

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 coastal areas and deep ocean of the Atlantic and Pacific Oceans, and in the Great Lakes. These data acquisition systems collect real-time meteorological and oceanographic measurements 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. The locations, operational status, and measurement capability of all moored buoys and C-MAN stations can be obtained on-line via NDBC's home page on the World Wide Web (www) at <http://www.ndbc.noaa.gov>. Specific questions may be addressed to NDBC Observing Systems Branch, Stennis Space Center, Mississippi 39529-6000, phone 228-688-3134.

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 measured at several stations. Ocean currents and salinity are measured at a few coastal stations.

NDBC has begun to acquire, quality control, encode, and distribute data from regional coastal ocean observing systems. Information on these systems may be obtained from their respective web sites that are linked to www.ndbc.noaa.gov.

8.1.3. **Drifting Buoys.**

8.1.3.1. NDBC. NDBC is capable of acquiring, preparing, and deploying drifting buoys; however, an operational drifting buoy requirement has not been identified or funded.

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. Drifting buoy deployments should be coordinated through the Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA). They will request deployment, through the Office of the Federal Coordinator for Meteorology (OFCM), by the 53rd Weather Reconnaissance Squadron (53 WRS) via HQ Air Force Reserve Command (AFRC). Deployments in advance of a U.S. land-threatening hurricane require a 36- to 48-hour notification.

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 before the planned deployment. Hard tasking for the deployment will be issued 14 hours before the event via the TCPOD.

8.2.2. Deployment of Buoys. DOC may request the deployment of up to four drifting buoys between 185 and 333 km (100 and 180 nmi) 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 8-1.

8.3. Communications. Moored buoy and C-MAN data are transmitted via NOAA 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) FM13-IX SHIP code. The SHIP code is defined in Federal Meteorological Handbook 2, Surface Synoptic Codes. C-MAN measurements are formatted into C-MAN code, which is very similar to the WMO FM12-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 the NOAA Polar Orbiting Environmental Satellites (POES) to the U.S. Argos Global Processing Center, Largo, MD. Service Argos processes and formats the data into WMO FM18 BUOY code defined in the WMO *Manual on Codes*, Volume I. The messages are 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	25.9E N., 89.7E W.	10	10
	42002	25.9E N., 93.6E W.	10	10
	42003	25.9E N., 85.9E W.	10	10
	42007	30.1E N., 88.8E W.	3	5
	42019	27.9E N., 95.4E W.	3	5
	42020	26.9E N., 96.7E W.	3	5
	42035	29.2E N., 94.4E W.	3	5
	42036	28.5E N., 84.5E W.	3	5
	42039 ¹	28.8E N., 86.0E W.	3	5
	42040 ¹	29.2E N., 88.2E W.	3	5
ATLANTIC OCEAN	41001	34.7E N., 72.6E W.	6	5
	41002	32.3E N., 75.2E W.	6	5
	41004	32.5E N., 79.1E W.	3	5
	41008	31.4E N., 80.9E W.	3	5
	41009 ¹	28.5E N., 80.2E W.	3	5
	41010 ¹	28.9E N., 78.5E W.	6	5
	41012	30.0EN., 80.50EW.	3	5
	44004	38.5E N., 70.7E W.	6	5
	44005	42.9E N., 68.9E W.	6	5
	44007	43.5E N., 70.1E W.	3	5
	44008	40.5E N., 69.4E W.	3	5
	44009	38.5E N., 74.7E W.	3	5
	44011	41.1E N., 66.6E W.	6	5
	44013	42.4E N., 70.7E W.	3	5
	44014 ¹	36.6E N., 74.8E W.	3	5
	44017	40.7EN., 72.0E W.	3	5
	44018	41.3EN., 69.2EW.	3	5
44025	40.3E N., 73.2E W.	3	5	
PACIFIC OCEAN (BETWEEN 10EN. AND 40EN.)	46002	42.5E N., 130.3E W.	6	5
	46011	34.9E N., 120.9E W.	3	5
	46012	37.4E N., 122.7E W.	3	5
	46013	38.2E N., 123.3E W.	3	5
	46014	39.2E N., 124.0E W.	3	5
	46023 ¹	34.7E N., 121.0E W.	3	5
	46025	33.8E N., 119.1E W.	3	5
	46026	37.8E N., 122.8E W.	3	5
	46028	35.7E N., 121.9E W.	3	5
	46042	36.8E N., 122.4E W.	3	5
	46047	32.4E N., 119.5E W.	3	5
	46053	34.2E N., 119.8E W.	3	5
	46054 ¹	34.3E N., 120.4E W.	10	10
	46059	38.0E N., 130.0E W.	6	5
	46062 ¹	35.1E N., 121.0E W.	10	10
	46063	34.3E N., 120.7E W.	6	5
	51001	23.4E N., 162.3E W.	6	6
51002	17.2E N., 157.8E W.	6	6	
51003	19.2E N., 160.7E W.	6	6	
51004	17.4E N., 152.5E W.	6	5	

¹Temporary site established with other special funding.

Table 8-2. C-MAN sites

SITE	STATION ID	LOCATION	STATION NAME	
GULF OF MEXICO	BURL1	28.9E N., 89.4E W.	Southwest Pass, LA	
	CDRF1	29.1E N., 83.0E W.	Cedar Key, FL	
	CSBF1 ²	29.7E N., 85.4E W.	Cape San Blas, FL	
	DPIA1	30.3E N., 88.1E W.	Dauphin Island, AL	
	DRYF1	24.6E N., 82.9E W.	Dry Tortugas, FL	
	GDIL1	29.3E N., 90.0E W.	Grand Isle, LA	
	KTNF1	29.8E N., 83.6E W.	Keaton Beach, FL	
	LONF1	24.8E N., 80.9E W.	Long Key, FL	
	PTAT2	27.8E N., 97.1E W.	Port Aransas, TX	
	SRST2	29.7E N., 94.1E W.	Sabine, TX	
	VENF1	27.1E N., 82.4E W.	Venice, FL	
	ATLANTIC OCEAN	ALSN6	40.5E N., 73.8E W.	Ambrose Light, NY
		BUZM3	41.4E N., 71.0E W.	Buzzards Bay, MA
CHLV2		36.9E N., 75.7E W.	Chesapeake Light, VA	
CLKN7		34.6E N., 76.5E W.	Cape Lookout, NC	
DSLN7 ³		35.2E N., 75.3E W.	Diamond Shoals, NC	
DUCN7		36.2E N., 75.8E W.	Duck Pier, NC	
FBIS1		32.7E N., 79.9E W.	Folly Island, SC	
FPSN7 ³		33.5E N., 77.6E W.	Frying Pan Shoals, NC	
FWYF1		25.6E N., 80.1E W.	Fowey Rocks, FL	
IOSN3		43.0E N., 70.6E W.	Isle of Shoals, NH	
LKWF1		26.6E N., 80.0E W.	Lake Worth, FL	
MDRM1		44.0E N., 68.1E W.	Mt. Desert Rock, ME	
MISM1		43.8E N., 68.9E W.	Matinicus Rock, ME	
MLRF1		25.0E N., 80.4E W.	Molasses Reef, FL	
SANF1		24.5E N., 81.9E W.	Sand Key, FL	
SAUF1		29.9E N., 81.3E W.	St. Augustine, FL	
SMKF1		24.6E N., 81.1E W.	Sombrero Key, FL	
SPGF1	26.7E N., 79.0E W.	Settlement Point, GBI		
TPLM2	38.9E N., 76.4E W.	Thomas Point, MD		
EASTERN PACIFIC OCEAN (SOUTH OF 45E N.)	CARO3	43.3E N., 124.4E W.	Cape Arago, OR	
	NWPO3	44.6E N., 124.1E W.	Newport, OR	
	PTAC1	39.0E N., 123.7E W.	Point Arena, CA	
	PTGC1	34.6E N., 120.6E W.	Point Arguello, CA	

¹Temporary site established with other special funding.²Station is expected to be moved offshore. Approximately 2 nmi S. at present location by 6/1/01.³ Station is expected to be removed in summer 2003 and replaced by a moored buoy in the vicinity.

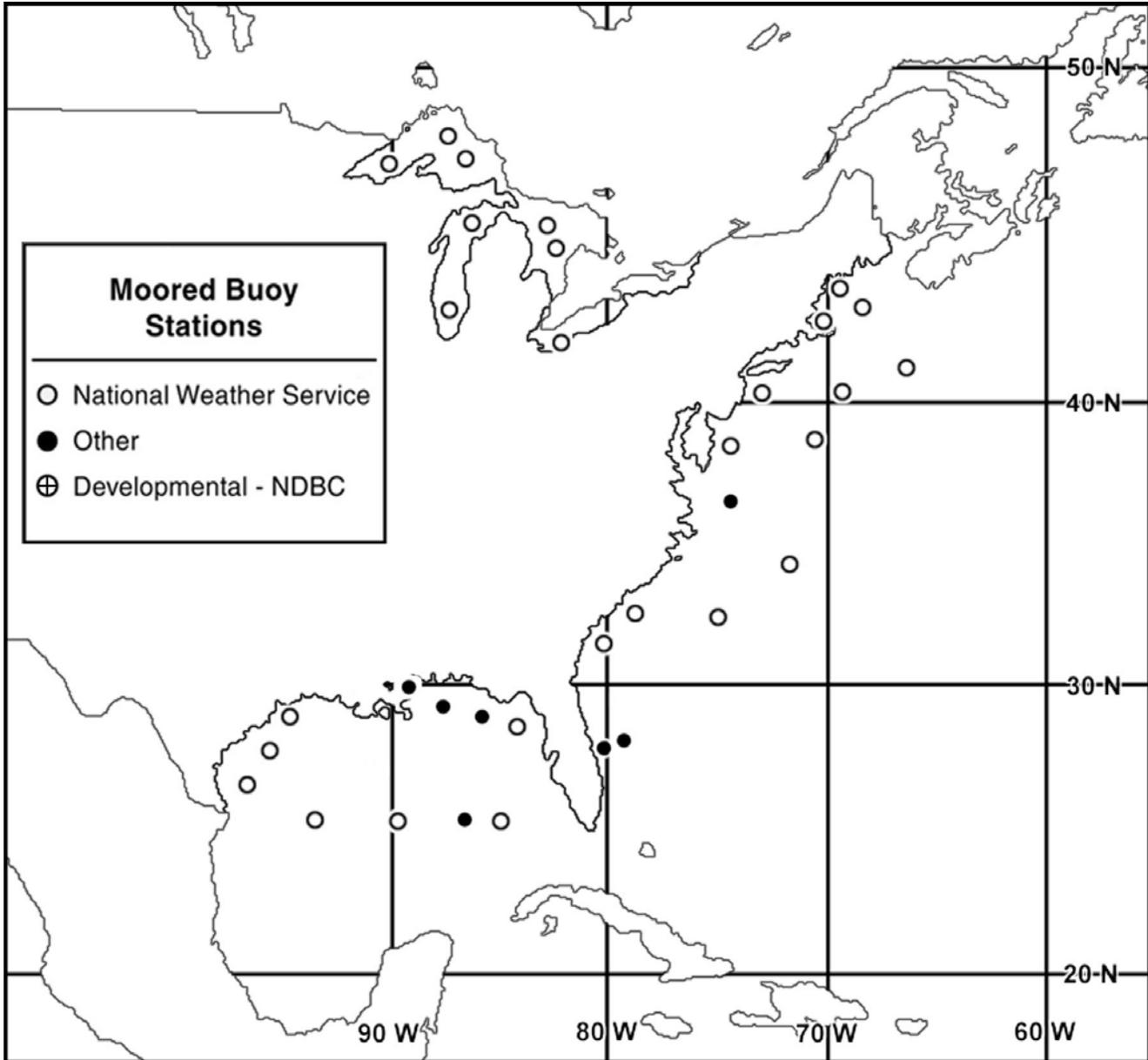


Figure 8-1. NDBC moored buoy locations in the Atlantic Ocean, the Gulf of Mexico, and the Great Lakes

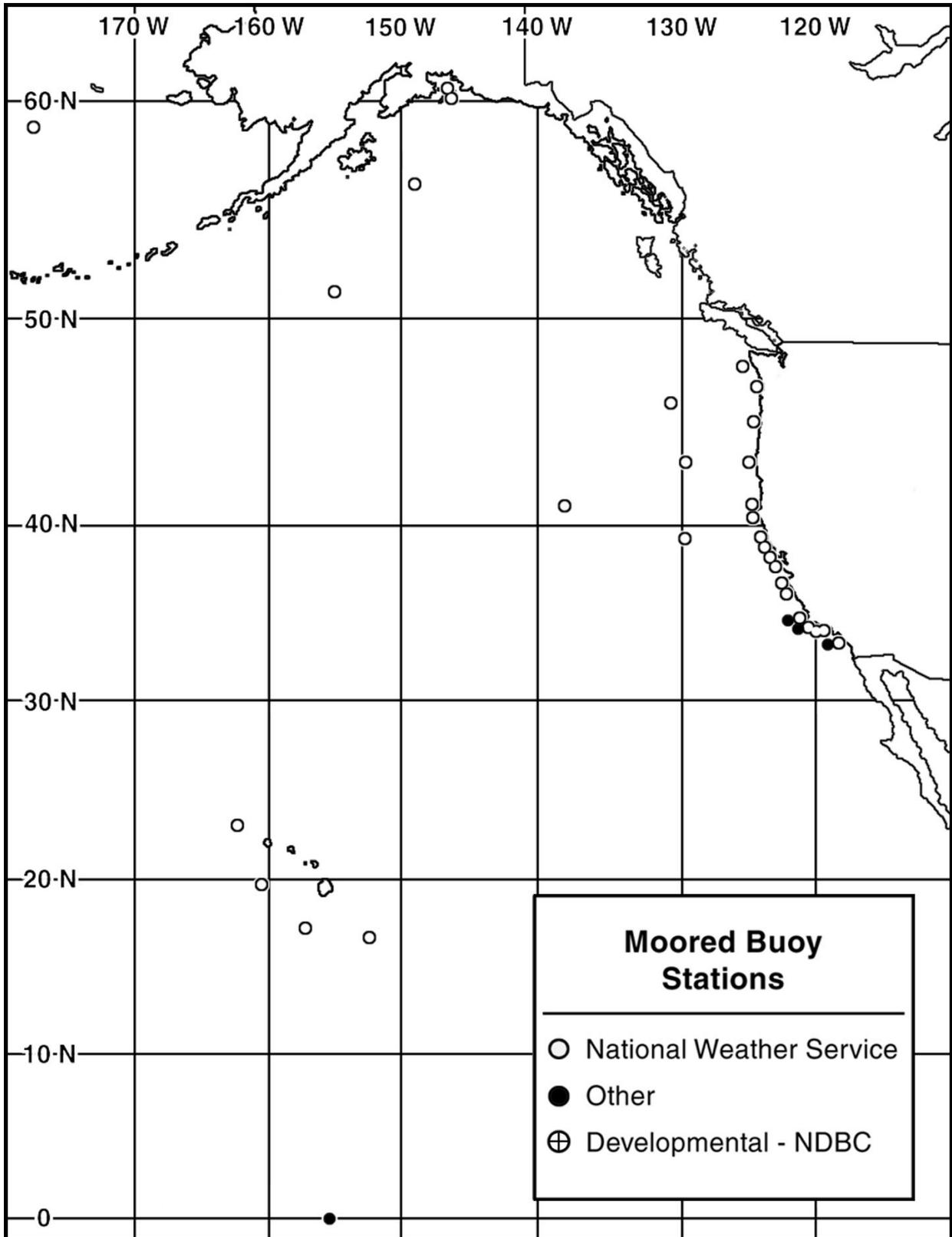


Figure 8-2. NDBC moored buoys in the Pacific Ocean

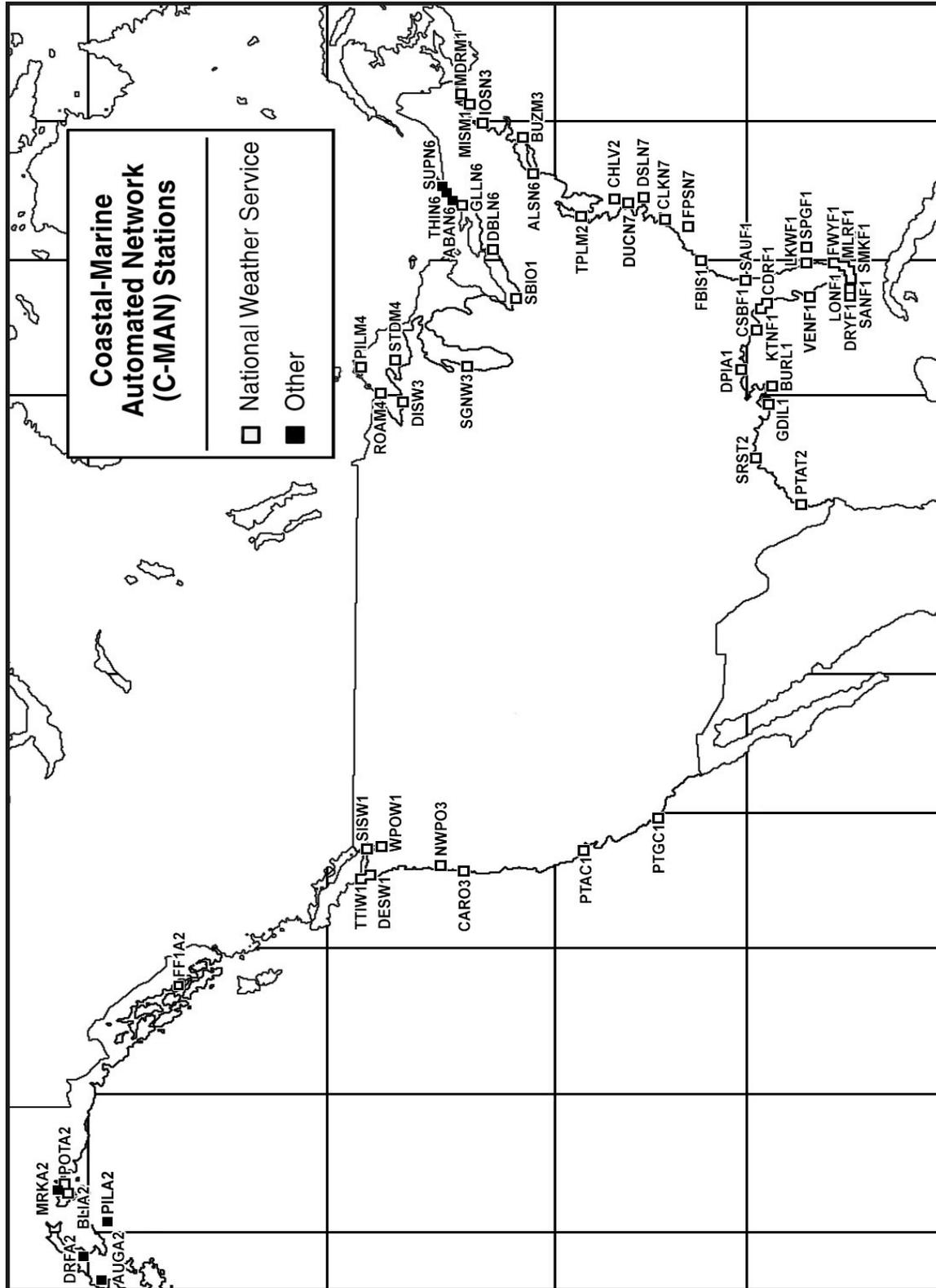


Figure 8-3. C-MAN stations in the coastal U.S.

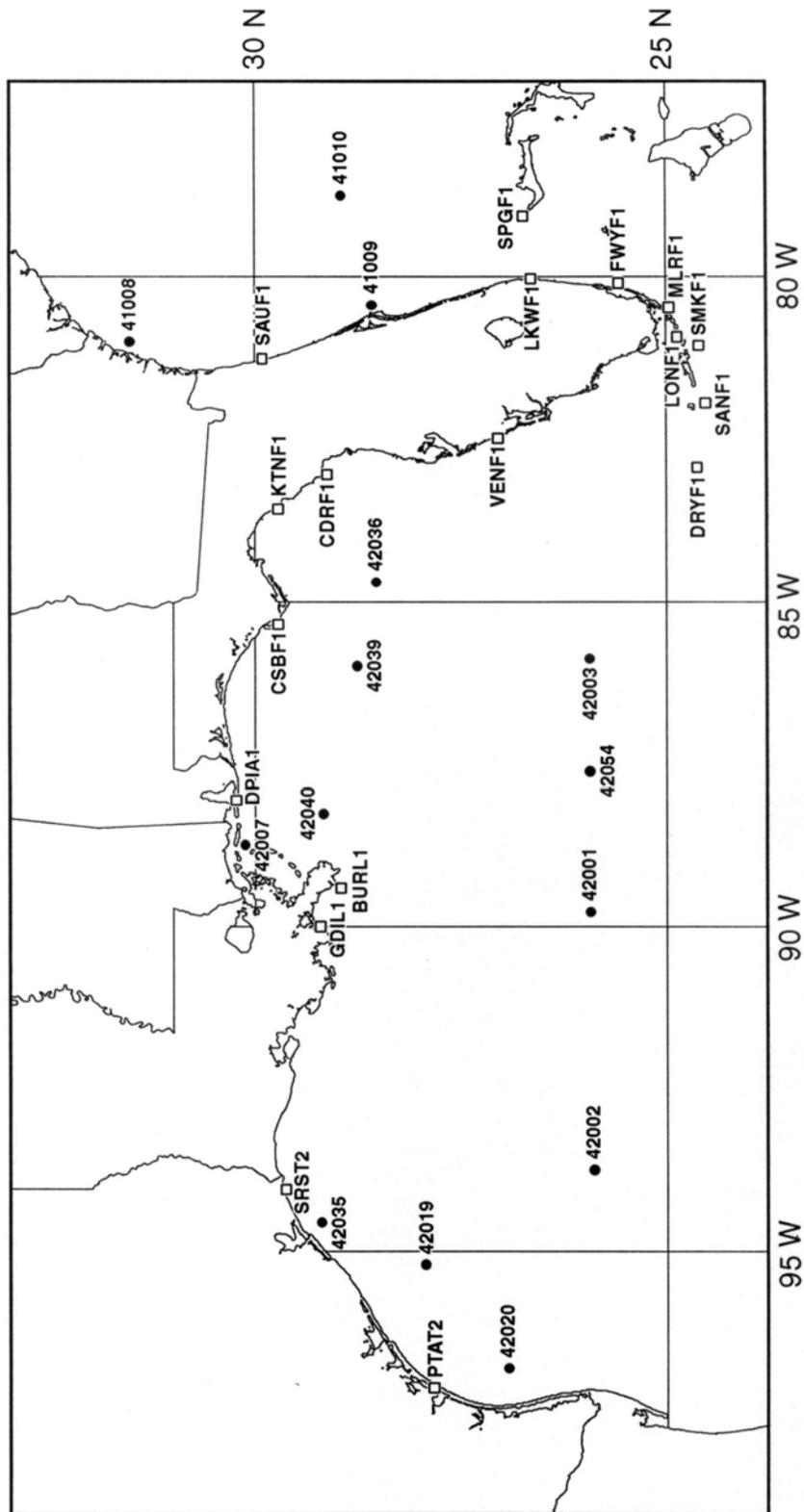


Figure 8-4. NDBC planned and current Gulf of Mexico moored buoy network

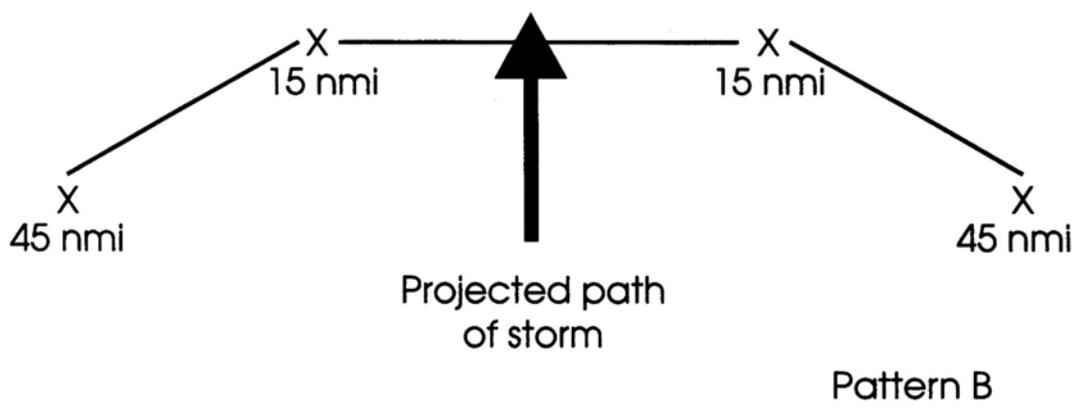
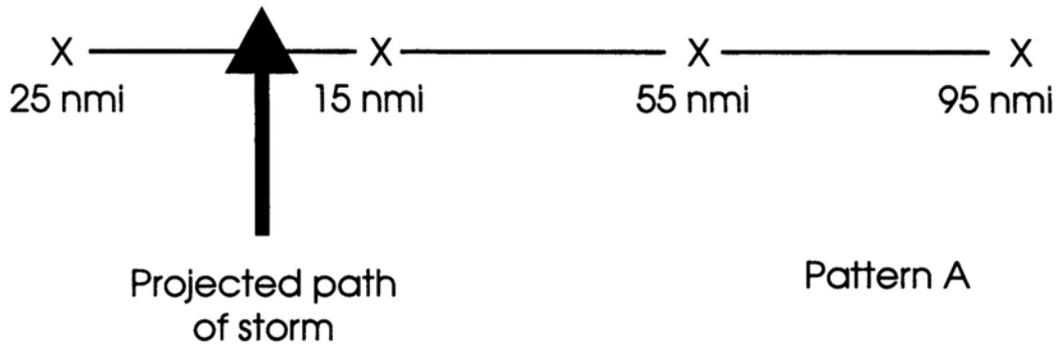


Figure 8-5. Drifting data buoy deployment patterns

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

FORM	CODE
FM13IX (SHIP) REPORT OF SYNOPTIC SURFACE OBSERVATION FROM A SEA STATION (AUTOMATIC WEATHER STATION)	M _i M _i M _i M _j A ₁ b _w n _b n _b n _b YYGGi _w 99L _a L _a L _a Q _c L _o L _o L _o L _o i _i x/// //ddff 1s _n TTT (2s _n T _d T _d T _d) 3P _o P _o P _o P _o 4PPPP 5appp 9GGgg 222oo Qs _n T _w T _w T _w 1P _{wa} P _{wa} H _{wa} H _{wa} 7o H _{wa} H _{wa} H _{wa} 333 912ff (oofff) 555 11fff 22fff (3GGgg 4ddf _m f _m) (6G _c G _c g _c g _c d ₁ d ₁ d ₁ f ₁ f ₁ f ₁ d ₆ d ₆ d ₆ f ₆ f ₆ f ₆) d ₂ d ₂ d ₂ f ₂ f ₂ f ₂ d ₃ d ₃ d ₃ f ₃ f ₃ f ₃ d ₄ d ₄ d ₄ f ₄ f ₄ f ₄ d ₅ d ₅ d ₅ f ₅ f ₅ f ₅
U.S. NATIONAL (C-MAN LAND STATION) MODIFIED FM12-IX SYNOP	CMAN YYGGi _w XXXXN _i i _R i _h VV Nddff (oofff) 1s _n TTT 2s _n T _d T _d T _d 3P _o P _o P _o P _o 4PPPP 5appp 6RRRt _R 9GGgg 222// oS _n T _w T _w T _w 1 _{wa} P _{wa} P _{wa} H _{wa} H _{wa} 7oH _{wa} H _{wa} H _{wa} 333 912ff (oofff) 444 1P _{av} P _{av} P _{av} / 555 11fff 22fff (3GGgg) (4ddf _m f _m f _m) (6G _c G _c g _c g _c d ₁ d ₁ d ₁ f ₁ f ₁ f ₁ d ₆ d ₆ d ₆ f ₆ f ₆ f ₆) d ₂ d ₂ d ₂ f ₂ f ₂ f ₂ d ₃ d ₃ d ₃ f ₃ f ₃ f ₃ d ₄ d ₄ d ₄ f ₄ f ₄ f ₄ d ₅ d ₅ d ₅ f ₅ f ₅ f ₅ (TIDE1111)
FM18 BUOY REPORT OF A DRIFTING BUOY OBSERVATION	ZZYY A ₁ b _w n _b n _b n _b YYMMJ GGggi _w Q _c L _a L _a L _a L _a L _o L _o L _o L _o L _o 6Q ₁ Q ₁ Q _d / <u>111</u> Q _d Q _x <u>Q</u> ddff (1 _{SN} TTT) [(2 _{SN} T _d T _d T _d) or (2 ₉ uuu)] (3 _P oP _o P _o P _o) (4 _{PPPP}) (5 _{appp}) 222Q _d Q _x (Q _s nT _w T _w T _w) (1P _{wa} P _{wa} H _{wa} H _{wa}) (2OP _{wa} P _{wa} P _{wa}) (21H _{wa} H _{wa} H _{wa}) <u>333</u> Q _{d1} Q _{d2} (8887k ₂ 2z _o z _o z _o z _o 3T _o T _o T _o T _o 4S _o S _o S _o S _o 2z _n z _n z _n z _n 3T _n T _n T _n T _n 4S _n S _n S _n S _n) (66k ₆ 9k ₃ 2z _o z _o z _o z _o d _o d _o c _o c _o c _o 2z _n z _n z _n z _n d _n d _n c _n c _n c _n) 444 (1 _Q pQ ₂ Q _{Tw} Q ₄) (2 _Q NQ _L //) [(Q _c L _a L _a L _a L _a L _o L _o L _o L _o L _o or (YYMMJ GGgg//)] (8V _i V _i V _i V _i) (9 _{1d} Z _d Z _d Z _d Z _d)