_dZ_dZ_d$)*