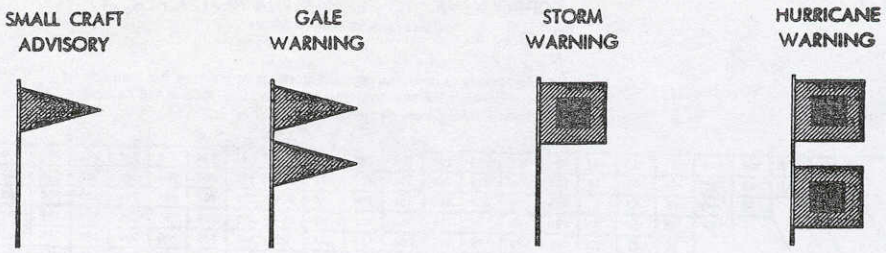
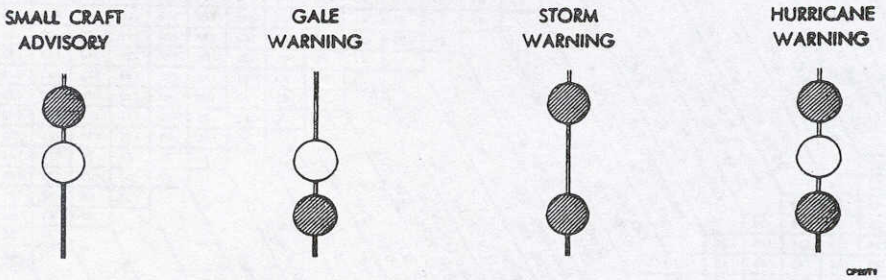
NATIONAL WEATHER SERVICE COASTAL WARNING DISPLAYS

DAYTIME SIGNALS



NIGHT (LIGHT) SIGNALS



EXPLANATION OF DISPLAYS

Small Craft Advisory: One RED pennant displayed by day and a RED light ABOVE a WHITE light at night, to alert mariners to sustained (more than two hours) weather or sea conditions, either present or forecast, that might be hazardous to small boats. Mariners learning of a Small Craft Advisory are urged to determine immediately the reason by tuning their radios to the latest marine broadcasts. Decision as to the degree of hazard will be left up to the boatman, based on his experience and size and type of boat. The threshold conditions for the Small Craft Advisory are usually 18 knots of wind (less than 18 knots in some dangerous waters) or hazardous wave conditions.

Gale Warning: Two RED pennants displayed by day and a WHITE light ABOVE a RED light at night to indicate that winds within the range 34 to 47 knots are forecast for the area.

Storm Warning: A single square RED flag with a BLACK center displayed during daytime and two RED lights at night to indicate that winds 48 knots and above, no matter how high the speed, are forecast for the area. However, if the winds are associated with a tropical cyclone (hurricane) the STORM WARNING display indicates that winds within the range 48 to 63 knots are forecast.

Hurricane Warning: Displayed only in connection with a tropical cyclone (hurricane). Two square RED flags with BLACK centers displayed by day and a WHITE light between two RED lights at night to indicate that winds 64 knots and above are forecast for the area.

Note: A "HURRICANE WATCH" is an announcement issued by the National Weather Service via press and radio and television broadcasts whenever a tropical storm or hurricane becomes a threat to a coastal area. The "Hurricane Watch" announcement is not a warning, rather it indicates that the hurricane is near enough that everyone in the area covered by the "Watch" should listen to their radios for subsequent advisories and be ready to take precautionary action in case hurricane warnings are issued.

Note: A SPECIAL MARINE WARNING BULLETIN is issued whenever a severe local storm or strong wind of brief duration is imminent and is not covered by existing warnings or advisories. No visual displays will be used in connection with the Special Marine Warning Bulletin; boaters will be able to receive these special warnings by keeping tuned to a NOAA VHF-FM radio station or to Coast Guard and commercial radio stations that transmit marine weather information.

DETERMINATION OF WIND SPEED BY SEA CONDITION

Miles per hour	Knots	Descriptive	Sea Conditions	Wind force (Beaufort)	Probable wave height (in ft.)
0-1	0-1	Calm	Sea smooth and mirror-like.	0	-
1-3	1-3	Light air	Scale-like ripples without foam crests.	1	1/4
4-7	4-6	Light breeze	Small, short wavelets; crests have a glassy appearance and do not break.	2	1/2
8-12	7-10	Gentle breeze	Large wavelets: some crests begin to break; foam of glassy appearance. Occasional white foam crests.	3	2
13-18	11-16	Moderate breeze	Small waves, become longer; fairly frequent white foam crests.	4	4
19-24	17-21	Fresh breeze	Moderate waves, taking a more pronounced long form; many white foam crests; there may be some spray.	5	6
25-31	22-27	Strong breeze	Large waves begin to form; white foam crests are more extensive everywhere; there may be some spray.	6	10
32-38	28-33	Near gale	Sea heaps up and white foam from breaking waves begins to be blown in streaks along the direction of the wind; spindrift begins.	7	14
39-46	34-40	Gale	Moderately high waves of greater length; edges of crests break into spindrift; foam is blown in well-marked streaks along the direction of the wind.	8	18
47-54	41-47	Strong gale	High waves; dense streaks of foam along the direction of the wind; crests of waves begin to topple, tumble, and roll over; spray may reduce visibility.	9	23
55-63	48-55	Storm	Very high waves with long overhanging crests. The resulting foam in great patches is blown in dense white streaks along the direction of the wind. On the whole, the surface of the sea is white in appearance. The tumbling of the sea becomes heavy and shocklike. Visibility is reduced.	10	29
64-72	56-63	Violent storm	Exceptionally high waves that may obscure small and medium-sized ships. The sea is completely covered with long white patches of foam lying along the direction of the wind. Everywhere the edges of the wave crests are blown into froth. Visibility is reduced.	11	37
73 or more	64 or more	Hurricane	The air is filled with foam and spray. Sea completely white with driving spray; visibility very much reduced.	12	45

INSIDE-ROUTE DISTANCES
NORFOLK, VA., TO FERNANDINA BEACH, FLA.
(Nautical and Statute Miles)

Figure at intersection of columns opposite ports in question is the nautical/statute mileage between the two. Example: Morehead City, N.C., is 445 nautical miles (512 statute miles) from Fernandina Beach, Fla.

Statute Miles

Nautical Miles

Port	Norfolk	Elizabeth City	Hertford	Columbia	Edenton	Plymouth	Manteo	Belhaven	Washington	Ocracoke	Oriental	New Bern	Beaufort, N.C.	Morehead City	Swansboro	Jacksonville	Wrightsville	Wilmington	Southport	Little River	Bucksport	Georgetown	McClellanville	Charleston	Beaufort, S.C.	Savannah	Thunderbolt	Brunswick	Fernandina Beach
Norfolk, Va. 36°50.9'N., 76°17.9'W.		89*	102	102	113	121	92	138	180	151	184	207	204	205	230	266	283	314	308	344	377	405	430	467	536	585	583	685	717
Elizabeth City, N.C. 36°18.1'N., 76°13.0'W.	77*		45	45	55	64	45	91	131	105	136	160	154	157	182	217	235	266	260	296	329	358	382	419	488	536	535	636	669
Hertford, N.C. 36°11.6'N., 76°28.0'W.	89	39		30	40	48	53	91	132	112	137	160	158	158	184	219	236	267	261	298	330	358	383	421	489	537	536	638	670
Columbia, N.C. 35°55.0'N., 76°15.4'W.	89	39	26		29	38	52	90	131	110	136	159	157	157	182	217	235	266	260	296	329	357	382	419	488	536	535	636	669
Edenton, N.C. 36°03.3'N., 76°36.6'W.	98	48	35	25		16	62	100	142	120	145	168	166	167	191	227	245	276	270	306	338	366	391	429	497	547	545	647	678
Plymouth, N.C. 35°51.8'N., 76°45.6'W.	105	56	42	33	14		70	109	150	130	154	178	175	175	201	237	254	285	280	315	349	376	402	438	508	556	555	656	688
Manteo, N.C. 35°54.6'N., 75°40.2'W.	80	39	46	45	54	61		81	121	70	105	127	127	127	152	186	205	236	231	267	299	326	352	388	457	506	505	606	639
Belhaven, N.C. 35°32.1'N., 76°37.4'W.	120	79	79	78	87	95	70		45	49	49	72	70	70	96	131	150	181	175	211	243	270	296	334	402	451	450	551	582
Washington, N.C. 35°32.6'N., 77°03.7'W.	156	114	115	114	123	130	105	39		69	64	87	85	85	110	146	163	194	189	224	258	285	311	348	417	465	464	565	597
Ocracoke, N.C. 35°06.8'N., 75°59.1'W.	131	91	97	96	104	113	61	43	60		47	71	68	68	93	129	147	178	173	208	241	268	293	331	399	449	448	549	580
Oriental, N.C. 35°01.5'N., 76°41.8'W.	160	118	119	118	126	134	91	43	56	41		26	25	25	51	86	105	136	130	166	198	226	251	289	357	406	405	506	537
New Bern, N.C. 35°06.1'N., 77°02.1'W.	180	139	139	138	146	155	110	63	76	62	23		44	44	69	105	123	154	148	184	216	245	270	307	376	425	423	525	557
Beaufort, N.C. 34°43.1'N., 76°40.2'W.	177	134	137	136	144	152	110	61	74	59	22	38		3	28	63	81	112	107	143	175	203	229	266	334	383	382	483	514
Morehead City, N.C. 34°42.8'N., 76°41.8'W.	178	136	137	136	145	152	110	61	74	59	22	38	3		25	61	79	110	105	140	173	200	226	264	331	381	380	481	512
Swansboro, N.C. 34°41.0'N., 77°07.3'W.	200	158	160	158	166	175	132	83	96	81	44	60	24	22		36	53	84	79	115	147	175	200	238	306	356	353	456	487
Jacksonville, N.C. 34°44.7'N., 77°26.3'W.	231	189	190	189	197	206	162	114	127	112	75	91	55	53	31		55	86	81	116	148	177	203	239	308	357	356	457	489
Wrightsville, N.C. 34°13.1'N., 77°48.8'W.	246	204	205	204	213	221	178	130	142	128	91	107	70	69	46	48		31	25	61	94	122	147	184	253	302	300	402	434
Wilmington, N.C. 34°14.0'N., 77°57.0'W.	273	231	232	231	240	248	205	157	169	155	118	134	97	96	73	75	27		24	60	93	121	146	183	252	300	299	402	433
Southport, N.C. 33°54.8'N., 78°01.0'W.	268	226	227	226	235	243	201	152	164	150	113	129	93	91	69	70	22	21		36	69	97	122	159	228	276	275	376	409
Little River, S.C. 33°52.2'N., 78°36.6'W.	299	257	259	257	266	274	232	183	195	181	144	160	124	122	100	101	53	52	31		32	61	86	123	192	241	239	341	373
Bucksport, S.C. 33°39.0'N., 79°05.6'W.	328	286	287	286	294	303	260	211	224	209	172	188	152	150	128	129	82	81	60	28		28	53	91	159	208	206	308	339
Georgetown, S.C. 33°21.4'N., 79°16.9'W.	352	311	311	310	318	327	283	235	248	233	196	213	177	174	152	154	106	105	84	53	24		28	64	133	183	181	283	314
McClellanville, S.C. 33°04.7'N., 79°27.6'W.	374	332	333	332	340	349	306	257	270	255	218	235	199	196	174	176	128	127	106	75	46	24		37	106	155	153	255	287
Charleston, S.C. 32°47.2'N., 79°55.2'W.	406	364	366	364	373	381	337	290	302	288	251	267	231	229	207	208	160	159	138	107	79	56	32		69	120	119	220	251
Beaufort, S.C. 32°25.6'N., 80°40.2'W.	466	424	425	424	432	441	397	349	362	347	310	327	290	288	266	268	220	219	198	167	138	116	92	60		49	47	150	181
Savannah, Ga. 32°05.0'N., 81°05.7'W.	508	466	467	466	475	483	440	392	404	390	353	369	333	331	309	310	262	261	240	209	181	159	135	104	43		16	117	150
Thunderbolt, Ga. 32°01.5'N., 81°02.8'W.	507	465	466	465	474	482	439	391	403	389	352	368	332	330	307	309	261	260	239	208	179	157	133	103	41	14		101	133
Brunswick, Ga. 31°08.0'N., 81°29.7'W.	595	553	554	553	562	570	527	479	491	477	440	456	420	418	396	397	349	349	327	296	268	246	222	191	130	102	88		40
Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.	623	581	582	581	589	598	555	506	519	504	467	484	447	445	423	425	377	376	355	324	295	273	249	218	157	130	116	35	

*51 statute miles via Dismal Swamp Canal
*44 nautical miles via Dismal Swamp Canal

INSIDE-ROUTE DISTANCES
FERNANDINA BEACH, FLA., TO KEY WEST, FLA.
(Nautical and Statute Miles)

Figure at intersection of columns opposite ports in question is the nautical/statute mileage between the two. Example: St. Augustine, Fla., is 271 nautical miles (312 statute miles) from Miami, Fla.

Statute miles

Nautical miles

Port	Norfolk	Fernandina Beach	Jacksonville	St. Augustine	Marineland	Daytona Beach	New Smyrna Beach	Titusville	Cocoa	Eau Gallie	Melbourne	Vero Beach	Fort Pierce	Salerno	Stuart	Port Mayaca	Clewiston	Moore Haven	Fort Myers	Jupiter	Port of Palm Beach	Fort Lauderdale	Port Everglades	Miami	Tavernier	Matecumbe Harbor	Marathon	Flamingo	Key West
Norfolk, Va. 36°50.9'N., 76°17.9'W.		717	758	778	796	831	846	879	898	915	918	952	966	990	995	1026	1053	1066	1122	1005	1018	1084	1067	1090	1150	1170	1203	1208	1244
Fernandina Beach, Fla. 30°40.3'N., 81°28.0'W.	623		41	60	79	114	130	162	181	198	201	235	249	273	278	310	336	349	406	289	302	348	350	373	435	453	486	491	527
Jacksonville, Fla. 30°19.2'N., 81°39.0'W.	659	36		58	75	109	124	158	176	193	197	230	244	268	274	305	331	344	402	284	297	344	345	368	430	449	481	486	522
St. Augustine, Fla. 29°53.6'N., 81°18.5'W.	676	53	49		18	53	68	101	120	137	140	174	188	212	217	248	275	288	344	227	241	287	289	312	373	392	425	430	466
Marineland, Fla. 29°40.1'N., 81°13.0'W.	692	69	65	16		35	51	83	102	119	122	157	170	194	199	230	257	270	327	209	222	269	270	293	356	374	407	412	448
Daytona Beach, Fla. 29°12.6'N., 81°00.7'W.	722	99	95	46	30		16	48	67	84	87	121	135	159	165	196	222	235	292	175	188	235	236	259	321	339	372	377	413
New Smyrna Beach, Fla. 29°01.7'N., 80°55.1'W.	735	113	108	59	44	14		32	52	68	72	106	120	144	150	181	207	220	276	159	173	219	220	243	305	323	356	362	397
Titusville, Fla. 28°37.3'N., 80°47.9'W.	764	141	137	88	72	42	28		20	36	39	74	87	112	116	147	174	188	244	127	139	186	188	211	273	291	323	329	365
Cocoa, Fla. 28°21.3'N., 80°43.1'W.	780	157	153	104	89	58	45	17		16	21	54	68	92	98	129	155	168	224	107	121	167	168	191	253	273	304	311	346
Eau Gallie, Fla. 28°07.9'N., 80°37.1'W.	795	172	168	119	103	73	59	31	14		3	38	52	76	81	112	138	152	208	91	104	151	152	175	237	257	288	293	329
Melbourne, Fla. 28°05.0'N., 80°35.5'W.	798	175	171	122	106	76	63	34	18	3		34	47	71	77	108	135	148	205	87	100	147	148	171	234	252	284	290	326
Vero Beach, Fla. 27°39.0'N., 80°22.4'W.	827	204	200	151	136	105	92	64	47	33	29		14	38	44	75	101	114	170	53	67	113	114	137	199	219	250	257	292
Fort Pierce, Fla. 27°27.5'N., 80°19.3'W.	839	216	212	163	148	117	104	76	59	45	41	12		24	30	61	87	100	157	39	53	99	100	123	185	205	236	243	278
Salerno, Fla. 27°08.8'N., 80°11.6'W.	860	237	233	184	169	138	125	97	80	66	62	33	21		9	40	67	81	137	20	32	79	80	104	166	185	216	222	258
Stuart, Fla. 27°12.2'N., 80°15.6'W.	865	242	238	189	173	143	130	101	85	70	67	38	26	8		31	58	70	128	25	38	85	86	109	171	190	222	228	264
Port Mayaca, Fla. 26°59.1'N., 80°36.8'W.	892	269	265	216	200	170	157	128	112	97	94	65	53	35	27		26	40	96	56	69	116	117	141	203	221	253	259	295
Clewiston, Fla. 26°45.6'N., 80°55.2'W.	915	292	288	239	223	193	180	151	135	120	117	88	76	58	50	23		13	70	83	96	143	144	167	229	247	280	285	321
Moore Haven, Fla. 26°50.0'N., 81°05.3'W.	926	303	299	250	235	204	191	163	146	132	128	99	87	70	61	34	11		56	96	108	155	156	180	242	261	292	298	334
Fort Myers, Fla. 26°38.9'N., 81°52.3'W.	975	353	349	299	284	254	240	212	195	181	178	148	136	119	111	83	61	49		152	166	212	213	236	298	318	349	356	390
Jupiter, Fla. 26°56.8'N., 80°05.4'W.	873	251	247	197	182	152	138	110	93	79	76	46	34	17	22	49	72	83	132		14	60	61	84	146	166	197	204	239
Port of Palm Beach, Fla. 26°46.1'N., 80°03.0'W.	885	262	258	209	193	163	150	121	105	90	87	58	46	28	33	60	83	94	144	12		47	48	71	133	152	184	190	226
Fort Lauderdale, Fla. 26°06.8'N., 80°07.2'W.	925	303	299	249	234	204	190	162	145	131	128	98	86	69	74	101	124	135	184	52	41		1	24	86	106	137	144	178
Port Everglades, Fla. 26°05.6'N., 80°07.0'W.	927	304	300	251	235	205	191	163	146	132	129	99	87	70	75	102	125	136	185	53	42	1		23	85	105	136	142	177
Miami, Fla. 25°47.0'N., 80°11.0'W.	947	324	320	271	255	225	211	183	166	152	149	119	107	90	95	122	145	156	205	73	62	21	20		62	82	113	120	154
Tavernier, Fla. 25°00.7'N., 80°31.3'W.	999	378	374	324	309	279	265	237	220	206	203	173	161	144	149	176	199	210	259	127	116	75	74	54		22	54	60	96
Matecumbe Harbor, Fla. 24°51.1'N., 80°44.5'W.	1017	394	390	341	325	295	282	253	237	223	219	190	178	161	165	192	215	227	276	144	132	92	91	71	19		33	40	75
Marathon, Fla. 24°42.2'N., 81°06.7'W.	1045	422	418	369	353	323	309	281	264	250	247	217	205	188	193	220	243	254	303	171	160	119	118	98	47	29		39	48
Flamingo, Fla. 25°08.5'N., 80°55.4'W.	1050	427	423	374	358	328	315	286	270	255	252	223	211	193	198	225	248	259	309	177	165	125	123	104	52	35	34		84
Key West, Fla. 24°33.7'N., 81°48.5'W.	1081	458	454	405	389	359	345	317	301	286	283	254	242	224	229	256	279	290	339	207	198	155	154	134	83	65	42	73	

DISTANCES ON ST. JOHNS RIVER, FLORIDA
(Nautical Miles)

Figure at intersection of columns opposite ports in question is the nautical mileage between the two. Example: Welaka, Fla., is 66 nautical miles from Jacksonville, Fla.

	St. Johns River mouth 30°24' 0"N. 81°23' 8"W.	Mayport 30°23' 7"N. 81°25' 9"W.	Intracoastal Waterway Route 30°23' 1"N. 81°27' 7"W	Broward River mouth 30°24' 6"N. 81°35' 1"W.	Jacksonville 30°19' 2"N. 81°39' 0"W	Doctors Lake, Inlet 30°08' 9"N. 81°41' 2"W	Palatka 29°38' 6"N. 81°37' 6"W	Crescent City 29°25' 8"N. 81°30' 3"W	Welaka 29°28' 8"N. 81°40' 5"W	Silver Springs, Oklawaha River	Moss Bluff Lock, Oklawaha River	Leesburg, Oklawaha River	Georgetown 29°23' 1"N. 81°38' 3"W	Astor-Volusia 29°10' 0"N. 81°31' 4"W	Sanford 28°49' 1"N. 81°16' 2"W	Lake Harney 28°46' 8"N. 81°03' 2"W
St. Johns River mouth 30°24' 0"N. 81°23' 8"W.																
Mayport 30°23' 7"N. 81°25' 9"W.	2															
Intracoastal Waterway Route 30°23' 1"N. 81°27' 7"W	4	2														
Broward River mouth 30°24' 6"N. 81°35' 1"W.	12	10	8													
Jacksonville 30°19' 2"N. 81°39' 0"W	20	18	16	8												
Doctors Lake, Inlet 30°08' 9"N. 81°41' 2"W	32	30	28	20	12											
Palatka 29°38' 6"N. 81°37' 6"W	68	66	64	56	48	36										
Crescent City 29°25' 8"N. 81°30' 3"W	89	87	85	77	69	56	20									
Welaka 29°28' 8"N. 81°40' 5"W	86	84	82	74	66	54	18	26								
Silver Springs, Oklawaha River	136	134	132	124	116	104	68	76	50							
Moss Bluff Lock, Oklawaha River	145	143	141	133	125	112	76	85	58	14						
Leesburg, Oklawaha River	162	160	158	150	142	129	94	102	75	31	17					
Georgetown 29°23' 1"N. 81°38' 3"W	95	93	91	83	75	62	26	35	8	56	65	82				
Astor-Volusia 29°10' 0"N. 81°31' 4"W	109	107	105	97	89	77	41	49	23	71	79	96	14			
Sanford 28°49' 1"N. 81°16' 2"W	143	141	139	131	123	111	75	83	57	105	113	131	49	34		
Lake Harney 28°46' 8"N. 81°03' 2"W	161	159	157	149	141	129	93	101	75	123	131	148	66	52	18	

Conversion Tables

INTERNATIONAL NAUTICAL MILES TO STATUTE MILES

1 nautical mile 6,076.12 feet or 1,852 meters 1 statute mile = 5,280 feet or 1,609.35 meters

Nautical miles	0	1	2	3	4	5	6	7	8	9
0	0.000	1.151	2.302	3.452	4.603	5.754	6.905	8.055	9.206	10.357
10	11.508	12.659	13.809	14.960	16.111	17.262	18.412	19.563	20.714	21.865
20	23.016	24.166	25.317	26.468	27.619	28.769	29.920	31.071	32.222	33.373
30	34.523	35.674	36.825	37.976	39.126	40.277	41.428	42.579	43.730	44.880
40	46.031	47.182	48.333	49.483	50.634	51.785	52.936	54.087	55.237	56.388
50	57.539	58.690	59.840	60.991	62.142	63.293	64.444	65.594	66.745	67.896
60	69.047	70.197	71.348	72.499	73.650	74.801	75.951	77.102	78.253	79.404
70	80.554	81.705	82.856	84.007	85.158	86.308	87.459	88.610	89.761	90.911
80	92.062	93.213	94.364	95.515	96.665	97.816	98.967	100.118	101.268	102.419
90	103.570	104.721	105.871	107.022	108.173	109.324	110.475	111.625	112.776	113.927

STATUTE MILES TO INTERNATONAL NAUTICAL MILES

Statute miles	0	1	2	3	4	5	6	7	8	9
0	0.000	0.869	1.738	2.607	3.476	4.345	5.214	6.083	6.952	7.821
10	8.690	9.559	10.428	11.297	12.166	13.035	13.904	14.773	15.642	16.511
20	17.380	18.249	19.118	19.986	20.855	21.724	22.593	23.462	24.331	25.200
30	26.069	26.938	27.807	28.676	29.545	30.414	31.283	32.152	33.021	33.890
40	34.759	35.628	36.497	37.366	38.235	39.104	39.973	40.842	41.711	42.580
50	43.449	44.318	45.187	46.056	46.925	47.794	48.663	49.532	50.401	51.270
60	52.139	53.008	53.877	54.746	55.615	56.484	57.353	58.222	59.091	59.959
70	60.828	61.697	62.566	63.435	64.304	65.173	66.042	66.911	67.780	68.649
80	69.518	70.387	71.256	72.125	72.994	73.863	74.732	75.601	76.470	77.339
90	78.208	79.077	79.946	80.815	81.684	82.553	83.422	84.291	85.160	86.029

FEET TO METERS

Feet	0	1	2	3	4	5	6	7	8	9
0	0.00	0.30	0.61	0.91	1.22	1.52	1.83	2.13	2.44	2.74
10	3.05	3.35	3.66	3.96	4.27	4.57	4.88	5.18	5.49	5.79
20	6.10	6.40	6.71	7.01	7.32	7.62	7.92	8.23	8.53	8.84
30	9.14	9.45	9.75	10.06	10.36	10.67	10.97	11.28	11.58	11.89
40	12.19	12.50	12.80	13.11	13.41	13.72	14.02	14.33	14.63	14.93
50	15.24	15.54	15.85	16.15	16.46	16.76	17.07	17.37	17.68	17.98
60	18.29	18.59	18.90	19.20	19.51	19.81	20.12	20.42	20.73	21.03
70	21.34	21.64	21.95	22.25	22.55	22.86	23.16	23.47	23.77	24.08
80	24.38	24.69	24.99	25.30	25.60	25.91	26.21	26.52	26.82	27.13
90	27.43	27.74	28.04	28.35	28.65	28.96	29.26	29.57	29.87	30.17

METERS TO FEET

Meters	0	1	2	3	4	5	6	7	8	9
0	0.00	3.28	6.56	9.84	13.12	16.40	19.68	22.97	26.25	29.53
10	32.81	36.09	39.37	42.65	45.93	49.21	52.49	55.77	59.06	62.34
20	65.62	68.90	72.18	75.46	78.74	82.02	85.30	88.58	91.86	95.14
30	98.42	101.71	104.99	108.27	111.55	114.83	118.11	121.39	124.67	127.95
40	131.23	134.51	137.80	141.08	144.36	147.64	150.92	154.20	157.48	160.76
50	164.04	167.32	170.60	173.88	177.16	180.45	183.73	187.01	190.29	193.57
60	196.85	200.13	203.41	206.69	209.97	213.25	216.54	219.82	223.10	226.38
70	229.66	232.94	236.22	239.50	242.78	246.06	249.34	252.62	255.90	259.19
80	262.47	265.75	269.03	272.31	275.59	278.87	282.15	285.43	288.71	291.99
90	295.28	298.56	301.84	305.12	308.40	311.68	314.96	318.24	321.52	324.80

Radio Bearing Conversion Table

Table of corrections, in minutes

[DIFFERENCE OF LONGITUDE IN DEGREES]

Mid. L	½°	1°	1½°	2°	2½°	3°	3½°	4°	4½°	5°	5½°	6°	6½°	7°	7½°	8°	8½°	9°	9½°	10°
15°	4	8	12	16	19	23	27	31	35	40	43	47	50	54	58	62	66	70	74	78
16°	4	8	12	17	21	25	29	33	37	41	45	50	54	58	62	66	70	74	79	83
17°	4	9	13	18	22	26	31	35	39	44	48	53	57	61	66	70	75	79	83	88
18°	5	9	13	19	23	28	32	37	42	46	51	56	60	65	70	74	79	83	88	93
19°	5	10	15	20	24	29	34	39	44	49	54	59	63	68	73	78	83	88	93	98
20°	5	10	15	21	26	31	36	41	46	51	56	62	67	72	77	82	87	92	98	103
21°	5	11	16	21	27	32	38	43	48	54	59	64	70	75	81	86	91	97	102	108
22°	6	11	17	22	28	34	39	45	51	56	62	67	73	79	84	90	96	101	107	112
23°	6	12	18	23	29	35	41	47	53	59	64	70	76	82	88	94	100	105	111	117
24°	6	12	18	24	31	37	43	49	55	61	67	73	79	85	92	98	104	110	116	122
25°	6	13	19	25	32	38	44	51	57	63	70	76	82	89	95	101	108	114	120	127
26°	7	13	20	26	33	39	46	53	59	66	72	79	85	92	99	105	112	118	125	131
27°	7	14	20	27	34	41	48	54	61	68	75	82	89	95	102	109	116	123	129	136
28°	7	14	21	28	35	42	49	56	63	70	77	84	92	99	106	113	120	127	134	141
29°	7	15	21	29	36	44	51	58	65	73	80	87	95	102	109	116	124	131	138	145
30°	7	15	22	30	38	45	53	60	68	75	83	90	98	105	113	120	127	135	143	150
31°	8	15	23	31	39	46	54	62	70	77	85	93	100	108	116	124	131	139	146	155
32°	8	16	24	32	40	48	56	64	72	79	87	95	103	111	119	127	135	143	151	159
33°	8	16	25	33	41	49	57	65	74	82	90	98	106	114	123	131	139	147	155	163
34°	8	17	25	34	42	50	59	67	75	84	92	101	109	117	126	134	143	151	159	168
35°	9	17	26	34	43	52	60	69	77	86	95	103	112	120	129	138	146	155	163	172
36°	9	18	26	35	44	53	62	71	79	88	97	106	115	123	132	141	150	159	168	176
37°	9	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	153	163	172	181
38°	9	18	28	37	46	55	65	74	83	92	102	111	120	129	139	148	157	166	175	185
39°	9	19	28	38	47	57	66	75	85	94	104	113	123	132	142	151	160	170	179	189
40°	10	19	29	39	48	58	68	77	87	96	106	116	125	135	145	154	164	174	183	193
41°	10	20	30	39	49	59	69	79	89	98	108	118	128	138	148	157	167	177	187	197
42°	10	20	30	40	50	60	70	80	90	100	110	120	130	140	151	161	171	181	191	201
43°	10	20	31	41	51	61	72	82	92	102	113	123	133	143	153	164	174	184	194	205
44°	10	21	31	42	52	63	73	83	94	104	115	125	135	146	156	167	177	188	198	208
45°	11	21	32	42	53	64	74	85	95	106	117	127	138	149	159	170	180	191	201	212
46°	11	22	32	43	54	65	76	86	97	108	119	129	140	151	162	173	183	194	205	216
47°	11	22	33	44	55	66	77	88	99	110	121	132	143	154	165	176	188	197	208	219
48°	11	22	33	45	56	67	78	89	100	111	123	134	145	156	167	178	190	201	212	223
49°	11	23	34	45	57	68	79	91	102	113	125	136	147	158	170	181	192	204	215	226
50°	11	23	34	46	57	69	80	92	103	115	126	138	149	161	172	184	195	207	218	230
51°	12	23	35	47	58	70	82	93	105	117	128	140	152	163	175	186	198	210	221	233
52°	12	24	35	47	59	71	83	95	106	118	130	142	154	165	177	189	201	213	225	236
53°	12	24	36	48	60	72	84	96	108	120	132	144	156	168	180	192	204	216	228	240
54°	12	24	36	49	61	73	85	97	109	121	133	146	158	170	182	194	206	218	231	243
55°	12	25	37	49	61	74	86	98	111	123	135	147	160	172	184	197	209	221	233	246
56°	12	25	37	50	62	75	87	100	112	124	137	149	162	174	187	199	211	224	236	249
57°	13	25	38	50	63	75	88	101	113	126	138	151	164	176	189	201	214	226	239	252
58°	13	25	38	51	64	76	89	102	115	127	140	153	165	178	191	204	216	229	242	254
59°	13	26	39	51	64	77	90	103	116	129	141	154	167	180	193	206	219	231	244	257
60°	13	26	39	52	65	78	91	104	117	130	143	156	169	182	195	208	221	234	247	260

Example. A ship in latitude 39°51′ N., longitude 67°35′ W., by dead reckoning, obtains a radio bearing of 299° true on the radiobeacon located in latitude 40°37′ N., longitude 69°37′ W.

Radiobeacon station	Latitude	40°37′ N.
Dead-reckoning position of ship	Latitude	39°51′
Middle latitude		40°14′
Radiobeacon station	Longitude	69°37′ W.
Dead-reckoning position of ship	Longitude	67°35′
Longitude difference		2°02′

Entering the table with difference of longitude equal 2°, which is the nearest tabulated value and opposite 40° middle latitude, the correction of 39′ is read.

As the ship is east of the radiobeacon, a minus correction is applied. The Mercator bearing then will be 299° − 000°39′ = 298°21′. To facilitate plotting, subtract 180° and plot from the position of the radiobeacon the bearing 298°21′ − 180°, or 118°21′ (Mercator bearing reckoned clockwise from true north).

Distance of Visibility of Objects at Sea

The following table gives the approximate geographic range of visibility for an object which may be seen by an observer whose eye is at sea level; in practice, therefore, it is necessary to add to these a distance of visibility corresponding to the height of the observer's eye above sea level.

Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles	Height, feet	Nautical miles
6	2.8	48	7.9	220	17.0	660	29.4	2,000	51.2
8	3.1	50	8.1	240	17.7	680	29.9	2,200	53.8
10	3.6	55	8.5	260	18.5	700	30.3	2,400	56.2
12	4.0	60	8.9	280	19.2	720	30.7	2,600	58.5
14	4.3	65	9.2	300	19.9	740	31.1	2,800	60.6
15	4.4	70	9.6	320	20.5	760	31.6	3,000	62.8
16	4.6	75	9.9	340	21.1	780	32.0	3,200	64.9
18	4.9	80	10.3	360	21.7	800	32.4	3,400	66.9
20	5.1	85	10.6	380	22.3	820	32.8	3,600	68.6
22	5.4	90	10.9	400	22.9	840	33.2	3,800	70.7
24	5.6	95	11.2	420	23.5	860	33.6	4,000	72.5
26	5.8	100	11.5	440	24.1	880	34.0	4,200	74.3
28	6.1	110	12.0	460	24.6	900	34.4	4,400	76.1
30	6.3	120	12.6	480	25.1	920	34.7	4,600	77.7
32	6.5	130	13.1	500	25.6	940	35.2	4,800	79.4
34	6.7	140	13.6	520	26.1	960	35.5	5,000	81.0
36	6.9	150	14.1	540	26.7	980	35.9	6,000	88.8
38	7.0	160	14.5	560	27.1	1,000	36.2	7,000	96.0
40	7.2	170	14.9	580	27.6	1,200	39.6	8,000	102.6
42	7.4	180	15.4	600	28.0	1,400	42.9	9,000	108.7
44	7.6	190	15.8	620	28.6	1,600	45.8	10,000	114.6
46	7.8	200	16.2	640	29.0	1,800	48.6		

DGPS

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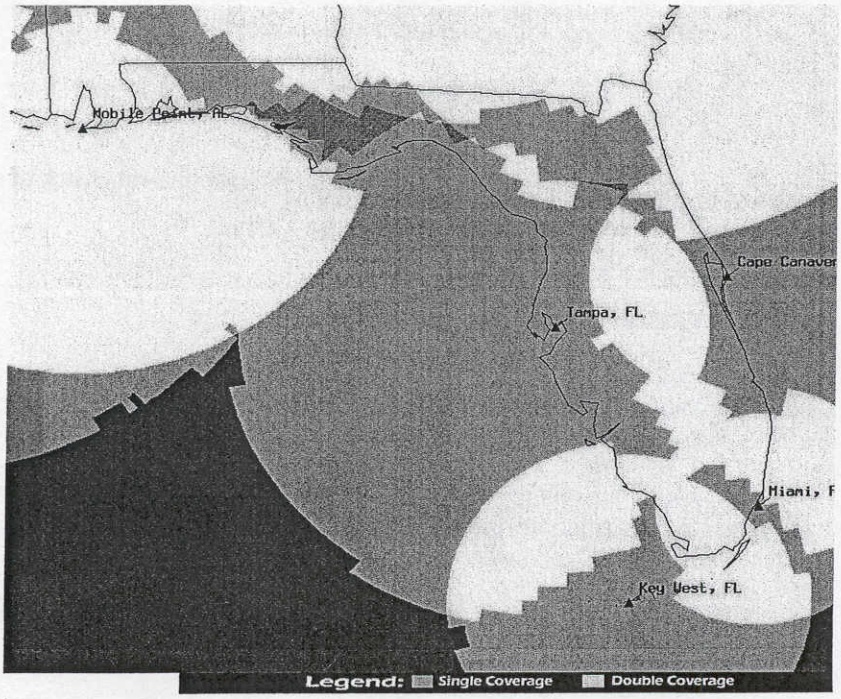
Differential GPS

NAVCEN operates the Coast Guard Maritime Differential GPS (DGPS) Service and the developing Nationwide DGPS Service, consisting of two control centers and over 60 remote broadcast sites. The Service broadcasts correction signals on marine radiobeacon frequencies to improve the accuracy of and integrity to GPS-derived positions. The Coast Guard DGPS Service provides 10-meter accuracy in all established coverage areas. Typically the positional error of a DGPS position is 1 to 3 meters, Greatly enhancing harbor entrance and approach navigation. The System provides service for coastal coverage of the continental U.S., the Great Lakes, Puerto Rico, portions of Alaska and Hawaii, and a greater part of the Mississippi River Basin. Many foreign nations are implementing standard DGPS services modeled after the U.S. Coast Guard's system to significantly enhance maritime safety in their critical waterways.

The Coast Guard's maritime Differential Global Positioning Service achieved Full Operational Capability (FOC) on 15 March 1999 as announced in the DOT press release. The maritime DGPS service provides 10 meter (2 dRMS) navigation accuracy, integrity alarms for GPS and DGPS out-of-tolerance conditions within 10 seconds of detection, availability of 99.7% per month, coastal coverage to the continental United States, the Great Lakes, Puerto Rico/US Virgin Islands, and selected portions of Alaska and Hawaii.

The achievement of FOC culminates a six-year effort to convert existing radiobeacon sites and construct new sites to transmit DGPS corrections. Several equipment upgrades were installed to improve system performance. During the procurement and installation phases of the system upgrades, the maritime DGPS service operated under Initial Operational Capability rules, where the signals provided accurate corrections with integrity to the maximum extent possible.

DGPS Site Coverage - Florida



The following DGPS Sites are represented above:
Mobile Point,AL Tampa,FL Key West,FL
Miami,FL Cape Canaveral,FL
This visual representation is of predicted DGPS coverage developed using a modeling tool, and has not b accounts for ground conductivity, transmitter output power, and land topography.

DGPS

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DGPS Frequently Asked Questions

- What is DGPS?
- How does DGPS work?
- Why use DGPS?
- Where do I get RTCM documents?
- How is DGPS used?
- What are the Coast Guard plans for DGPS?

What is DGPS?

Differential GPS (DGPS) is the regular Global Positioning System (GPS) with an additional correction (differential) signal added. This correction signal improves the accuracy of the GPS and can be broadcast over any authorized communication channel.

How does DGPS work?

The GPS determined position of a reference station is computed and compared to its surveyed geodetic position. The differential information ... some systems use the error in fix position, while others use individual satellite range errors ... is transmitted to user receivers by radio or other means.

Why use DGPS?

DGPS accuracy and integrity are better than GPS.

* Accuracy improvement (2drms): Positions of 10 meters or better are achievable using DGPS (USCG signals) vs. 100 meters or better for GPS (Standard Positioning Service)

* Integrity improvement: Provides an independent check of each GPS satellite's signal, and reports whether it's good or bad.

Where do I get RTCM documents?

The Coast Guard does not provide RTCM documents. You can order them directly from the RTCM. Their phone number is (703) 684-4481, fax (703) 836-4229. All orders must identify specific documents being ordered and number of copies. Orders, with payment, should be sent to:

Radio Technical Commission for Maritime Services
1800 Diagonal Road, Suite 600
Alexandria VA 22314
USA

How is DGPS used?

DGPS receivers collect navigational signals from all GPS satellites in view, plus differential corrections from a nearby DGPS site. (Many DGPS receivers consist of two units: a GPS receiver, with a data "port" for DGPS corrections, directly connected to a radio receiver.) DGPS receivers

display position, velocity, time, etc., as needed for their marine, terrestrial, or aeronautical applications.

What are the Coast Guard's plans for DGPS?

The Coast Guard is developing a DGPS service for public use in harbor entrance and approach (formerly harbor and harbor entrance) areas of the continental United States, the Great Lakes, Puerto Rico, and portions of Alaska and Hawaii. The DGPS signals will be broadcast via USCG marine radiobeacons.

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Technical questions about the Web site: webmaster@navcen.uscg.mil
Other inquiries/comments: nisws@navcen.uscg.mil
General Contact Information

DGPS BROADCAST SITE STATUS & OPERATING SPECIFICATIONS
STATUS AS OF 6/27/02

USERS SHOULD NOTIFY THE NIS WATCHSTANDER AT (703)313-5900 OF ANY OBSERVED OUTAGES, PROBLEMS, OR REQUESTS. ALL CURRENT OUTAGE INFORMATION WILL BE LISTED FOLLOWING EACH SITE.

THE COAST GUARD DGPS SERVICE IS AVAILABLE FOR POSITIONING AND NAVIGATION. USERS MAY EXPERIENCE SERVICE INTERRUPTIONS WITHOUT ADVANCE NOTICE. COAST GUARD DGPS BROADCASTS SHOULD NOT BE USED UNDER ANY CIRCUMSTANCES WHERE A SUDDEN SYSTEM FAILURE OR INACCURACY COULD CONSTITUTE A SAFETY HAZARD.

NOTE: Differential corrections are based on the NAD 83 position of the reference station (REFSTA) antenna. Positions obtained using DGPS should be referenced to NAD 83 coordinate system only. All sites are broadcasting RTCM Type 9-3 correction messages.

The Latest Status for CAPE CANAVERAL, FL

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CAPE CANAVERAL, FL

Status:	Operational
RBn Antenna Location:	28° 27.6' N;80° 32.6' W
REFSTA Ant Location (A):	28° 27.59506' N;80° 32.59693' W
REFSTA Ant Location (B):	28° 27.62215' N;80° 32.57255' W
REFSTA RTCM SC-104 ID (A):	18
REFSTA RTCM SC-104 ID (B):	19
REFSTA FIRMWARE VERSION:	RD00-1C19
Broadcast Site ID:	809
Transmission Frequency:	289 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV/m at 200 NM

The Latest Status for MIAMI, FL

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MIAMI, FL

Status:	Operational
RBn Antenna Location:	25° 44' N;80° 9.6' W
REFSTA Ant Location (A):	25° 43.96829' N;80° 9.61001' W
REFSTA Ant Location (B):	25° 43.96653' N;80° 9.63006' W
REFSTA RTCM SC-104 ID (A):	20
REFSTA RTCM SC-104 ID (B):	21
REFSTA FIRMWARE VERSION:	RD00-1C19
Broadcast Site ID:	810
Transmission Frequency:	322 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV/m at 75 NM

Outages:

No Current Outages.

DGPS BROADCAST SITE STATUS & OPERATING SPECIFICATIONS
STATUS AS OF 6/27/02

USERS SHOULD NOTIFY THE NIS WATCHSTANDER AT (703)313-5900 OF ANY OBSERVED OUTAGES, PROBLEMS, OR REQUESTS. ALL CURRENT OUTAGE INFORMATION WILL BE LISTED FOLLOWING EACH SITE.

THE COAST GUARD DGPS SERVICE IS AVAILABLE FOR POSITIONING AND NAVIGATION. USERS MAY EXPERIENCE SERVICE INTERRUPTIONS WITHOUT ADVANCE NOTICE. COAST GUARD DGPS BROADCASTS SHOULD NOT BE USED UNDER ANY CIRCUMSTANCES WHERE A SUDDEN SYSTEM FAILURE OR INACCURACY COULD CONSTITUTE A SAFETY HAZARD.

NOTE: Differential corrections are based on the NAD 83 position of the reference station (REFSTA) antenna. Positions obtained using DGPS should be referenced to NAD 83 coordinate system only. All sites are broadcasting RTCM Type 9-3 correction messages.

The Latest Status for KEY WEST, FL

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KEY WEST, FL

Status:	Operational
RBn Antenna Location:	24° 34.94' N;81° 39.18' W
REFSTA Ant Location (A):	24° 34.93608' N;81° 39.18175' W
REFSTA Ant Location (B):	24° 34.93819' N;81° 39.1675' W
REFSTA RTCM SC-104 ID (A):	22
REFSTA RTCM SC-104 ID (B):	23
REFSTA FIRMWARE VERSION:	RD00-1C19
Broadcast Site ID:	811
Transmission Frequency:	286 KHZ
Transmission Rate:	100 BPS
Signal Strength:	75uV/m at 110 NM

The Latest Status for TAMPA, FL

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TAMPA, FL

Status:	Operational
RBn Antenna Location:	27° 51' N;82° 31.93' W
REFSTA Ant Location (A):	27° 50.98895' N;82° 31.93893' W
REFSTA Ant Location (B):	27° 50.98904' N;82° 31.95533' W
REFSTA RTCM SC-104 ID (A):	244
REFSTA RTCM SC-104 ID (B):	245
REFSTA FIRMWARE VERSION:	RD00-1C19
Broadcast Site ID:	827
Transmission Frequency:	312 KHZ
Transmission Rate:	200 BPS
Signal Strength:	100uV/m at 389 KM

Outages:

No Current Outages.

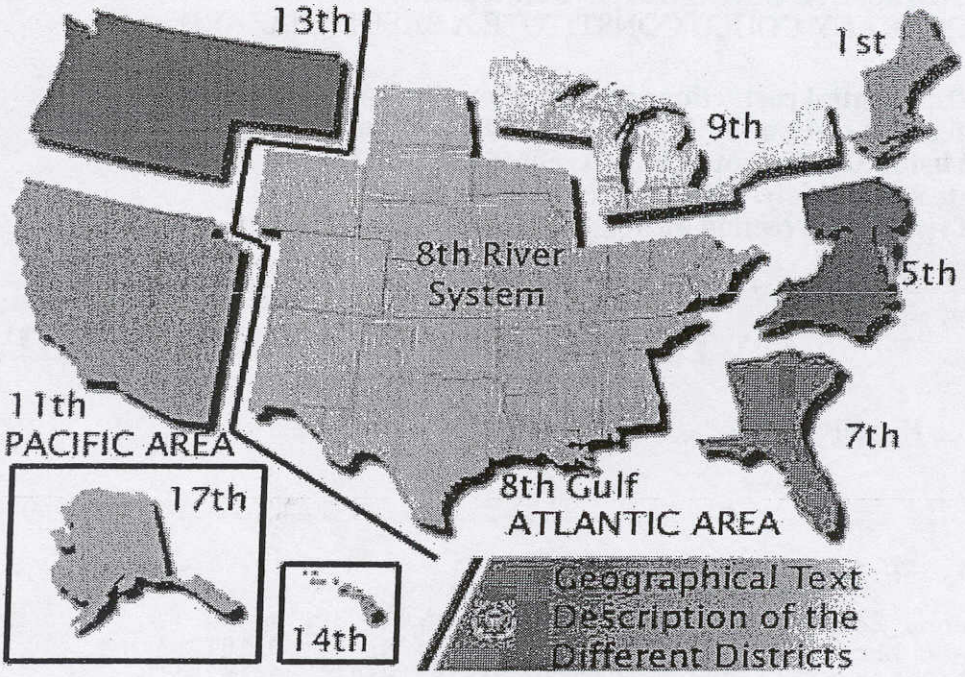
U.S. COAST GUARD NAVIGATION CENTER

1st District
5th District
7th District
8th District Gulf Coast
8th District Western Rivers
9th District
11th District
13th District
14th District
17th District

LINKS
F.A.Q.

ARCHIVED LNM'S:
1995
1996
1997
1998

Local Notice to Mariners



Geographical Text Description of the Different Districts

Answers to FAQ LNM's

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9. Why were the LNM's removed from your Fax on Demand system?

What is a Local Notice To Mariners (LNM)?

The LNM is the primary means for disseminating information concerning aids to navigation, hazards to navigation, and other items of marine information of interest to mariners on the waters of the United States, it's territories, and possessions. These notices are essential to all navigators for the purpose of keeping their charts. Light Lists, Coast Pilots and other nautical publications up-to-date. These notices are published weekly. They may be obtained free of charge, by making application to the appropriate Coast Guard District or the LNM's are available on the World Wide Web, the BBS (703-313- 5910) and the Fax on Demand (FOD) 703-313-5931. Vessels operating in ports and waterways in several districts will need to obtain the LNM's from each district in order to be fully informed.

How does the Coast Guard develop a LNM?

Local Notice To Mariners

1st District
5th District
7th District
8th District - Gulf Coast
8th District - Western Rivers
9th District
11th District
13th District
14th District
17th District

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Archived Local Notice To Mariners

The following years are available from our FTP site as ZIP files. They range in size from 1M to 15M.

- 2001
- 2000
- 1999
- 1998
- 1997
- 1996
- 1995

Links

- National Ocean Service (NOS)
- Canadian Notices to Mariners (NOTMAR)
- National Imagery and Mapping Agency, NIMA
- Seventeenth Coast Guard District Waterways Management and Navigation Safety Branch

Frequently Asked Questions

- What is a Local Notice to Mariners?
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What is a Local Notice To Mariners (LNM)?

The LNM is the primary means for disseminating information concerning aids to navigation, hazards to navigation, and other items of marine information of interest to mariners on the waters of the United States, it's territories, and possessions. These notices are essential to all navigators for the purpose of keeping their charts. Light Lists, Coast Pilots and other nautical publications up-to-date. These notices are published weekly. They may be obtained free of charge, by making application to the appropriate Coast Guard District or the LNM's are available on the World Wide Web. Vessels operating in ports and waterways in several districts will need to obtain the LNM's from each district in order to be fully informed.

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How does the Coast Guard develop a LNM?

Each Coast Guard District is responsible for developing and issuing a LNM. LNM's are developed from information received from Coast Guard field units, the General Public, Army Corps of Engineers,

U.S. Merchant Fleet, National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), and other sources, concerning the establishment of, changes to, and deficiencies in aids to navigation and any other information pertaining to the safety of the waterways within each Coast Guard District. This information includes: Reports of channel conditions, obstructions, hazards to navigation, dangers, anchorage's, restricted areas, regattas, information on bridges such as proposed construction or modification, the establishment or removal of drill rigs and vessels, and similar items.

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What are LNM enclosures?

Enclosures contain NOS chartletts of a local area of tabulations of controlling depths, excerpts from Code of Fed regulations regarding marine laws or regulations, marine events, Corps of Engineer report of channel condition survey sheets, Coast Pilot corrections, and more.

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What is a Coast Guard Light List?

The Coast Guard Light Lists are published in seven volumes covering the U.S. Coasts, the Great Lakes, and the Mississippi River System. These are complete listings of all lights, buoys, daybeacons, ranges, fog signals, radiobeacons, and radar beacons (RACONS); detailed information is given on each aid including position (where necessary), shape, color, and characteristics. In addition, each Light List volume contains introductory pages with general information on aids to navigation and their use, and the GPS, DGPS, and LORAN- C radionavigation systems. Each volume is republished annually, but during the year should be kept continuously corrected from the Local Notice to Mariners.

Coast Guard Light Lists are sold by the Superintendent of Documents, U.S. Government Printing Office (GPO), Washington, DC 20402, by GPO Bookstores, and by GPO sales agents.

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What is a Light List Number (LLNR)?

Light List numbers are assigned to all aids to navigation in order to facilitate reference in the Light List and to resolve ambiguity when referencing aids. Aids are tabulated in the same sequence as lights are numbered - basically, clockwise around the U.S. Coasts from Maine to Florida to Texas, California to Washington, east to west on the Great Lakes, and upriver in the Mississippi River System; seacoast aids are listed first in the applicable volumes, followed by harbor and river aids, and then Intracoastal Waterways aids, if applicable.

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What is a Coast Pilot?

Just as for aids to navigation, charts are limited in what can be shown by symbols and abbreviations regarding channels, hazards, winds and currents, restricted areas, port facilities, pilotage service, and many other types of information needed by a navigator for safe and efficient navigation. These deficiencies are remedied by the Coast Pilots published by National Ocean Service (NOS). U.S. Coast Pilots are published in nine volumes to cover the waters of the U.S. and it's possessions. They are of great value to a navigator when used with charts of an area both during the planning stage of a voyage and in the actual transit of the area.

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Where do I obtain Nautical Charts?

The principal U.S. Agencies involved with nautical charts are the National Ocean Service (NOS) and the National Imagery and Mapping Agency (NIMA). Both of these agencies have branch or regional offices, plus a network of local sales agents from whom charts and other publications can be obtained. Charts or "navigational maps" of some inland rivers, chiefly the Mississippi, Ohio, Tennessee, and their tributaries are prepared by the Army Corps of Engineers. Such charts or maps are normally purchased from District Engineer Offices. For more information see: Ordering Charts

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How do I know what Chart to use?

Nautical charts can provide a navigator with a vast amount of information including the depth of the water and objects under and on the surface; features of the land; man-made features; information on tides and currents, facilities ashore, and restrictive laws and regulations; and more. Charts are published with an edition number and the date to which the information it contains has been corrected. The NOS and DMAHTC publish chart catalogs consisting of various pages or panels showing the area covered by each chart.

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