

# VOYAGE STRATEGY AND RACING PILOTING

CAPT RICHARD A. MORIN, MSC, USN (RET)



# YOUR MISSION

To assist in the sail training of midshipmen

\* \* \*

Naval Academy Sailing is a  
**MIDSHIPMEN TRAINING PROGRAM**



# A WORD FROM DNAS

*“It’s real easy to forget on a 10,000-ton destroyer what the wind and current can do to you. However, it is on a sailboat that you begin to understand what wind and current do.”*

*-- CAPT Harold J. Flammang, USN-Director of Naval Academy Sailing (15 January 2002)*



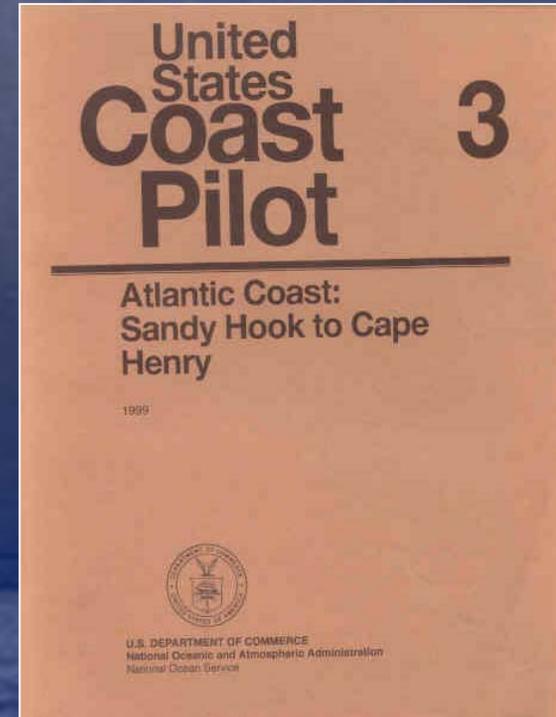
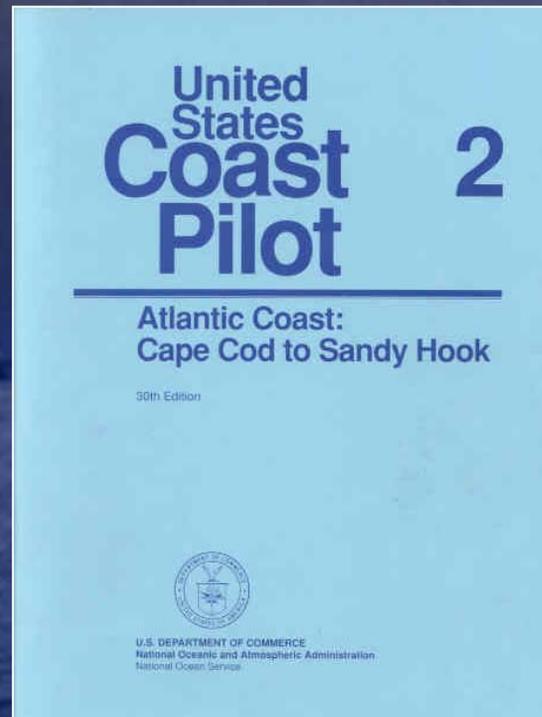
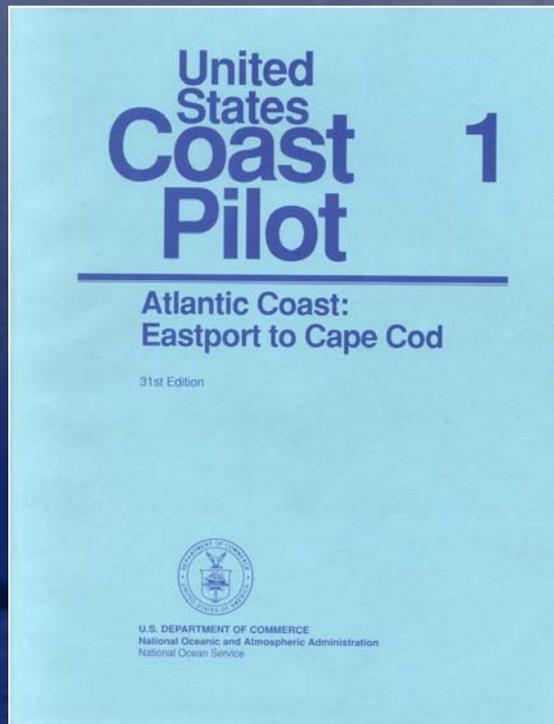
# PRESENTATION REFERENCES

## U.S. Coast Pilot

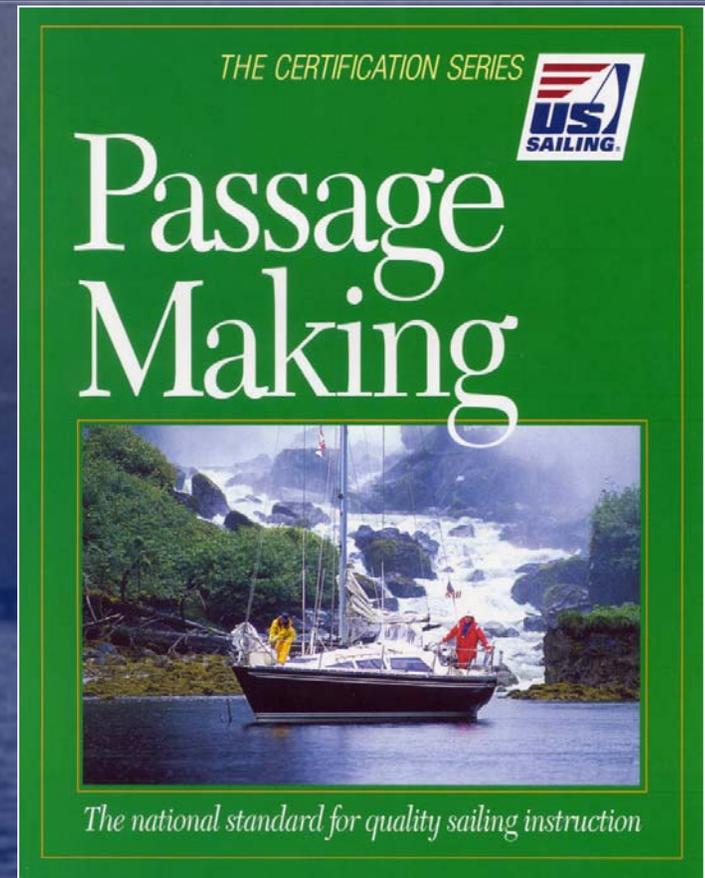
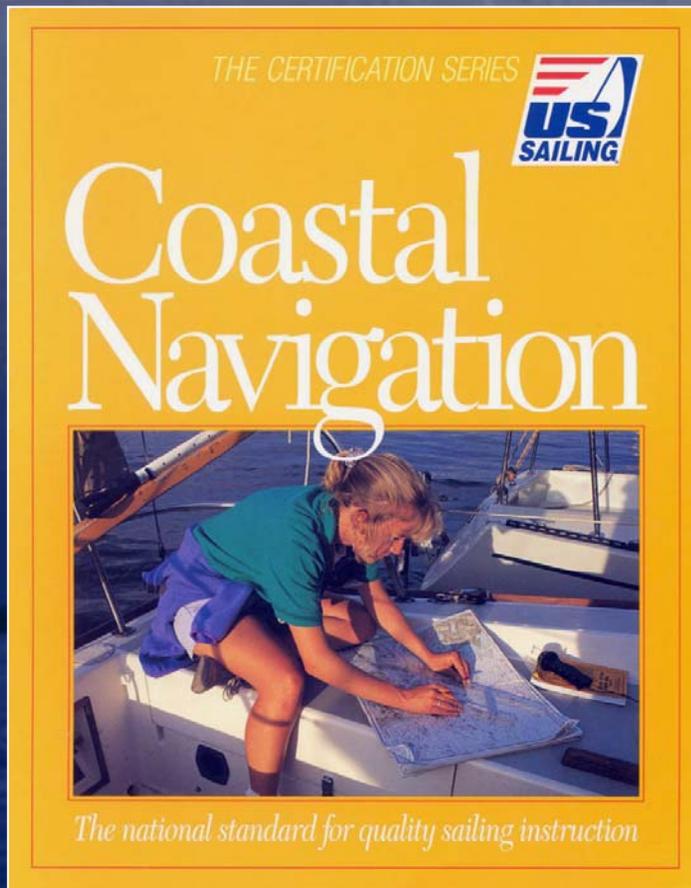
- Wide variety of detailed information about harbors and coastal areas of the U.S.
- Dangers and aids to navigation
- Details of all restricted areas and local regulations
- Information on weather and suggested tracks
- Photographs of many harbors
- In 9 regional volumes



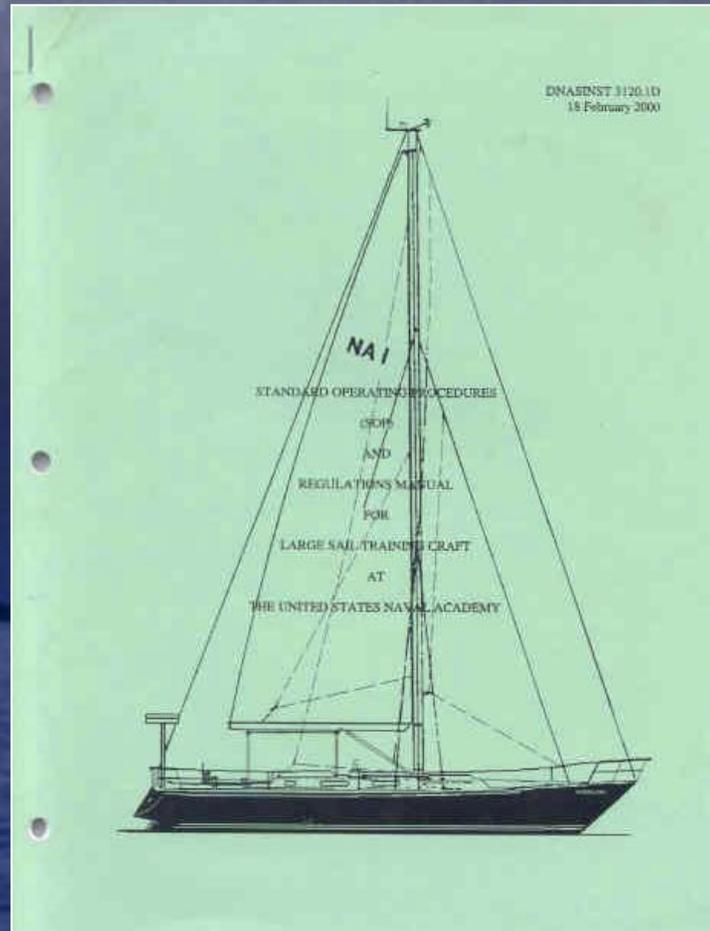
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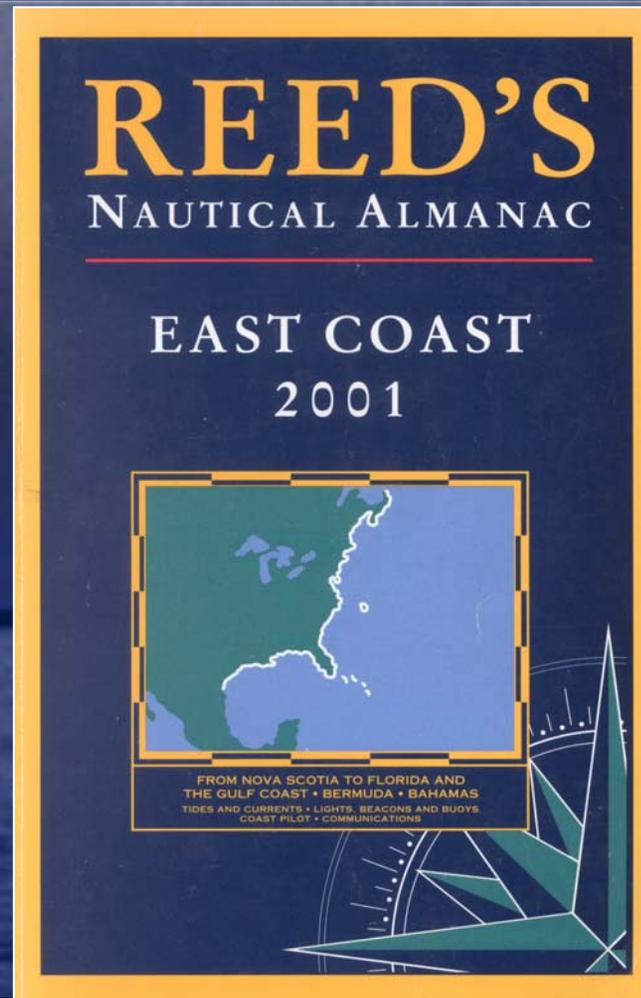
# PRESENTATION REFERENCES



# PRESENTATION REFERENCES



# PRESENTATION REFERENCES



# PRESENTATION REFERENCES

**Tide and Current Tables in Summer Daylight Time**

ONE HUNDRED AND TWENTY-EIGHTH YEAR

## ELDRIDGE TIDE AND PILOT BOOK 2002

TIDES AND CURRENTS

Daily High and Low Water at BOSTON .....	pages	12 - 17
Tidal Differences, High and Low Water, Ports from NOVA SCOTIA to KEY WEST .....	pages	18 - 26
Charts of Currents, BUZZARDS BAY, VINEYARD and NANTUCKET SOUNDS .....	pages	50 - 61
Daily Current Tables, CAPE COD CANAL, WOODS HOLE and POLLOCK RIP .....	pages	30 - 49
Daily High and Low Water at NEWPORT .....	pages	64 - 69
Daily Current Table, THE RACE .....	pages	70 - 75
Charts of Currents, BLOCK I, LONG I. Sounds .....	pages	78 - 83
Daily High and Low Water at BRIDGEPORT .....	pages	84 - 89
Daily High and Low Water at WILLETS POINT .....	pages	90 - 95
Daily HELL GATE, THE NARROWS Current Table .....	pages	96 - 107
Daily High and Low Water at THE BATTERY .....	pages	108 - 113
NEW YORK BAY Current Charts .....	pages	114 - 119
Daily High and Low Water at SANDY HOOK .....	pages	120 - 125
Daily DELAWARE BAY ENTR. and CHESAPEAKE & DELAWARE CANAL Current Tables .....	pages	126 - 139
Daily High Water at BALTIMORE .....	pages	140 - 143
Daily High Water at MIAMI HARBOR ENTR. ....	pages	146 - 149
Current Differences from MAINE to FLORIDA .....	pages	150 - 157
LIGHTS & FOG SIGNALS - COURSES & DISTANCES .....	pages	160 - 195
DISTRESS CALLS .....	page	239
RADIOTELEPHONE INFORMATION .....	pages	242, 243
RADIOBEACON STATIONS - RACONS .....	pages	235, 237

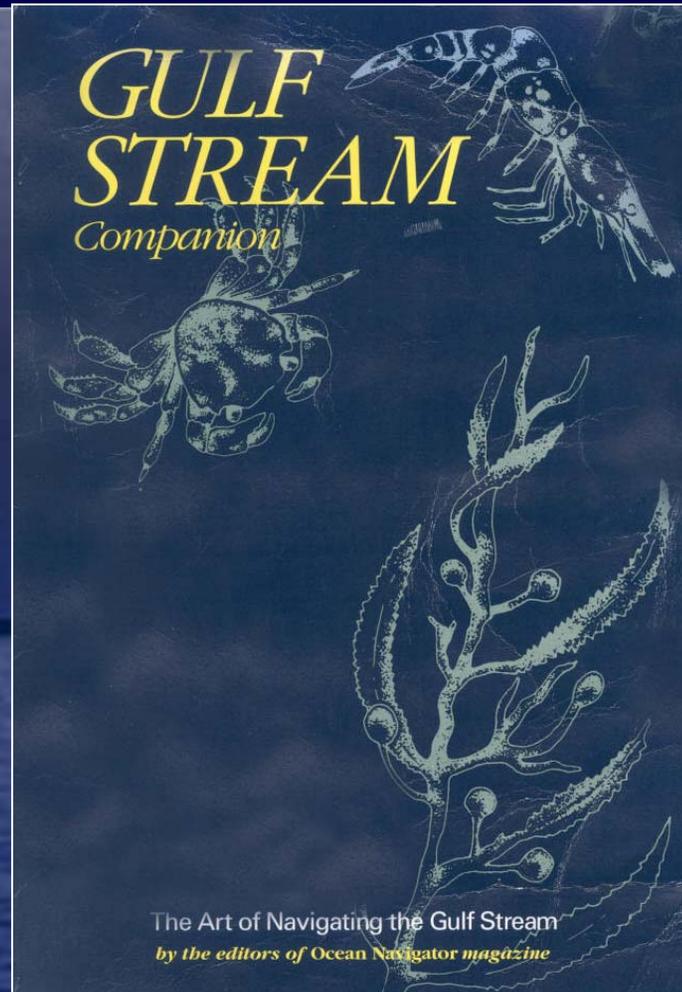
SEE DETAILED LIST OF ASTRONOMICAL,  
WEATHER AND OTHER NAVIGATIONAL DATA ..... page 1

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# PRESENTATION REFERENCES



# PRESENTATION REFERENCES

United States Coast Pilot 1, Atlantic Coast: Eastport to Cape Cod\*

United States Coast Pilot 2, Atlantic Coast: Cape Cod to Sandy Hook\*

United States Coast Pilot 3, Atlantic Coast: Sandy Hook to Cape Henry\*

Reed's Nautical Almanac (current year)\*

*\* should be on board*

Coastal Navigation--U.S. Sailing

Passage Making--U.S. Sailing

Standard Operating Procedures and Regulations Manual – DNAS  
INST.3120.1D

Eldridge Tide And Pilot Book (current year)

Gulf Stream Companion

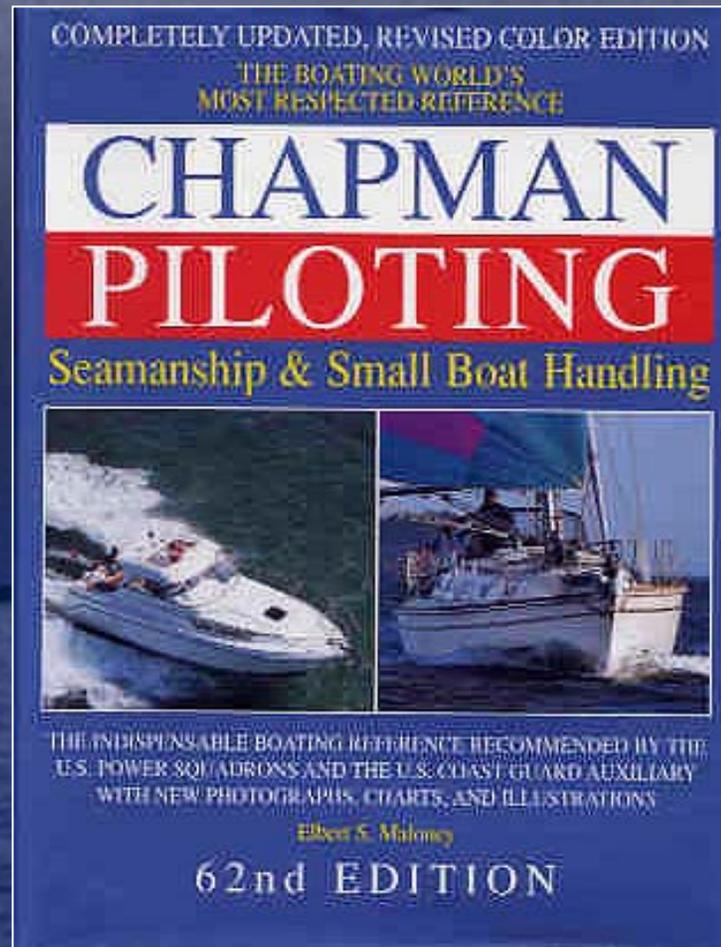


# ON-BOARD PUBLICATIONS

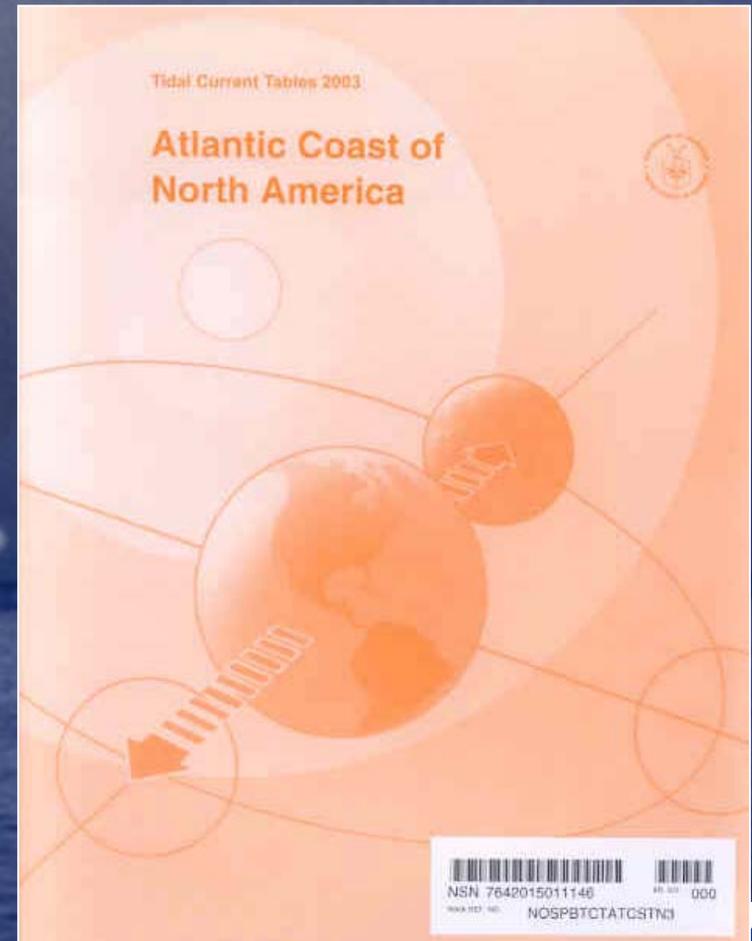
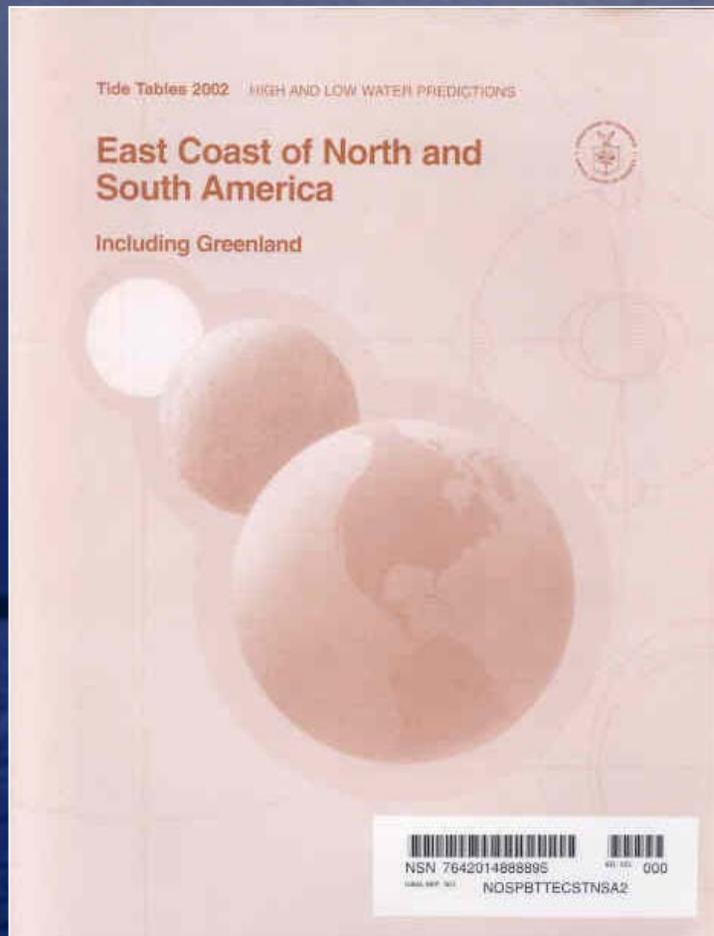
Chapman's Piloting: Seamanship & Small Boat Handling  
Tide Tables, Atlantic Coast of North America (current year)  
Tidal Current Tables, Atlantic Coast of North America (current year)  
Updated charts (per chart list)  
Light List (applicable operating areas) -- for U.S. coastal waters  
List of Lights (applicable operating areas) -- for non-U.S. waters  
United States Coast Pilot (applicable volumes)  
Fleet Guide – Atlantic (applicable chapters)  
Sailing Directions (as applicable)  
Reed's Nautical Almanac (current year)



# ON-BOARD PUBLICATIONS



# ON-BOARD PUBLICATIONS



# ON-BOARD PUBLICATIONS

## Light List

Contains descriptions of lighted aids to navigation and unlighted buoys, day beacons, fog signals, radiobeacons, and LORAN-C and Differential GPS coverage in U.S. coastal waters.

## List of Lights

Contains descriptions of lighted aids to navigation and unlighted buoys, day beacons, fog signals, radiobeacons, and Differential GPS coverage in non-U.S. waters.



# ON-BOARD PUBLICATIONS

U.S. Department  
of Transportation  
United States  
Coast Guard



## LIGHT LIST

Volume III

### ATLANTIC and GULF COASTS

Little River, South Carolina to Econfina River, Florida  
(includes Puerto Rico and the U. S. Virgin Islands)

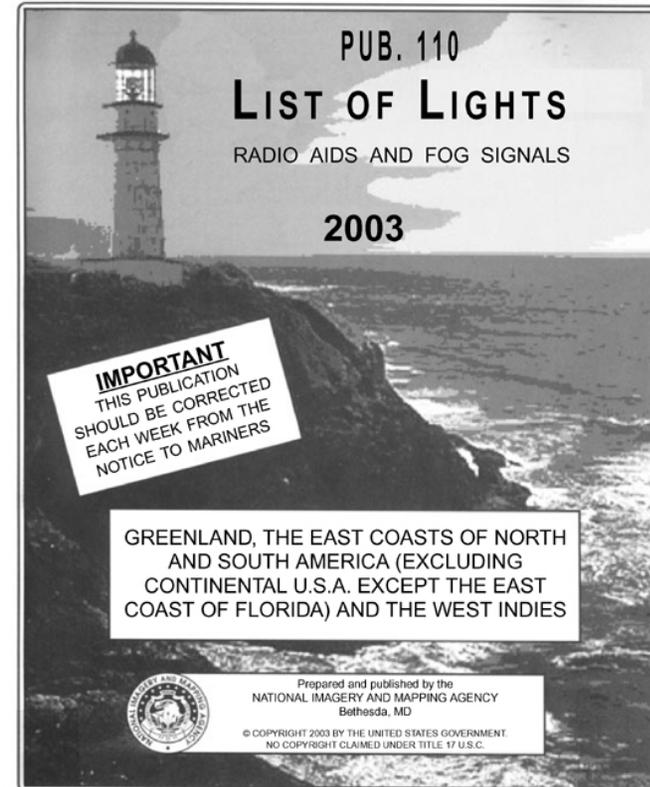
This publication contains a list of lights, sound  
signals, buoys, daybeacons, and other aids to navigation.

#### IMPORTANT

*THIS PUBLICATION SHOULD BE CORRECTED  
EACH WEEK FROM THE LOCAL NOTICES TO MARINERS  
OR NOTICES TO MARINERS AS APPROPRIATE.*

2001

COMDTPUB P16502.3



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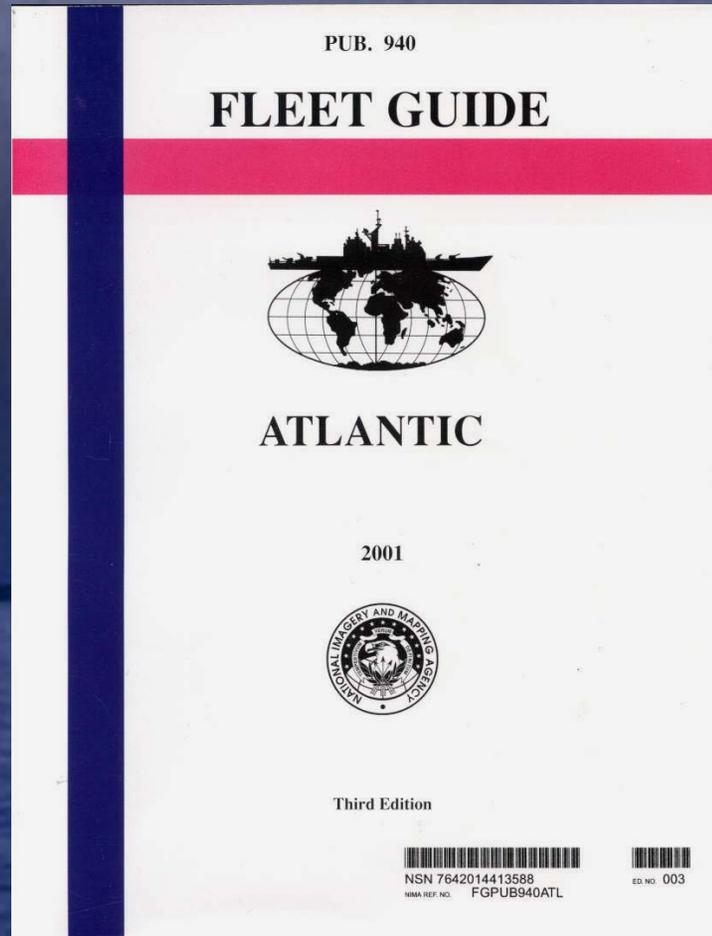
# ON-BOARD PUBLICATIONS

## Fleet Guide -- Atlantic

- Available only for ports with major naval facilities
- Designed to acquaint incoming naval ships with pertinent command, navigational, operational, repair, and logistics information



# ON-BOARD PUBLICATIONS



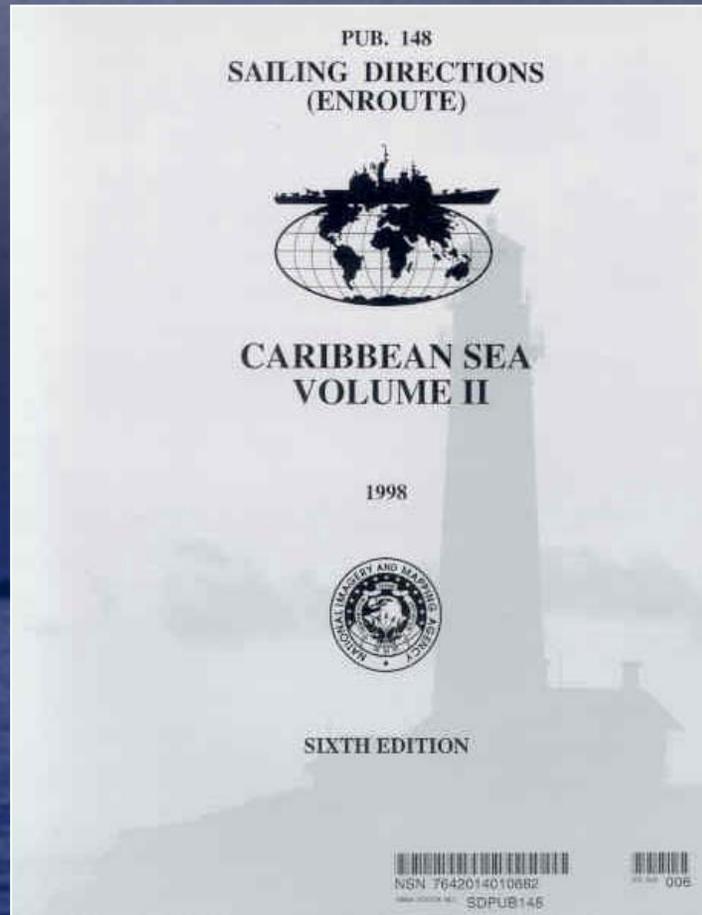
# ON-BOARD PUBLICATIONS

## Sailing Directions

- Provides much of the same information as the Coast Pilot, but for non-U.S. waters
- Also has similar information to the Pilot Charts



# ON-BOARD PUBLICATIONS



# ADDITIONAL PUBLICATIONS

## Pilot Charts

- ❑ Small-scale charts of ocean areas
- ❑ Provides complete forecasts of hydrographic, navigational, and meteorological conditions to be expected in a given area
- ❑ Includes average tides, currents, barometric pressure, temperature, storms, fog, wind, iceberg migration, and isogonic lines of variation



# ADDITIONAL PUBLICATIONS

## World Port Index (Pub 150)

- Provides information on services available at ports throughout the world



# ADDITIONAL PUBLICATIONS

## Catalog of Nautical Charts, Pub #1-N

- Contains a complete numerical listing of all unclassified charts and publications by portfolio number
- Navigator consults this pub to determine what charts are required for the voyage



# ADDITIONAL PUBLICATIONS

## U.S. Sailing Publication



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

**1. ACCOUNTABILITY**

**2. NAVIGATION PLANNING**

**3. WEATHER PLANNING**

**4. TIDES AND CURRENTS**

**5. DANGERS AND OBSTACLES**



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 1. ACCOUNTABILITY

- PROGRAM HISTORY AND REVIEW OF THE SOP



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 2. NAVIGATION PLANNING

- Charts -- relevant for transit and/or race, safe havens
- Read the charts, Know the charts, Require chart “maintenance”
- Timeline plan -- adjusted for expected weather & crew experience
- Alternative route plan -- especially transits (e.g., Bermuda-Annapolis via Chesapeake Bay or Delaware Bay)
- Waypoints -- relevant to both transit & race strategy



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 3. WEATHER PLANNING

- Local conditions
- Planning ahead by looking early
- Heavy weather considerations



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 4. TIDES AND CURRENTS

- ❑ Reed's, Eldridge, Coast Pilots -- special emphasis on "choke points"
- ❑ Annapolis-Newport Race -- "corner" at Chesapeake Bay Bridge Tunnel
- ❑ Gulf Stream trends strategy 3-4 weeks prior



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 5. DANGERS AND OBSTACLES

- Cutting corners
- Cape May and Chesapeake Bay Bridge Tunnel
- Gulf Stream eddies
- Brazil Rock and Bay of Fundy tides



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

**1. ACCOUNTABILITY**

**2. NAVIGATION PLANNING**

**3. WEATHER PLANNING**

**4. TIDES AND CURRENTS**

**5. DANGERS AND OBSTACLES**



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 1. ACCOUNTABILITY

- PROGRAM HISTORY
- REVIEW OF THE SOP



# ACCOUNTABILITY

## PROGRAM HISTORY

- ❑ *“Informal watchstanding has ended and there is now a requirement to know the SOP and the OPOORDER “*  
*-- CAPT Harold J. Flammang, USN-Director of Naval Academy Sailing (15 January 2002)*
- ❑ Navigation Training emphasis in 2002-2003
- ❑ Increased mandatory requirements in 2003



# ACCOUNTABILITY

## WHAT MAKES YOUR ROLE SO IMPORTANT?

*“The coach is the Officer in Charge, under Navy Regulations. He and he alone is responsible for the safe operation of the boat. The midshipman skipper is in training to be an officer in charge.”*

*-- CAPT J.B. Bonds, USN-Director of  
Naval Academy Sailing (July 1984)*



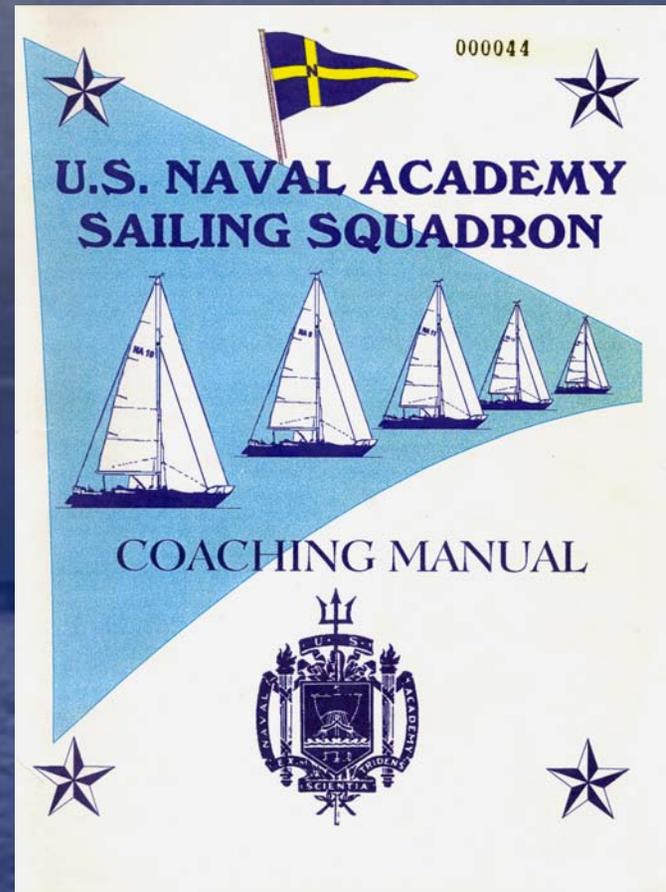
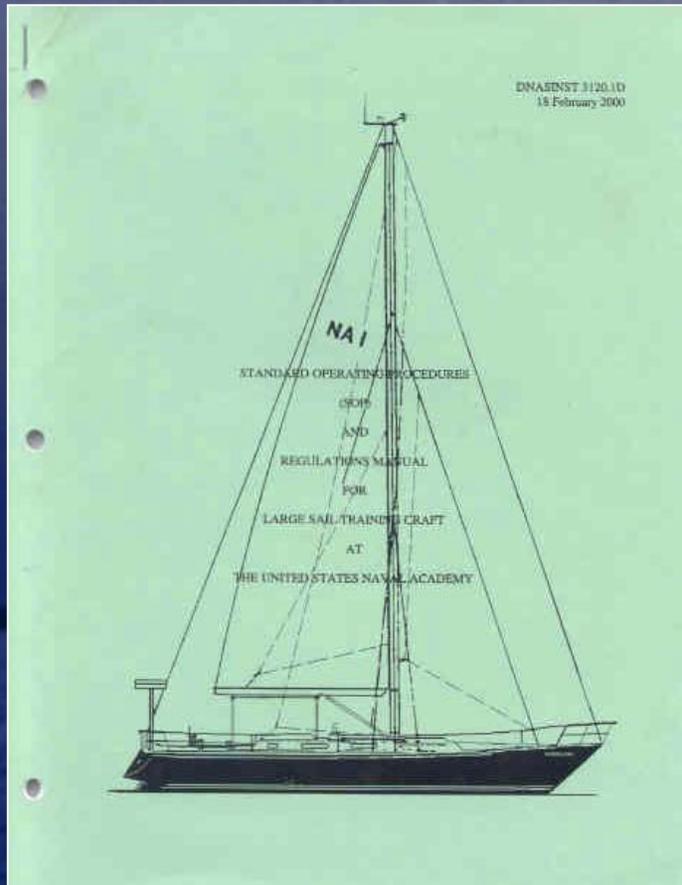
# ACCOUNTABILITY

WHEN EXACTLY ARE YOU IN CHARGE?

EVERY U.S. NAVY OFFICIAL DOCUMENT STRESSES THE SAME POINT -- THE OIC IS IN CHARGE -- ALWAYS



# ACCOUNTABILITY



# ACCOUNTABILITY

and attachments to Sailing Instructions (SIs) for VOST Races -- ALL  
STATE THE SAME THING



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## □ 1. ACCOUNTABILITY

- PROGRAM HISTORY
- **REVIEW OF THE SOP**



# ACCOUNTABILITY

For example, the SOP states:

## SOP 203. OFFICER-IN-CHARGE/COACH

*“Only one individual on board can have ultimate command responsibility. For STC this individual is designated the Officer-in-Charge (OIC) or Coach. Officers-in-Charge or Coaches shall notify all crewmembers that they have assumed this responsibility before the STC gets underway.”*



# ACCOUNTABILITY

Do you see who is in charge?



# ACCOUNTABILITY

YOU ARE

and when you are in charge,  
you are...



# ACCOUNTABILITY

...ACCOUNTABLE



# ACCOUNTABILITY

The Navy's view on accountability is

*"...the person in charge is the one who is accountable"*

*"...accountability and responsibility are the foundations of our profession; our task is to instill these values in our subordinates"*

\* \* \* \*

Quoting a CO (Commanding Officer) who was relieved of his command for a grounding incident... *"Our ship went aground. I was the captain and I am responsible."*

*-- Flag Officer Newsgram-186 (6 March 1986)*



# ACCOUNTABILITY

**You are responsible for avoiding collisions**

SOP CHAPTER 5

POLICY REGARDING INCIDENTS WHILE UNDERWAY

-- Cites U.S. Navy Regs, COLREGS, International Yacht Racing Rules, and DVOST Sailing Instructions

All make it clear that collision avoidance is a must.



# ACCOUNTABILITY

The SOP further defines

**Minor Incident** as “touching bottom” (*i.e.*, a soft grounding where progress is not stopped)

versus

**Admiralty Incident** as a collision with another vessel, bridge, pier, buoy, etc. or a collision which results in personnel injury (*i.e.*, a hard grounding where forward progress is stopped) → report immediately by fastest means and collect information for complete investigation



# ACCOUNTABILITY

When you get to the part on the report “Who’s accountable?”,  
start with yourself.

**-- IT IS CLEAR NOT ONLY WHO WILL BE HELD  
ACCOUNTABLE BUT ALSO WHEN**



# ACCOUNTABILITY

## COLLISION AVOIDANCE REDUX

Every time the Director of Naval Academy Sailing talks to a group, he stresses that COLLISIONS are to be avoided.

### SOP--2.10 COLLISION AVOIDANCE

*“The basic fundamental policy regarding collisions of Naval Academy STC in any situation whether racing or cruising is that COLLISIONS ARE TO BE AVOIDED.”*



# ACCOUNTABILITY

SO, THE BOTTOM LINE IS THAT--

You are always in charge

and

YOU WILL BE HELD ACCOUNTABLE



# ACCOUNTABILITY

Summer 2002

## Navigation-related Incident Summary

- Grounding – Bermuda
- Grounding – Coast of Maine
- Grounding – Coaster's Harbor
- Grounding – Delaware River
- Grounding – Exit of C&D Canal
- Grounding – Eastern Bay
- Grounding – Greenbury Point
- Collision with bridge – Newport
- Collision with buoy – Delaware River (motoring)



# ACCOUNTABILITY

## Post-critique...Actual Root Causes

- OIC not setting the right standard*
- OIC focused on the wrong set of priorities*
- Nav Party not manned when required
- Post-mission let-down
- Midshipman steering errors



# ACCOUNTABILITY

SO, THE BOTTOM LINE IS THAT--

You are always in charge

and

YOU WILL BE HELD ACCOUNTABLE



# ACCOUNTABILITY

## REMINDER

*“The prudent mariner knows the situation, knows the limitations and capabilities of his craft and crew and always leaves an escape route”*

*-- SOP*

## Advisory

*“Let the skipper do everything he is capable of, and push him into things he isn't yet competent in – but back him up so he doesn't ruin his career and yours by a mistake. Our mission is to train these youngsters to the limit of our ability – safely.”*

*– CAPT J.B. Bonds, USN-Director of Naval Academy Sailing (1984)*



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

1. ACCOUNTABILITY

2. NAVIGATION PLANNING

3. WEATHER PLANNING

4. TIDES AND CURRENTS

5. DANGERS AND OBSTACLES



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 2. NAVIGATION PLANNING

- Charts -- relevant for transit and/or race, safe havens
- Read the charts, Know the charts, Require chart “maintenance”
- Timeline plan -- adjusted for expected weather & crew experience
- Alternative route plan -- especially transits (e.g., Bermuda-Annapolis via Chesapeake Bay or Delaware Bay)
- Waypoints -- relevant to both transit & race strategy



# NAVIGATION PLANNING

## SOP CHAPTER 3

### 303. REQUIREMENTS FOR LOCAL OPS –

#### a. “...A navigation brief...”

1. Charts 12270, 12282, 12283
2. Tide Table, Current Table, Light List
3. VHF Weather broadcast

#### b. ADDITIONAL REQUIREMENTS –

*For all RACES*

*-Logbook entries*

For VOST Practices, CSNTS Practices, P-100, and Rec. Sailing, the OIC/Coach, a brief, including wind & weather conditions/forecast, anticipated training evolutions & safety considerations



# NAVIGATION PLANNING

## NAVIGATION TOOLS

Reed's Nautical Almanac, Eldridge Tide and Pilot Book, and applicable Coast Pilots can assist in navigation planning and race strategy during VOST Races and/or transits to and from northern and southern waters.

An important step for either an offshore race or a transit — read the applicable portions of these publications before departing and ensure the Navigator briefs the Skipper and the crew frequently (e.g., before entering Newport Bay, the Bay of Fundy, and Long Island Sound).



# NAVIGATION PLANNING

## Why Briefings?

### Reed's Nautical Almanac

#### Delaware Bay

*“...can be one of the nastiest pieces of water on the East Coast. The combination of strong currents and few good harbors requires advance planning. The winds against tide here creates rough waters, as do any winds over 20 knots.”*



# NAVIGATION PLANNING

## Why Briefings?

### Reed's Nautical Almanac

#### Chesapeake Bay

*“The southern end of the bay is home to one of the largest naval base in the world and one of the busiest ports. In Norfolk, you share the channel with aircraft carriers and ore carriers. Tune to VHF Channel 13 to keep abreast of the commercial traffic or to ask for channel clarification.”*



04JUL1997



# NAVIGATION PLANNING

## COAST PILOT 2

Section 3 starts at description of prominent features  
-- listing applicable charts and significant areas  
(e.g., Martha's Vineyard)

Newport Area – Paragraph 24 describes fog and  
weather conditions that relate to fog clearing,  
days of fog per month



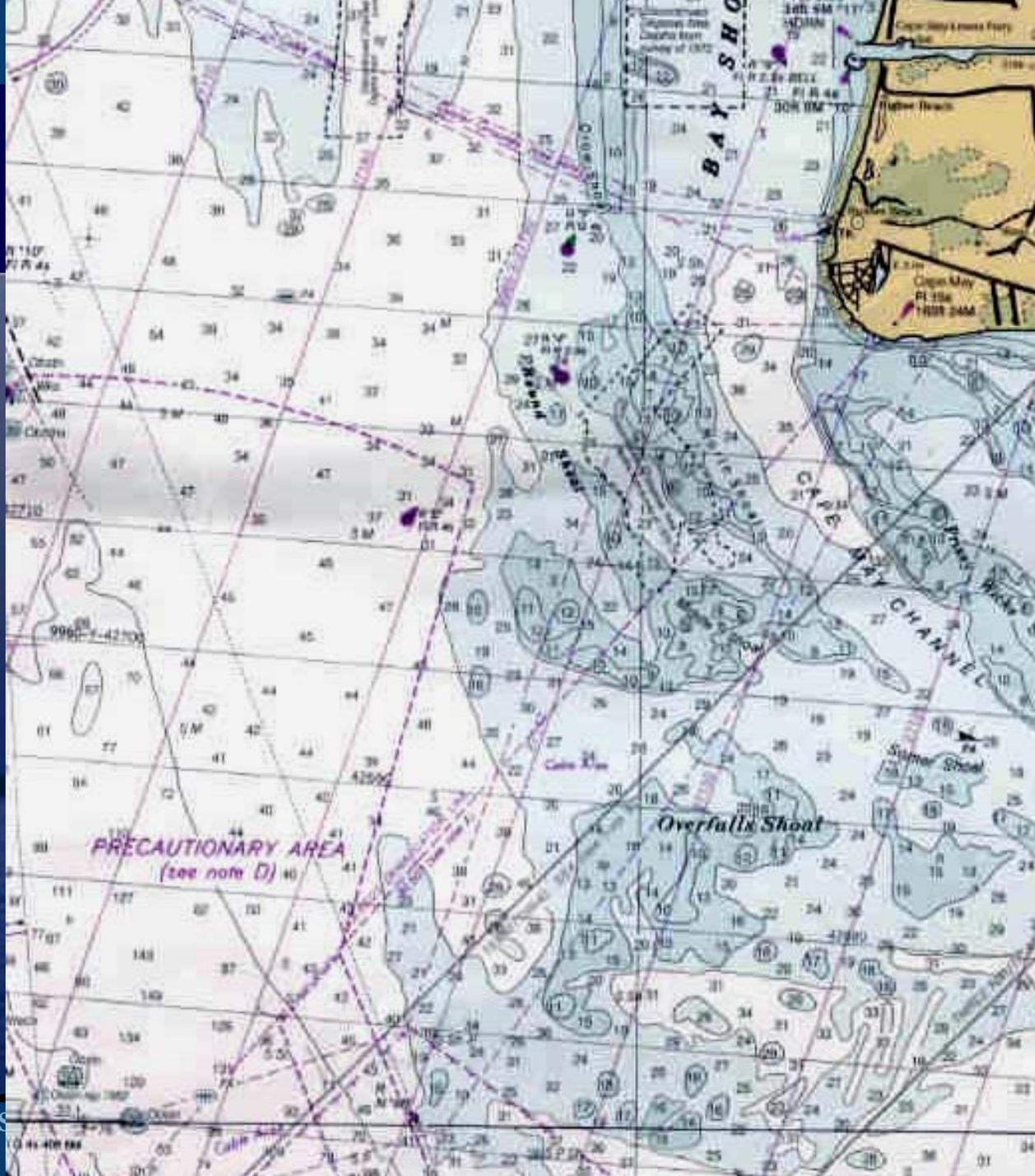
# NAVIGATION PLANNING

## Reed's Nautical Almanac

### Section P (Piloting) and Section T (Tides)

- ❑ Coastal Passage Notes and large area chartlets
- ❑ Marblehead, MA – lights & buoys & warnings
- ❑ New York – the Race and Eastern Entrance to Long Island Sound
- ❑ Delaware Bay markers
- ❑ Chesapeake Bay – Page P-224 describes the bridge tunnel as a “Hazard” (so, it’s not just another waypoint)
  - ❑ incident in 1998-99 RE
- ❑ Bermuda -- Pages P-429 and T-165
- ❑ Halifax – Pages P-32 and T-12
- ❑ “cutting corners” (e.g., at Cape May)





This is a tremendously busy port. Both commercial fishing and pleasure fishing boats blast in and out at all times of the day. Be very careful when approaching the opening bridges, as the currents are swift and the bridges slow to open. Be prepared to anchor if necessary. The Point Pleasant Canal leads to the New Jersey section of the Intracoastal Waterway. The current flows swiftly through the canal, which is crossed by two opening bridges. Sailboats are advised to enter the canal at slack current or with a slight adverse tide. There is very little maneuvering room inside. Manasquan is the last good harbor of refuge before Atlantic City when headed south.

### BARNEGAT INLET

**Hazards:** *Barnegat Inlet Channel is subject to continual change due to severe shoaling. The buoys marking the channel are shifted frequently to mark the best water and therefore are not charted. Breakers make across the inlet with an ebb tide and an easterly wind. Strangers should not attempt to transit the inlet under any but ideal conditions. Boatmen needing assistance should lay outside the inlet and contact the local Coast Guard station.*

**NOTE:** *Positions of buoys frequently shifted with changing conditions.*

**Barnegat Lighted Buoy B**, 39 45.8N, 73 46.1W. Fl Y 6s, 7M. Yellow. **RACON B** (- . . -).

**Barnegat Offshore Lighted Gong Buoy 2**, 39 45.5N, 73 59.5W. Fl R 6s, 5M. Red.

**Barnegat Inlet Wreck Buoy**, 39 46.4N, 74 05.0W. Red nun.

**Barnegat Inlet Outer Lighted Whistle Buoy BI**, 39 44.6N, 74 03.5W. Mo (A) W, 6M. Red and white stripes with red spherical topmark.

**North Jetty Danger Buoy**, white and orange can.

**Lighted Buoy 1**, Fl G 2.5s, 4M. Green.

**Buoy 2**, red nun.

**Buoy 3**, green can.

**South Jetty Danger Buoy**, white and orange, can.

**Lighted Buoy 4**, Fl R 6s. Red nun.

**Buoy 4A**, red nun.

**Buoy 5A**, green can.

**NORTH BREAKWATER LIGHT 6**, 39 45.6N, 74 05.5W. Fl R 4s, 37ft, 5M. TR on skeleton tower.

**SOUTH BREAKWATER LIGHT 7**, 39 45.5N, 74 05.6W. Q G, 37ft, 5M. SG on tower. Horn: 1 blast every 30s.

**Lighted Buoy 8**, Fl R 4s, 4M. Red.

**Lighted Buoy 9**, Fl G 2.5s. Green.

**Lighted Buoy 11**, Q G, 4M. Green.

**Lighted Buoy 12**, Fl R 2.5s, 3M. Red.

**Barnegat Harbor Channel Lighted Buoy 14**, Fl R 2.5s, 3M. Red. Replaced by nun when endangered by ice.

**Barnegat Harbor Channel Junction Buoy**, green and red banded can.

### LITTLE EGG INLET

**NOTE:** *Positions of buoys frequently shifted with changing conditions.*

**Little Egg Inlet Outer Lighted Whistle Buoy LE**, 39 27.7N, 74 16.6W. Mo (A) W, 5M. Red and white stripes with red spherical topmark.

**Buoy A**, red and white stripes, spherical buoy.

**Buoy B**, red and white stripes, spherical buoy.

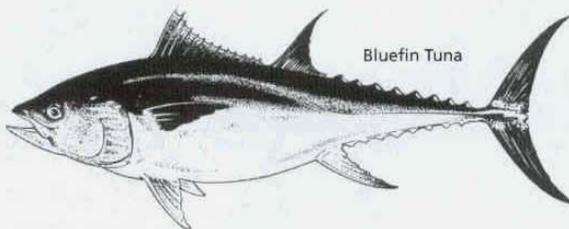
**Buoy C**, red and white stripes, spherical buoy.

**Lighted Buoy D**, Mo (A) W, 5M. Red and white stripes.

**Buoy E**, red and white stripes, nun.

**Lighted Buoy F**, Mo (A) W, 5M. Red and white stripes.

**Buoy G**, 39 30.1N, 74 18.3W. Red and white stripes, nun.



Bluefin Tuna

# NAVIGATION PLANNING

## Reed's Nautical Almanac





# NAVIGATION PLANNING

## U.S. COAST PILOT

- ❑ Review the narrative sections (e.g., the description of the Nantucket Shoals in CP-2 on Page 109)
- ❑ Find lists of Lats & Longs for areas *“to be avoided... because of the great danger of stranding and for reasons of environmental protection.”*

There is in every Coast Pilot detailed Navigation information – charts, land features, NavAids, etc. – in a large section on Navigation. This information is applicable to races such as Newport, Around Martha’s Vineyard, and Around Long Island.



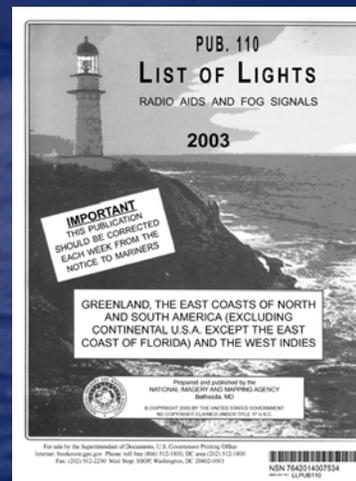
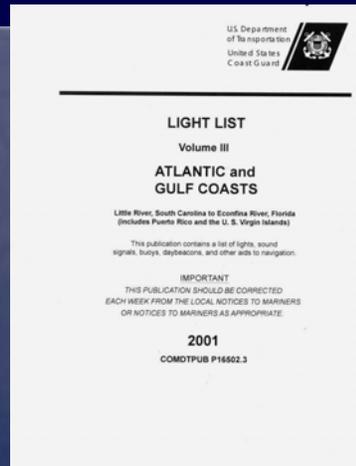
# NAVIGATION PLANNING

## Light List

Contains descriptions of lighted aids to navigation and unlighted buoys, day beacons, fog signals, radiobeacons, and LORAN-C and Differential GPS coverage in U.S. coastal waters.

## List of Lights

Contains descriptions of lighted aids to navigation and unlighted buoys, day beacons, fog signals, radiobeacons, and Differential GPS coverage in non-U.S. waters.



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

1. ACCOUNTABILITY

2. NAVIGATION PLANNING

3. WEATHER PLANNING

4. TIDES AND CURRENTS

5. DANGERS AND OBSTACLES



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 3. WEATHER PLANNING

- Local conditions
- Planning ahead by looking early
- Heavy weather considerations



# WEATHER PLANNING

Pat Healy gave in-depth weather presentation last week (4 Feb 2003).

This section on **Weather Planning** lists information available within the previously mentioned references.



# WEATHER PLANNING

*“The ability to deal with heavy weather is as much a function of the crew’s experience and stamina as it is of the sturdiness of the boat.”*

*--Ralph Naranjo-Naval Academy Sailing Vanderstar Chair  
(December 2002)*



# WEATHER PLANNING

## Planning for Weather

While tides can be predicted for years ahead, the weather cannot. Weather reports and models are presented daily. But, to use the weather information effectively, you must have a feeling for the conditions you might encounter. You must both understand what you are seeing in reports and, more importantly, you must also begin looking early.



# WEATHER PLANNING

## Coast Pilot 2 (Atlantic Coast: Cape Cod to Sandy Hook)

Weather -- Newport and vicinity -- The prevailing winds are southwesterly in the summer and northwesterly in the winter. The heaviest gales are usually from the northwest and the northeast.

So,....



# WEATHER PLANNING

...if you look at a weather fax and see winds developing from the NW or NE, would you reconsider your plans?



# WEATHER PLANNING

As a general rule of thumb--

for a daysail or a day race, start looking ahead at least 4 to 5 days

for a transit to Newport, start looking ahead at least 2 weeks



# WEATHER PLANNING

## CLIMATOLOGICAL TABLES

### Coast Pilot 2

Newport Fog – Coast Pilot Table lists a visibility row “Mean number of days with fog”

For Newport, it’s 10 days in June, 12 days in July, and 9 days in August.

So, June, July, and August are the 3 months with the most days for fog.

The prudent OIC prepares both a transit plan and a training exercise for these expected conditions.



CONVERSION TABLE

CONVERSION OF METRIC TO U.S. UNITS

Metric Unit	U.S. Unit	Conversion Factor
1 meter	3.28 feet	1 m = 3.28 ft
1 kilometer	0.62 miles	1 km = 0.62 mi
1 centimeter	0.39 inches	1 cm = 0.39 in
1 millimeter	0.039 inches	1 mm = 0.039 in
1 gram	0.035 ounces	1 g = 0.035 oz
1 kilogram	2.2 pounds	1 kg = 2.2 lb
1 liter	1.06 quarts	1 l = 1.06 qt
1 cubic meter	35.3 cubic feet	1 m <sup>3</sup> = 35.3 cu ft
1 square meter	10.8 square feet	1 m <sup>2</sup> = 10.8 sq ft
1 hectare	2.5 acres	1 ha = 2.5 ac
1 degree Celsius	1.8 degrees Fahrenheit	1°C = 1.8°F
1 second	0.000278 hours	1 s = 0.000278 hr
1 minute	0.0167 hours	1 min = 0.0167 hr
1 hour	0.0417 days	1 hr = 0.0417 d
1 day	0.305 days	1 d = 0.305 d
1 week	2.14 days	1 wk = 2.14 d
1 month	0.262 years	1 mo = 0.262 yr
1 year	1.0 year	1 yr = 1.0 yr



# WEATHER PLANNING

There is also information on the “prevailing weather” in Coast Pilot, Reed’s, Eldridge, Gulf Stream Companion, etc.



# WEATHER PLANNING

Coast Pilot volumes have meteorological information

- Weather elements – monthly tables, wind, wave heights, *etc.*



# WEATHER PLANNING

## U.S. Sailing Publication *Passage Making*

- Coastal Weather in Chapter 5, including information on how to interpret a Weather Fax on pages 33, 34, and 35

*“[Preparing for] heavy weather is a relative term, one that is tempered by the soundness of the vessel and the ability of the crew.”*

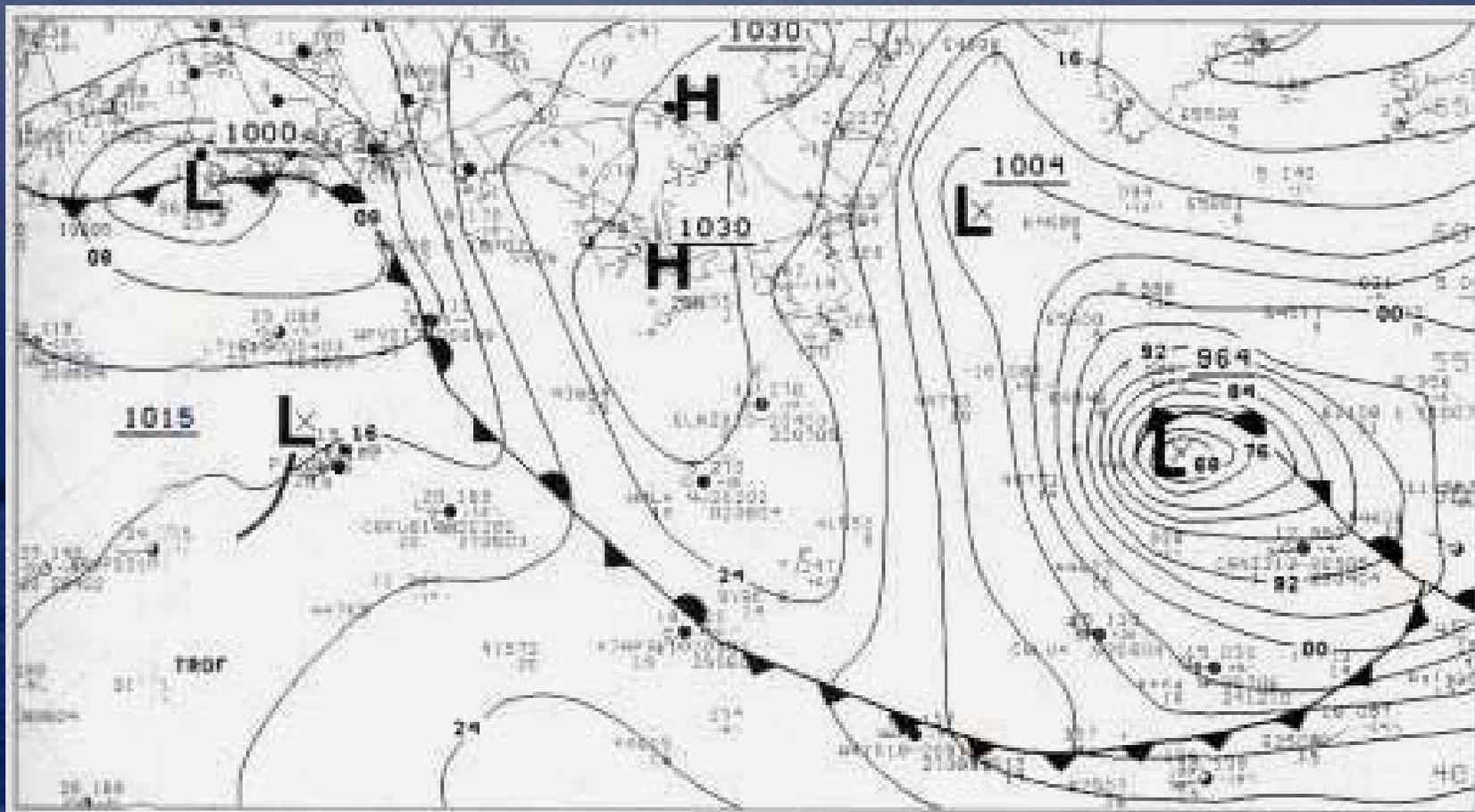
*-- Ralph Naranjo-Naval Academy Sailing Vanderstar Chair (December 2002)*

- Coastal Heavy Weather in Chapter 11



# WEATHER PLANNING

## Weather Fax



# WEATHER PLANNING

## A POINT WORTH REMEMBERING...

Sailing involves two different environments -- air and water -- don't overlook important features of getting the boat to "go fast" through the water (e.g., in heavy weather)

*"Don't attempt to bash straight into the waves. Crack off – Sail fast enough to prevent loss to leeway but not so fast you" shake yourself to pieces.*

Don't take the strength of your crew for granted. Being able to somehow offer hot food -- soup, noodles -- does wonders for the crew's morale and strength.



# WEATHER PLANNING

## U.S. Sailing Publication *Passage Making*

-- Ocean Weather in Chapter 18

**Tropical Storms** – You need more than to know that they exist. You need to understand their nature, how they begin, and what is their likely behavior should one be coming your way.

-- Heavy Weather Offshore in Chapter 23

**Watch Sections** – Most people cannot handle a 3-hour watch in 40-50 knots of wind, so watch cycles must be considered in light of the positions that must be manned, individual crew strength, stamina, and severity of the weather.



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

1. ACCOUNTABILITY

2. NAVIGATION PLANNING

3. WEATHER PLANNING

4. TIDES AND CURRENTS

5. DANGERS AND OBSTACLES



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 4. TIDES AND CURRENTS

- ❑ Reed's, Eldridge, Coast Pilots -- special emphasis on "choke points"
- ❑ Annapolis-Newport Race -- "corner" at Chesapeake Bay Bridge Tunnel





**INNER MIDDLE  
GROUND AREA**

**HIGH LEVEL  
BRIDGE AREA**

**BRIDGE  
TUNNEL  
TRESTLE**

**BALTIMORE  
CHANNEL  
AREA**

**FOURTH  
ISLAND**

**THIRD  
ISLAND**

**RED CAN  
BUOYS**

**RESTRICTED AREA  
334 320**

Maximum draft 20 meters (66 feet) from the Chesapeake Bay Bridge-Tunnel. Excess draft may result from the presence of additional loads due to unbalanced vessel, traffic conditions, navigational hazards or 20 other emergency conditions.

**FISHERMAN'S  
NATIONAL  
WILDLIFE  
REFUGE  
(Preserved)**

**SMITH I.**

**REGULATED AREA  
185 801**

Y-41350

320

REA

13

**CAUTION**

**CAUTION**

**CAUTION**

**CAUTION**

**CHESAPEAKE  
BEACH**

**NAVIGATIONAL  
OPERATIONS  
IN FIXED SPANS  
HIGH TIDE TEST**

**99400**

**27300**

195

190

185

180

215

210

220

390

370

60

320

REA

**CAUTION**

**CAUTION**

**CAUTION**

**CAUTION**

**CHESAPEAKE  
BEACH**

**NAVIGATIONAL  
OPERATIONS  
IN FIXED SPANS  
HIGH TIDE TEST**

**99400**

**27300**

195

190

185

180

215

210

220

390

370

60

320

REA

# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 4. TIDES AND CURRENTS

- ☐ Gulf Stream trends strategy 3-4 weeks prior



# TIDES AND CURRENTS

- ❑ Reed's Nautical Almanac
- ❑ Eldridge Tide and Pilot Book
- ❑ Coast Pilot
- ❑ Gulf Stream Companion



# TIDES AND CURRENTS

## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

- ❑ Tides High & Low – daily (also, sunrise and sunset)
- ❑ Contains a caveat: predictions based on average weather for the area -- beware of neap & spring tides
- ❑ Currents
- ❑ Slack Time & Max Time – Flood/Ebb in knots



# TIDES AND CURRENTS

## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

### C & D Canal

-- Monitor VHF 13 when in the C & D Canal. Canal dispatcher, located at Chesapeake City, should be informed immediately in case of engine failure. Sailboats and low-powered vessels will do well to wait a favorable current; 2- to 3-knot currents may be encountered.



# TIDES AND CURRENTS



# TIDES AND CURRENTS



# TIDES AND CURRENTS



# TIDES AND CURRENTS

## REEDY POINT, DE

HIGH & LOW WATER 2001

U.S. Datum

39°33.4'N 75°34.4'W

Eastern Time (75°W)

Corrected for Daylight Saving Time: April 1 - October 27

MAY				JUNE				JULY				AUGUST			
Time	ft	Time	ft	Time	ft	Time	ft	Time	ft	Time	ft	Time	ft	Time	ft
1 0035 0.8		16 0045 1.1		1 0230 0.5		16 0203 1.0		1 0309 0.4		16 0228 1.0		1 0434 0.3		16 0405 0.6	
0612 5.9		16 0645 5.6		0807 5.9		16 0748 5.4		0844 5.6		16 0800 5.2		1007 5.5		16 0928 5.3	
Tu 1329 0.5	W	1329 0.8		F 1457 0.1	Sa	1418 0.7		Su 1521 0.2	M	1424 0.6		W 1633 0.5	Th	1600 0.5	
1905 5.5		1926 5.3		2045 6.3		2019 5.8		2114 6.4		2024 6.1		2227 6.4		2147 6.5	
2 0142 0.7		17 0144 1.0		2 0329 0.3		17 0302 0.9		2 0405 0.3		17 0330 0.8		2 0523 0.3		17 0502 0.3	
0722 5.9		17 0742 5.6		0905 5.9		17 0841 5.4		0937 5.6		17 0857 5.2		2 1055 5.5		17 1025 5.5	
W 1428 0.3	Th	1419 0.8		Sa 1549 0.1	Su	1509 0.6		M 1611 0.2	Tu	1523 0.5		Th 1720 0.5	F	1701 0.3	
2008 5.8		2018 5.6		2137 6.5		2106 6.1		2203 6.5		2117 6.3		2312 6.4		2243 6.7	
3 0247 0.5		18 0242 0.9		3 0425 0.2		18 0400 0.7		3 0458 0.2		18 0430 0.6		3 0608 0.3		18 0557 0.1	
0826 6.0		18 0835 5.6		0958 5.9		18 0933 5.4		3 1028 5.8		18 0953 5.3		3 1140 5.5		18 1119 5.8	
Th 1524 0.1	F	1508 0.7		Su 1639 0.1	M	1600 0.5		Tu 1700 0.3	W	1622 0.4		F 1804 0.5	Sa	1759 0.1	
2105 6.1		2105 5.8		2225 6.6		2153 6.3		2249 6.5		2210 6.5		2355 6.3		2337 6.8	
4 0347 0.2		19 0338 0.7		4 0519 0.1		19 0456 0.5		4 0547 0.2		19 0526 0.4		4 0651 0.3		19 0648 -0.1	
0925 6.1		19 0924 5.6		4 1049 5.8		19 1023 5.4		4 1116 5.5		19 1047 5.4		4 1223 5.4		19 1212 6.0	
F 1617 0.0	Sa	1556 0.6		M 1727 0.2	Tu	1652 0.5		W 1746 0.4	Th	1720 0.3		Sa 1847 0.6	Su	1855 0.0	
2158 6.4		2149 6.0		2311 6.7		2238 6.5		2334 6.5		2302 6.7		○			
5 0444 0.0		20 0431 0.6		5 0609 0.0		20 0549 0.4		5 0634 0.2		20 0620 0.1		5 0035 6.3		20 0030 6.8	
1019 6.1		20 1011 5.6		5 1137 5.7		20 1112 5.4		5 1203 5.4		20 1140 5.5		5 0730 0.4		20 0738 -0.3	
Sa 1707 -0.1	Su	1642 0.5		Tu 1812 0.3	W	1743 0.4		Th 1830 0.5	F	1816 0.2		Su 1303 5.4	M	1304 6.1	
2247 6.6		2231 6.2		○ 2356 6.6		2324 6.6		○		2354 6.8		1927 0.6		1949 -0.1	
6 0538 -0.1		21 0523 0.4		6 0656 0.1		21 0642 0.2		6 0016 6.4		21 0712 0.0		6 0112 6.2		21 0122 6.7	
1110 6.1		21 1056 5.6		6 1224 5.6		21 1201 5.4		6 0718 0.3		21 1232 5.6		6 0807 0.4		21 0826 -0.3	
Su 1754 -0.1	M	1727 0.5		W 1856 0.5	Th	1835 0.4		F 1247 5.4	Sa	1911 0.1		M 1341 5.4	Tu	1356 6.2	
2334 6.7		2311 6.3		○				1911 0.6				2006 0.7		2042 0.0	
7 0629 -0.1		22 0613 0.3		7 0038 6.5		22 0011 6.7		7 0057 6.3		22 0046 6.8		7 0148 6.1		22 0214 6.6	
1158 6.0		22 1139 5.5		7 0742 0.2		22 0733 0.1		7 0759 0.3		22 0802 -0.2		7 0842 0.5		22 0914 -0.3	
M 1840 0.1	Tu	1812 0.5		Th 1309 5.5	F	1250 5.5		Sa 1329 5.3	Su	1325 5.7		Tu 1415 5.4	W	1447 6.3	
○		2350 6.5		1937 0.6		1927 0.4		1951 0.7		2005 0.1		2043 0.8		2136 0.1	
8 0019 6.7		23 0702 0.3		8 0120 6.4		23 0100 6.7		8 0136 6.2		23 0138 6.7		8 0222 6.0		23 0306 6.3	
0717 -0.1		23 1223 5.5		8 0825 0.3		23 0823 0.0		8 0838 0.4		23 0852 -0.2		8 0914 0.6		23 1001 -0.1	
Tu 1246 5.9	W	1857 0.5		F 1353 5.4	Sa	1341 5.5		Su 1409 5.3	M	1417 5.9		W 1448 5.5	Th	1540 6.3	
1924 0.3				2017 0.8		2020 0.4		2029 0.8		2100 0.1		2121 0.8		2230 0.3	
9 0103 6.6		24 0031 6.6		9 0200 6.3		24 0151 6.7		9 0214 6.1		24 0231 6.6		9 0256 5.8		24 0401 6.0	
0804 0.0		24 0751 0.3		9 0906 0.5		24 0913 0.0		9 0915 0.5		24 0941 -0.2		9 0945 0.6		24 1050 0.1	
W 1332 5.7	Th	1308 5.5		Sa 1437 5.3	Su	1434 5.6		M 1449 5.2	Tu	1511 5.9		Th 1521 5.6	F	1635 6.2	
2005 0.5		1944 0.5		2056 0.9		2114 0.4		2107 0.9		2154 0.2		2202 0.9		2325 0.5	
10 0145 6.5		25 0113 6.6		10 0241 6.1		25 0244 6.5		10 0251 6.0		25 0326 6.3		10 0333 5.7		25 0459 5.7	
0849 0.2		25 0840 0.4		10 0946 0.6		25 1003 0.0		10 0950 0.6		25 1030 -0.2		10 1018 0.6		25 1140 0.3	
Th 1418 5.5	F	1355 5.4		Su 1521 5.2	M	1530 5.6		Tu 1528 5.3	W	1607 6.0		F 1558 5.7	Sa	1731 6.1	
2046 0.7		2032 0.6		2135 1.0		2210 0.4		2147 0.9		2251 0.3		2249 1.0		2306 6.3	
11 0227 6.3		26 0200 6.6		11 0323 6.0		26 0341 6.3		11 0330 5.9		26 0423 6.1		11 0417 5.5		26 0023 0.6	
0933 0.4		26 0929 0.3		11 1026 0.7		26 1055 0.0		11 1026 0.6		26 1120 -0.1		11 1056 0.6		26 0558 5.5	
F 1504 5.4	Sa	1446 5.4		M 1606 5.2	Tu	1628 5.7		W 1608 5.3	Th	1704 6.0		Sa 1644 5.8	Su	1733 0.5	
2127 0.9		2124 0.6		2218 1.0		2308 0.5		2231 1.0		2348 0.4		2345 1.1		1830 6.3	
12 0311 6.1		27 0251 6.5		12 0409 5.8		27 0441 6.1		12 0413 5.7		27 0523 5.8		12 0512 5.3		27 0121 0.7	
1017 0.6		27 1021 0.3		12 1107 0.8		27 1147 0.0		12 1103 0.7		27 1212 0.1		12 1143 0.7		27 0658 5.4	
Sa 1553 5.2	Su	1542 5.4		Tu 1654 5.2	W	1728 5.8		Th 1652 5.4	F	1802 6.1		Su 1739 5.8	M	1327 0.8	
2209 1.0		2220 0.7		2307 1.1		2307 1.1		2322 1.0		2322 1.0		○		1927 6.1	
13 0358 5.9		28 0349 6.3		13 0459 5.7		28 0008 0.6		13 0502 5.5		28 0048 0.5		13 0051 1.1		28 0219 0.7	
1102 0.7		28 1115 0.3		13 1151 0.8		28 0544 5.9		13 1145 0.7		28 0624 5.6		13 0617 5.2		28 0757 5.3	
Su 1644 5.1	M	1643 5.4		W 1745 5.2	Th	1241 0.1		F 1740 5.5	Sa	1305 0.2		M 1241 0.7	Tu	1422 0.6	
2255 1.1		2321 0.7		1828 6.0				1900 6.1		1900 6.1		1842 6.0		2023 6.1	
14 0450 5.7		29 0453 6.1		14 0002 1.1		29 0109 0.6		14 0021 1.1		29 0147 0.5		14 0159 1.1		29 0314 0.6	
1149 0.8		29 1210 0.3		14 0555 5.5		29 0646 5.8		14 0559 5.3		29 0724 5.5		14 0724 5.1		29 0852 5.4	
M 1737 5.1	Tu	1746 5.5		Th 1238 0.8	F	1335 0.1		Sa 1233 0.7	Su	1359 0.3		Tu 1347 0.7	W	1515 0.6	
2348 1.1		2348 1.1		1837 5.4		1927 6.1		1834 5.7		1956 6.2		1947 6.1		2115 6.2	
15 0547 5.6		30 0024 0.7		15 0102 1.1		30 0210 0.5		15 0124 1.1		30 0246 0.5		15 0304 0.9		30 0405 0.5	
1238 0.9		30 0600 6.0		15 0652 5.4		30 0747 5.7		15 0700 5.2		30 0821 5.4		15 0828 5.2		30 0943 5.5	
Tu 1832 5.2	W	1307 0.3		F 1327 0.7	Sa	1428 0.1		Su 1326 0.7	M	1452 0.4		W 1455 0.6	Th	1605 0.6	
2209 1.0		1849 5.8		1929 5.6		2022 6.3		1929 5.9		2050 6.3		2049 6.3		2203 6.3	
15 Sun† Sun‡		31 0706 5.9		15 Sun† Sun‡		31 0342 0.4		15 Sun† Sun‡		31 0916 5.5		15 Sun† Sun‡		31 0453 0.4	
15 0548 2010		Th 1403 0.2		15 0534 2032		15 0547 2029		15 0547 2029		Tu 1544 0.4		15 0615 1958		15 0615 1958	
31 0537 2023		1949 6.0		30 0538 2034		30 0538 2034		31 0601 2016		2140 6.4		31 0630 1935		F 1653 0.5	
														2248 6.3	

# TIDES AND CURRENTS

## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

### Long Island Sound and New York

- Check timing against the tide and current tables. Distance between Throgs Neck Bridge...



# TIDES AND CURRENTS

## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

### Long Island Sound and New York

„,and Sandy Hook is about 30  
nautical miles. Currents at  
Hell Gate ...



# TIDES AND CURRENTS

## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

### Long Island Sound and New York

...run up to 5 or 6 knots and great whirlpools develop in the East River. New York Harbor is jammed with freighters, tankers, container ships, ferries, and tugboats...



# TIDES AND CURRENTS

## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

### Long Island Sound and New York

....Waters are full of flotsam, ranging from old fruit to sections of floating dock. An extra vigilant watch is needed in the harbor.



# TIDES AND CURRENTS

## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

### TIDES (Section T)

- ☐ High & low water
- ☐ Sunrise & sunset
- ☐ Spring tides

## THE RACE, LONG ISLAND SOUND

CURRENT TABLE 2001 41°14.0'N 72°03.6'W Flood 302° Ebb 112°  
Eastern Time (75°W) Corrected for Daylight Saving Time: April 1 – October 27

MAY						JUNE					
Slack time	Max time	Fld Ebb knots	Slack time	Max time	Fld Ebb knots	Slack time	Max time	Fld Ebb knots	Slack time	Max time	Fld Ebb knots
<b>1</b> 0023	0316	2.5	<b>16</b> 0102	0342	1.8	<b>1</b> 0224	0514	2.7	<b>16</b> 0209	0449	2.0
0634	0945	3.0	0704	1007	2.3	0828	1126	3.1	0807	1107	2.4
Tu 1305	1556	2.6	W 1328	1615	2.0	F 1440	1738	3.0	Sa 1414	1709	2.4
1920	2220	2.8	1943	2240	2.2	2057			2031	2339	2.8
<b>2</b> 0134	0425	2.6	<b>17</b> 0200	0441	1.9	<b>2</b> 0000	0300	3.4	<b>17</b> 0300	0542	2.2
0744	1049	3.1	0801	1101	2.3	0323	0615	2.8	0900	1158	2.5
W 1407	1701	2.8	Th 1418	1708	2.1	Sa 0927	1222	3.1	Su 1502	1758	2.6
2022	2323	3.1	2032	2331	2.5	1533	1833	3.1	2117		
<b>3</b> 0240	0531	2.8	<b>18</b> 0252	0535	2.0	<b>3</b> 0053	0353	3.6	<b>18</b> 0027	0327	3.1
0847	1149	3.3	0853	1151	2.5	0416	0709	2.9	0349	0632	2.4
Th 1505	1801	3.0	F 1504	1755	2.4	Su 1020	1314	3.1	M 0950	1246	2.7
2119			2117			1623	1922	3.1	1548	1846	2.8
<b>4</b> 0339	0632	3.0	<b>19</b> 0339	0623	2.3	<b>4</b> 0506	0758	2.9	<b>18</b> 0220	0514	3.1
F 0945	1244	3.4	Sa 0941	1238	2.6	M 1110	1402	3.1	0435	0720	2.7
1557	1855	3.3	1547	1839	2.6	1710	2008	3.1	Tu 1037	1334	2.8
2211			2159			2323			1634	1933	3.0
<b>5</b> 0433	0726	3.2	<b>20</b> 0423	0708	2.5	<b>5</b> 0552	0843	2.9	<b>19</b> 0435	0720	2.7
Sa 1039	1336	3.5	Su 1025	1322	2.8	Tu 1157	1448	3.0	Tu 1037	1334	2.8
1647	1944	3.4	1628	1921	2.8	1755	2050	3.0	1634	1933	3.0
2259			2238						2247		
<b>6</b> 0522	0815	3.3	<b>21</b> 0505	0751	2.7	<b>6</b> 0006	0312	3.6	<b>20</b> 0521	0808	2.9
Su 1128	1423	3.5	M 1108	1405	2.9	0635	0924	2.8	W 1124	1421	3.0
1733	2029	3.5	1707	2003	3.0	W 1241	1531	2.9	1720	2020	3.2
2344			2317			1838	2131	2.9	2333		
<b>7</b> 0609	0900	3.3	<b>22</b> 0546	0834	2.9	<b>7</b> 0047	0354	3.5	<b>21</b> 0607	0855	3.1
M 1215	1509	3.4	Tu 1150	1447	3.0	0718	1004	2.7	Th 1211	1509	3.2
1817	2112	3.4	1747	2045	3.2	Th 1323	1614	2.8	1808	2108	3.4
<b>8</b> 0028	0333	3.9	2357			1920	2211	2.7	<b>22</b> 0020	0335	3.9
0654	0943	3.2	<b>23</b> 0311	0607	3.7	<b>8</b> 0128	0436	3.3	0654	0943	3.2
Tu 1300	1553	3.3	W 1232	1531	3.1	0759	1044	2.6	F 1259	1558	3.3
1901	2154	3.2	1829	2129	3.2	F 1406	1657	2.6	1858	2157	3.4
<b>9</b> 0110	0417	3.7	<b>24</b> 0039	0355	3.8	<b>8</b> 2002	2252	2.5	<b>23</b> 0109	0424	3.0
0738	1025	3.0	0712	1002	3.1	<b>9</b> 0208	0518	3.1	0742	1033	3.3
W 1344	1637	3.0	Th 1316	1616	3.1	0841	1125	2.4	Sa 1349	1649	3.3
1943	2236	3.0	1914	2215	3.2	Sa 1448	1741	2.4	1950	2249	3.4
<b>10</b> 0152	0500	3.5	<b>25</b> 0124	0442	3.8	<b>9</b> 2046	2335	2.4	<b>24</b> 0201	0515	3.9
0822	1107	2.7	0758	1049	3.1	<b>10</b> 0250	0602	2.9	0832	1124	3.3
Th 1428	1721	2.8	F 1404	1705	3.1	0923	1208	2.3	Su 1442	1742	3.3
2027	2318	2.7	2003	2304	3.2	Su 1533	1827	2.3	2046	2342	3.3
<b>11</b> 0235	0545	3.2	<b>26</b> 0213	0531	3.7	<b>10</b> 2133			<b>25</b> 0255	0608	3.8
0907	1151	2.5	0848	1139	3.0	<b>11</b> 0021	022	2.2	0924	1217	3.2
F 1514	1807	2.5	Sa 1455	1757	3.0	M 1008	1254	2.2	M 1537	1838	3.3
2113			2057	2356	3.0	1620	1916	2.2	2146		
<b>12</b> 0321	0631	2.8	<b>27</b> 0307	0624	3.5	2224			<b>26</b> 0353	0703	3.5
Sa 0954	1238	2.2	0941	1233	2.9	<b>11</b> 0335	0648	2.7	Tu 1019	1313	3.1
1603	1857	2.3	Su 1552	1853	2.9	M 1008	1254	2.2	1635	1936	3.2
2204			2157			1620	1916	2.2	2249		
<b>13</b> 0410	0722	2.6	<b>28</b> 0406	0722	3.3	2224			<b>27</b> 0454	0801	3.3
Su 1045	1328	2.0	M 1039	1331	2.8	<b>12</b> 0424	0737	2.5	W 1117	1412	3.0
1656	1950	2.1	1653	1954	2.9	Tu 1055	1343	2.1	1736	2037	3.2
2300			2303			1710	2008	2.2	2355		
<b>14</b> 0505	0815	2.4	<b>29</b> 0511	0822	3.2	2319			<b>28</b> 0559	0901	3.1
M 1139	1422	1.9	Tu 1140	1433	2.8	<b>13</b> 0517	0829	2.3	Th 1216	1512	2.9
1753	2046	2.0	1757	2057	2.9	W 1144	1434	2.1	1837	2139	3.2
<b>15</b> 0001	0242	1.8	<b>30</b> 0012	0301	2.6	1801	2101	2.2	<b>29</b> 0101	0348	2.5
0604	0911	2.3	W 1242	1536	2.8	<b>14</b> 0017	0257	1.8	0704	1002	2.9
Tu 1234	1519	1.9	1900	2201	3.0	Th 1235	1526	2.1	F 1116	1614	2.9
1850	2144	2.1	<b>31</b> 0120	0408	2.6	1853	2155	2.3	1936	2240	3.2
			0725	1027	3.1	<b>15</b> 0114	0354	1.9	<b>30</b> 0205	0454	2.5
			Th 1342	1639	2.9	F 1325	1618	2.2	Sa 1414	1715	2.8
			2001	2303	3.2	1943	2248	2.5	2034	2338	3.3

# TIDES AND CURRENTS

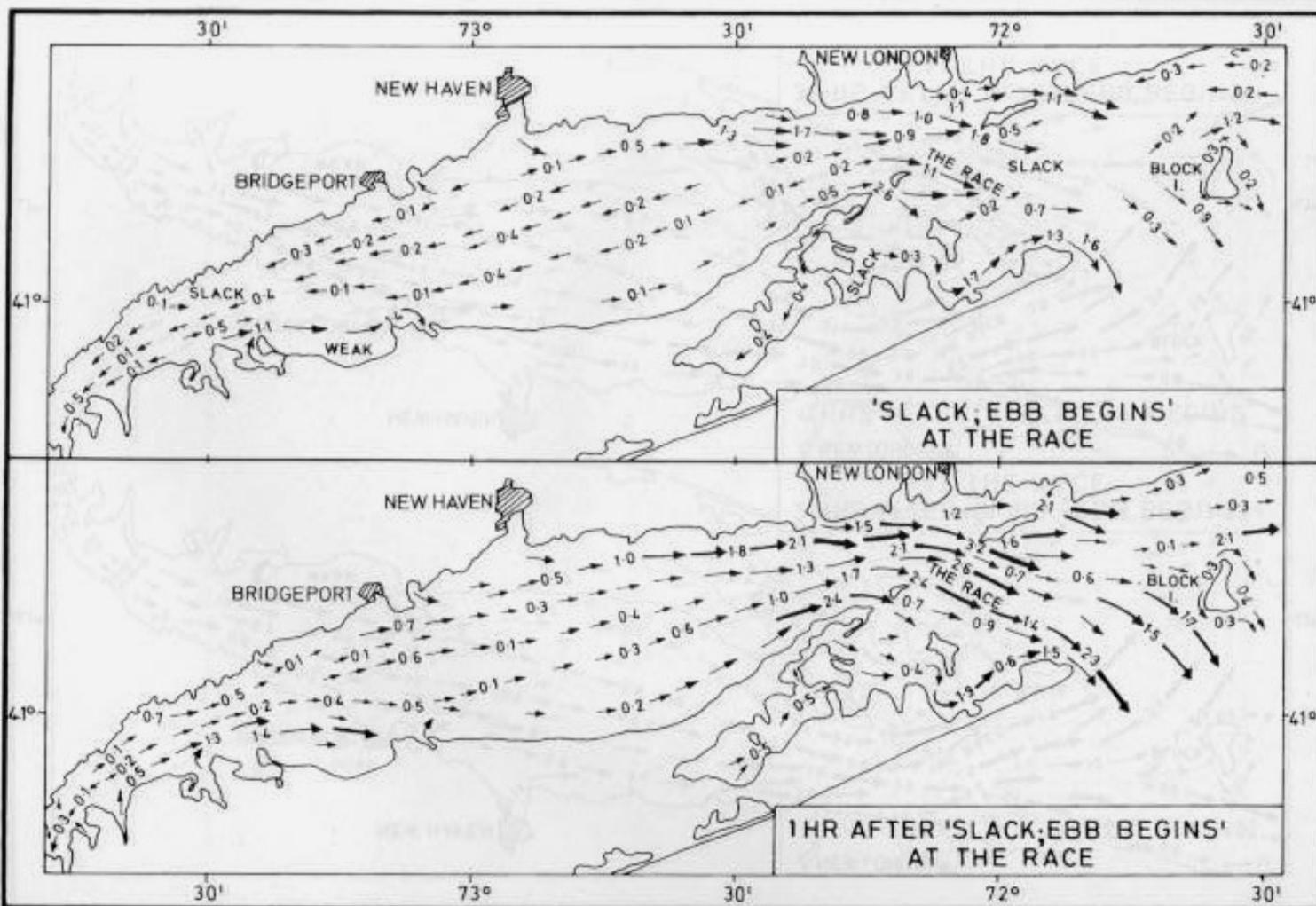
## REED'S NAUTICAL ALMANAC (NORTH AMERICAN EAST COAST)

### CURRENT (Section C)

*“Prudent mariners understand that all tide and time current predictions are approximations and are subject to weather influences that cannot be predicted in the long term...”*



# TIDES AND CURRENTS



TIDAL CURRENTS

LONG ISLAND SOUND  
BLOCK ISLAND SOUND



# TIDES AND CURRENTS

## ELDRIDGE TIDE AND PILOT BOOK

- ❑ Lists – tides and currents
- ❑ Current change at various points such as
  - Long Island Sound, Delaware Bay, and Chesapeake Bay



# TIDES AND CURRENTS

## 2002 HIGH & LOW WATER NEWPORT, R.I.

41-30N x 71-20W

Daylight Time

Daylight Time

D A Y O F M O N T H	D A Y O F W E E K	JULY						D A Y O F M O N T H	D A Y O F W E E K	AUGUST						
		HIGH			LOW					HIGH			LOW			
		a.m.	Ht.		p.m.	Ht.				a.m.	p.m.		a.m.	Ht.	p.m.	Ht.
1	M	1 06	3.2		1 34	3.3	6 29	6 58	1	T	1 46	2.9	2 09	3.3	7 13	8 24
2	T	1 51	3.0		2 19	3.3	7 18	8 12	2	F	2 34	2.8	2 58	3.3	8 08	9 40
3	W	2 35	2.8		3 04	3.3	8 12	9 27	3	S	3 28	2.8	3 53	3.4	9 07	10 41
4	T	3 24	2.8		3 53	3.4	9 06	10 24	4	S	4 29	2.9	4 53	3.6	10 03	11 33
5	F	4 18	2.8		4 44	3.5	9 56	11 13	5	M	5 30	3.0	5 52	3.9	10 56	...
6	S	5 13	2.9		5 35	3.7	10 43	11 59	6	T	6 25	3.3	6 45	4.2	12 21	-A-
7	S	6 05	3.0		6 24	3.9	11 28	...	7	W	7 16	3.6	7 35	4.5	1 08	12 39
8	M	6 54	3.2		7 10	4.1	12 45	12 13	8	T	8 05	3.9	8 24	4.6	1 54	1 31
9	T	7 41	3.4		7 56	4.3	1 32	12 59	9	F	8 53	4.2	9 12	4.7	2 37	2 23
10	W	8 27	3.6		8 42	4.5	2 18	1 46	10	S	9 42	4.4	10 02	4.7	3 19	3 16
11	T	9 14	3.7		9 30	4.5	3 02	2 35	11	S	10 33	4.5	10 54	4.5	3 59	4 08
12	F	10 04	3.8		10 20	4.5	3 44	3 25	12	M	11 26	4.5	11 46	4.2	4 39	5 00
13	S	10 55	4.0		11 12	4.3	4 25	4 16	13	T	...	...	12 19	4.5	5 21	5 57
14	S	11 48	4.1		...	...	5 06	5 09	14	W	12 41	4.0	1 15	4.4	6 07	7 06
15	M	12 06	4.2		12 42	4.1	5 50	6 08	15	T	1 37	3.7	2 13	4.3	7 00	8 48
16	T	1 00	3.9		1 37	4.2	6 39	7 19	16	F	2 35	3.4	3 14	4.1	8 05	10 14
17	W	1 56	3.7		2 33	4.2	7 35	8 52	17	S	3 38	3.3	4 19	4.0	9 19	11 16
18	T	2 55	3.5		3 33	4.2	8 38	10 13	18	S	4 44	3.2	5 23	4.0	10 25	11 59
19	F	3 57	3.4		4 36	4.3	9 39	11 15	19	M	5 46	3.3	6 21	4.1	11 19	...
20	S	5 00	3.3		5 37	4.3	10 33	11 59	20	T	6 41	3.5	7 11	4.1	12 49	12 06
21	S	6 01	3.4		6 34	4.4	11 23	...	21	W	7 29	3.6	7 55	4.1	1 23	12 50
22	M	6 56	3.5		7 25	4.4	12 56	12 11	22	T	8 12	3.8	8 36	4.1	1 51	1 34
23	T	7 46	3.6		8 12	4.4	1 39	12 58	23	F	8 52	3.9	9 15	4.0	2 18	2 17
24	W	8 32	3.7		8 57	4.3	2 18	1 45	24	S	9 31	3.9	9 52	3.8	2 49	2 58
25	T	9 17	3.7		9 40	4.1	2 52	2 32	25	S	10 09	3.8	10 28	3.6	3 21	3 38
26	F	10 01	3.7		10 22	3.9	3 24	3 17	26	M	10 45	3.8	11 05	3.4	3 54	4 17
27	S	10 44	3.6		11 04	3.7	3 57	4 00	27	T	11 22	3.7	11 43	3.3	4 28	4 56
28	S	11 26	3.6		11 44	3.4	4 31	4 43	28	W	11 59	3.5	...	...	5 02	5 36
29	M	...	...		12 07	3.5	5 06	5 27	29	T	12 22	3.1	12 39	3.4	5 40	6 22
30	T	12 23	3.2		12 46	3.4	5 44	6 15	30	F	1 06	2.9	1 23	3.4	6 22	7 22
31	W	1 03	3.0		1 27	3.4	6 25	7 12	31	S	1 55	2.9	2 14	3.4	7 14	8 50

A also at 11:47 a.m.

Dates when Ht. of Low Water is below Mean Low with Ht. of lowest given for each period and Date of lowest in ( ):  
9th - 12th: -0.3'

Average Rise and Fall 3.5 ft.

When a high tide exceeds av. ht., the following low tide will be lower than av.

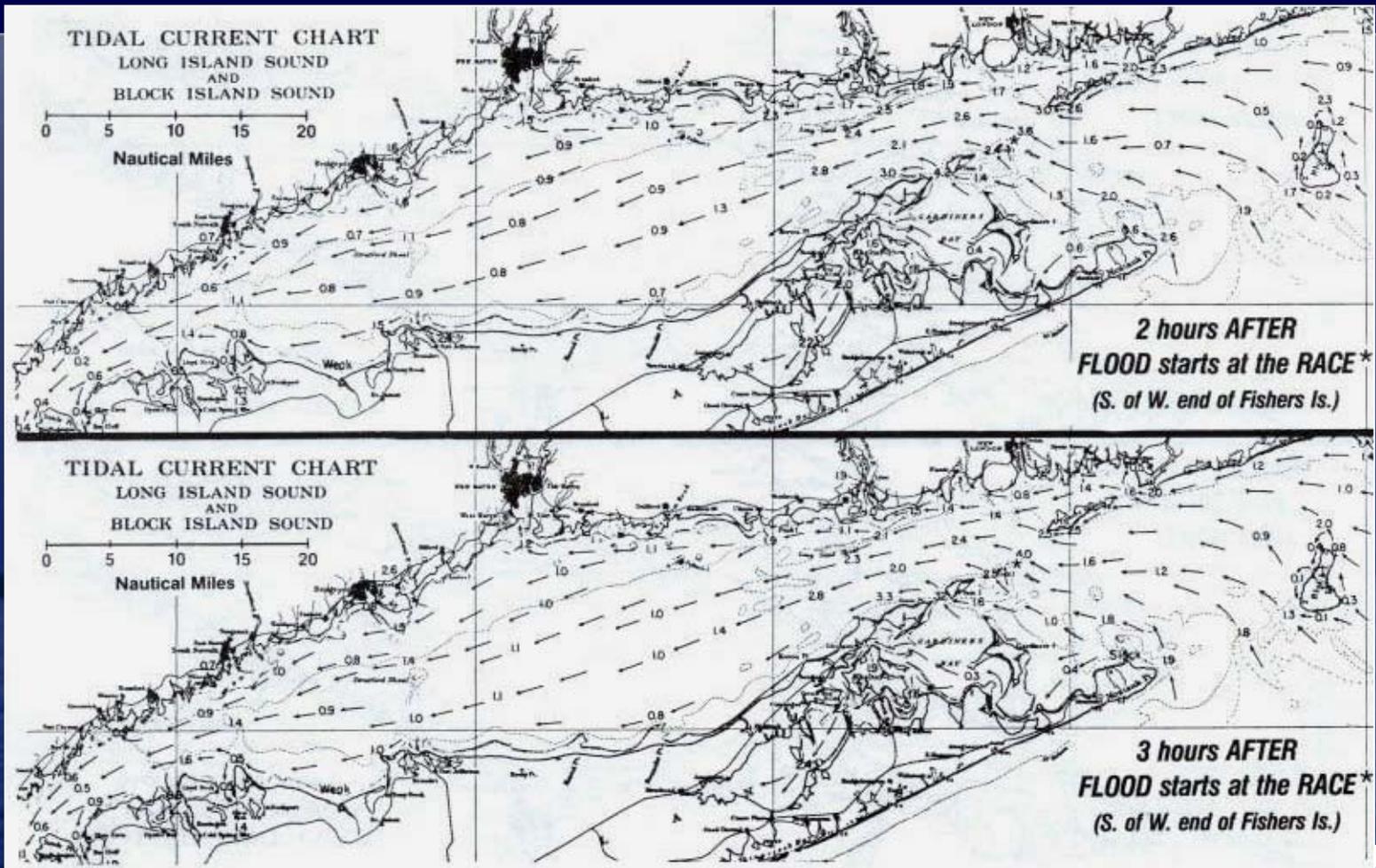
# TIDES AND CURRENTS

## ELDRIDGE TIDE AND PILOT BOOK

- ☐ Lists – tides and currents
- ☐ Current Charts & Diagrams
  - For example, chart of Long Island Sound after flood



# TIDES AND CURRENTS



# TIDES AND CURRENTS

## ELDRIDGE TIDE AND PILOT BOOK

- ☐ Lists – tides and currents
- ☐ Current Charts & Diagrams
  - Tidal current charts similar to those in Reed's





# TIDES AND CURRENTS

## ELDRIDGE TIDE AND PILOT BOOK

- ❑ Lists – tides and currents
  - ❑ Current Charts & Diagrams
    - Notes on Tides & Currents
  
- ❑ Lights and Fog Signals



# TIDES AND CURRENTS

## COAST PILOT

Discusses Tides and Currents

### Coast Pilot 2

Nantucket Shoals List Lat & Long of area to be avoided, then states *“currents are strong and erratic, reaching a velocity of 3-5 knots around the edges in some cases deflected to such an extent as to cause the direction to change 180 degrees.”*



# TIDES AND CURRENTS

## RACING TO HALIFAX

*“The race itself is often won by those who best deal with the tides that sweep around Brazil Rock from the Bay of Fundy. The vagaries of those tides provide either the good fortune of a boost along the final leg up the coast of Nova Scotia or the penalty for an unintended detour into the Gulf of Maine.”*

*--Preliminary Notice of Race--2003 Marblehead-to-Halifax Race*



# TIDES AND CURRENTS

## RACING TO HALIFAX

**NORTH HEAD LIGHT**, on Fisherman's Wharf, 44 45.8N, 66 45.1W. Fl R 6s, 23ft, 7M. Skeleton tower, white enclosed lower portion, 20ft.

**FARMER LEDGE LIGHT**, 44 43.4N, 66 43.6W. Fl R 4s, 13ft. Red skeleton tower, 12ft.

**GREAT DUCK ISLAND LIGHT**, S end of island, 44 41.1N, 66 41.6W. Fl W 10s, 50ft, 18M. White square tower on white dwelling, 29ft. Horn: 1 blast every 60s, horn points 120°. Emergency light.

**EDMUNDS ROCK LIGHT**, 44 40.4N, 66 43.2W. Fl G 4s, 19ft. Small green skeleton tower.

**HALF TIDE ROCK LIGHT**, middle of Cheney Passage between Cheney and Ross islands, 44 39.3N, 66 43.7W. Fl G 4s, 11ft, 5M. Skeleton structure, black, white, and green daymarks, 10ft. Horn: 1 blast every 15s.

**Prangle Point Bell Buoy XP3**, NE of the point, 44 38.5N, 66 40.7W. Fl G. Green, marked XP3. Radar reflector.

**WHITEHEAD HARBOUR**, 44 37.8N, 66 43.7W. Fl R 4s, 14ft, 5M. Framework tower on dolphin.

**LONG POINT LIGHT**, S extremity of White Head Island, 44 36.8N, 66 42.6W. Iso W 12s, 51ft, 11M. Square tower. Horn: 1 blast every 20s, horn points 180°. Emergency light.

**Brazil Shoal Bell Buoy**, 44 35.3N, 66 41.3W. Mo (A) W. Safe water mark, red and white vertical stripes, marked XK.

**Old Proprietor Shoal Whistle Buoy**, S of shoal, 44 32.6N, 66 39.5W. Fl G. Green, marked XK1.

**GANNET ROCK LIGHT**, S of Grand Manan, 44 30.6N, 66 46.9W. Fl W 6s, 92ft, 19M. Black and white striped octagonal tower, 76ft. Horn: 3 blasts every 60s, horn points 162°. **RACON G** (- - -), 120s, 10M.

**WHITE HORSE ISLET LIGHT**, 44 36.2N, 66 48.5W. Fl G 4s, 44ft. Mast, red and white rectangular daymark with black square in center, 20ft. Radar reflector.

**INGALLS HEAD BREAKWATER LIGHT**, 44 39.7N, 66 45.3W. F G, 26ft. Skeleton tower, 20ft.

**SEAL COVE OUTER BREAKWATER LIGHT**, 44 38.8N, 66 50.3W. Iso G 4s, 25ft, 7M. Triangular aluminum skeleton tower, 22ft.

**SEAL COVE WEST BREAKWATER LIGHT**, head of breakwater, 44 39.0N, 66 50.3W. F R, 26ft. Skeleton tower.

**SOUTHWEST HEAD LIGHT**, on Gull Cliff, 44 36.0N, 66 54.3W. Fl W 10s, 156ft, 14M. White tower on white square building, 30ft. Horn: 1 blast every 60s, horn points 240°. Emergency light.

### SOUTHWEST OF GRAND MANAN

**Bull Rock Whistle Buoy XA1**, E side of rock, 44 30.3N, 66 56.4W. Fl G. Green, marked XA1.

**MACHIAS SEAL ISLAND LIGHT**, summit, 44 30.1N, 67 06.1W. Fl W 3s, 82ft, 17M. White octagonal tower, red top, 60ft. Horn: 2 blasts every 60s, horn points 270°. Emergency light.

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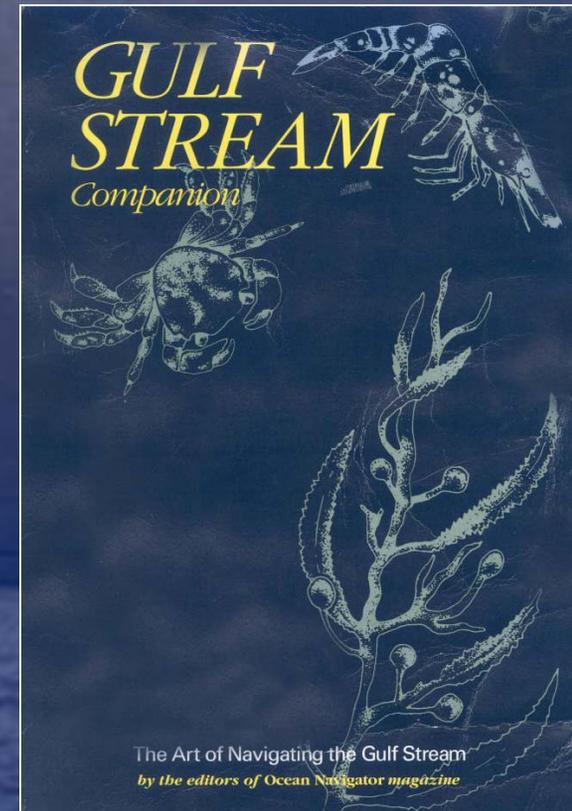
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# TIDES AND CURRENTS

## GULF STREAM COMPANION

-- *“The first challenge for the navigator is to hit the ‘knuckle’ where the loop starts to turn south. After that, it's a matter of knowing how to stay in the fastest part of a southbound meander...”*

Of course, the other challenge is not hitting an eddy – either cold or warm -  
- on the northbound side.



# TIDES AND CURRENTS

## GULF STREAM SATELLITE PHOTO



# TIDES AND CURRENTS

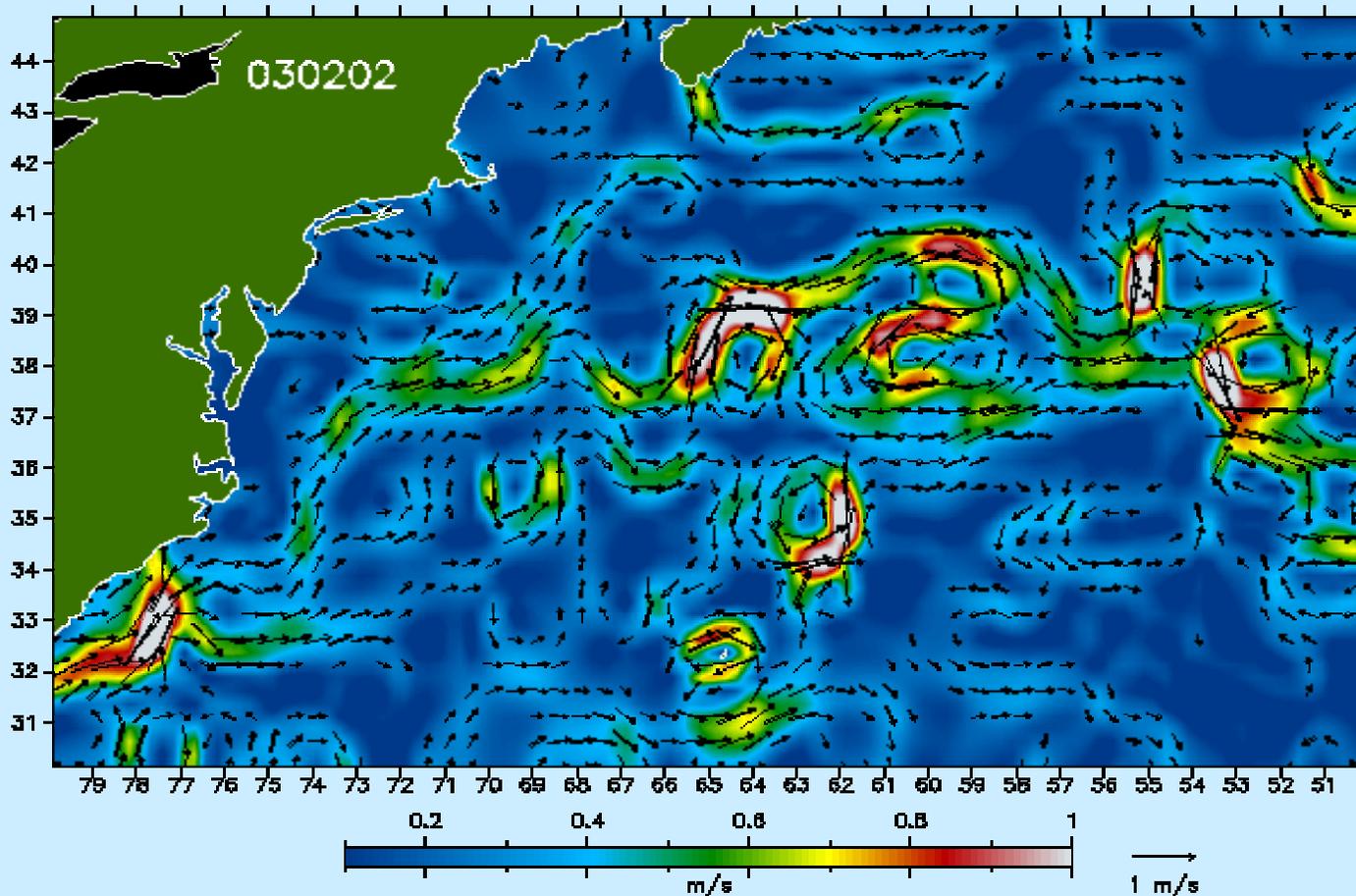
## The Gulf Stream is a special case.

For navigation, it is the direction and its condition that is significant. The Gulf Stream is more like weather than it is like other currents, since it changes constantly. These changes must be observed, “plotted”, and interpreted. There are web sites available to do this. To successfully race, observations and plots should begin 3 to 4 weeks prior to the race.

Check web site <<http://www.deos.tudelft.nl/altim/gulfstream/>> for current velocities.



# TIDES AND CURRENTS



# TIDES AND CURRENTS

## THE RETURN TRANSIT FROM BERMUDA

- ❑ Weather and seas determine routing via Chesapeake Bay or Delaware Bay
- ❑ Tides and currents will effect “timeline”



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

1. ACCOUNTABILITY

2. NAVIGATION PLANNING

3. WEATHER PLANNING

4. TIDES AND CURRENTS

5. DANGERS AND OBSTACLES



# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 5. DANGERS AND OBSTACLES

- ❑ “Cutting corners”
  - ❑ Cape May and Chesapeake Bay Bridge Tunnel





# WHY ARE THESE FACTORS IMPORTANT TO THE OIC?

## 5. DANGERS AND OBSTACLES

- Gulf Stream eddies
- Brazil Rock and Bay of Fundy tides



# DANGERS AND OBSTACLES

Situational awareness!



# DANGERS AND OBSTACLES

Remember what charts don't tell you...



# DANGERS AND OBSTACLES

Depth is related to wind and tides...



# DANGERS AND OBSTACLES

...which are also relative to times and currents...



# DANGERS AND OBSTACLES

...and the moon!



# DANGERS AND OBSTACLES

## The Risk Factor

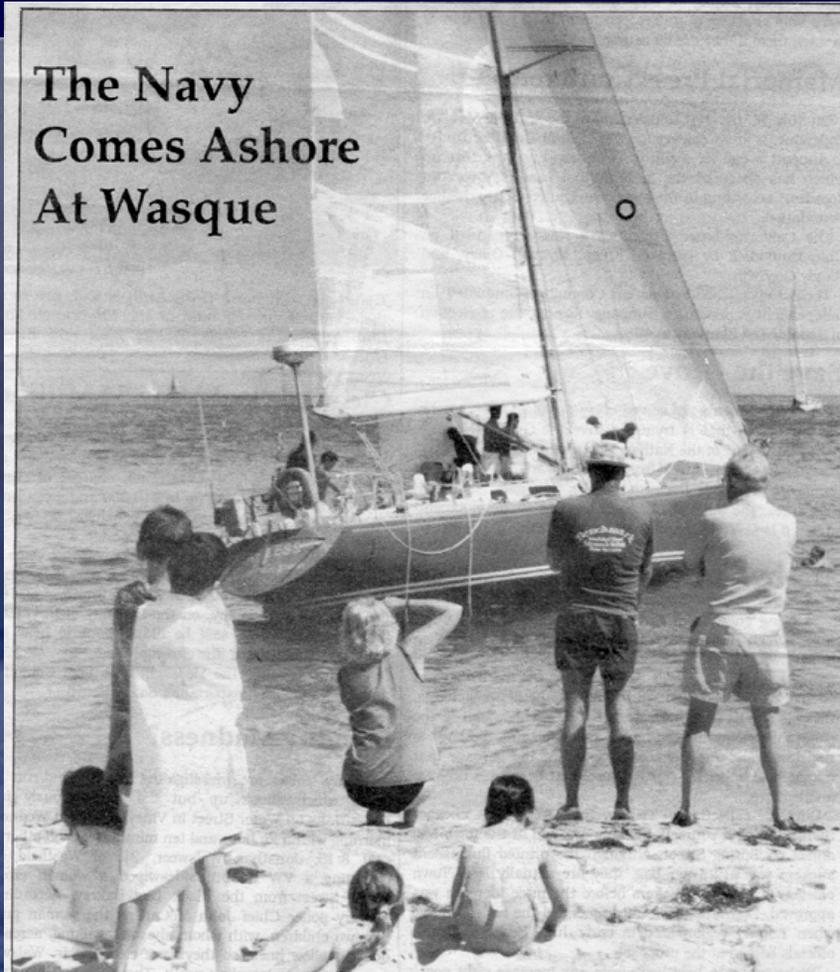
Bouncing off the soft ground during a tack in the Chesapeake Bay may be an acceptable risk during a race.

Taking the same risk – a “tack bounce” -- in the waters around the islands of Nova Scotia, Cape Cod, Nantucket, Martha’s Vineyard, Elizabeth, Block, and Fisher may not be an acceptable risk.



# DANGERS AND OBSTACLES

*Fearless* grounding close to shore during Edgartown Race Week in 1990 made front page of local newspaper.



The Navy Comes Ashore At Wasque

PHOTO BY NELSON SIGELMAN

*The sloop Fearless from the Naval Academy at Annapolis, racing in the Edgartown Regatta, ran aground on a sandbar off Wasque Point, and there it stuck. Whoops.*





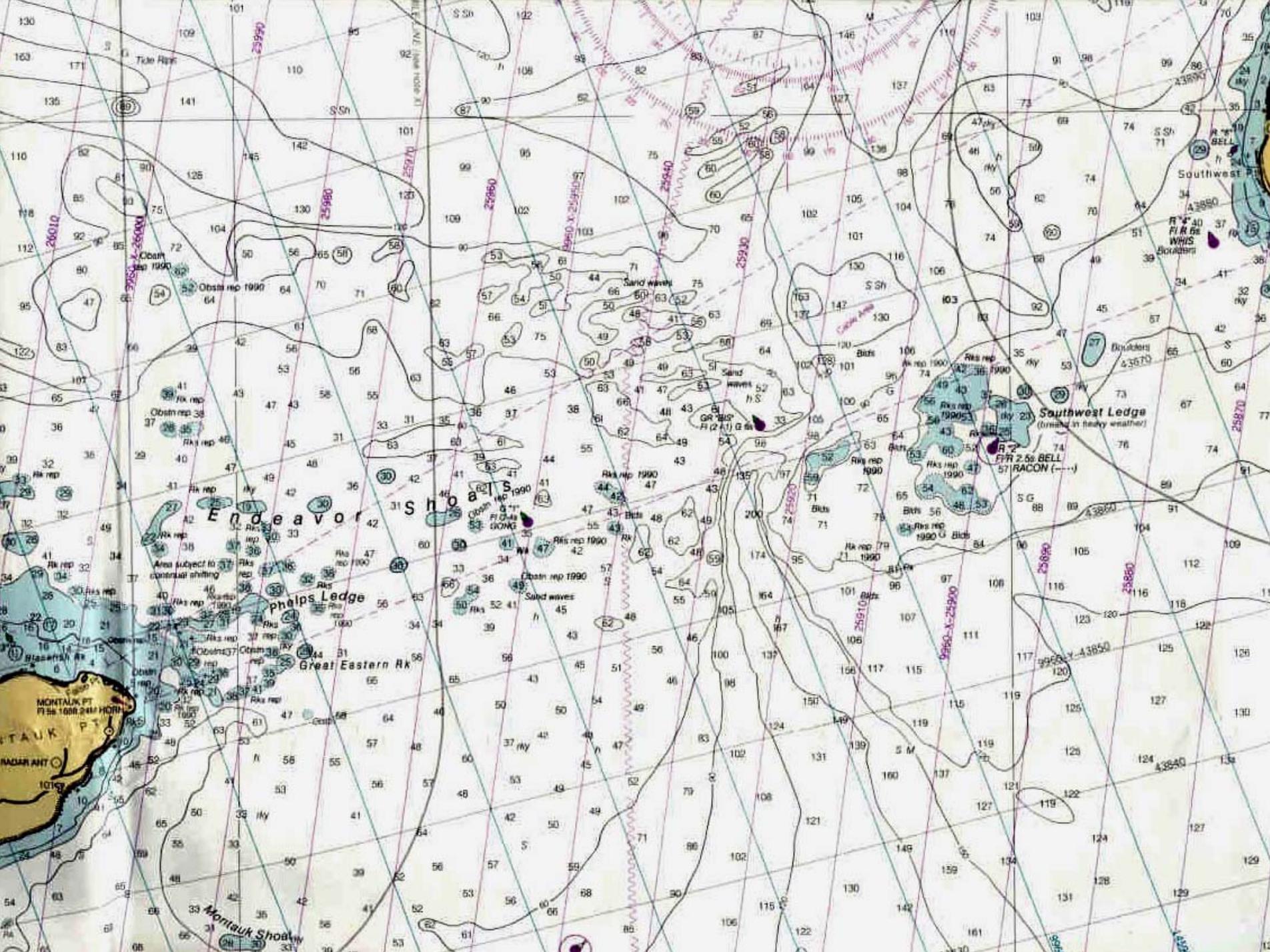
# DANGERS AND OBSTACLES

*“The areas around Cape Cod, Long Island, as well as the islands of Martha’s Vineyard and Block, were all originally the terminal moraines of the ice sheet in the last ice age. The mainland is rock and, although there are large stretches of sand, there are also many boulders, some boulders – the size of a 2-story building .”*

*“There are also sand shoals in these areas, especially in Nantucket and Vineyard Sound. Shoals that shift from year to year. It is, therefore, prudent to take the chart with a grain of salt and watch the Fathometer closely.”*

*-- Henry Morgan*





# DANGERS AND OBSTACLES

Nantucket Shoals is *“the general name of the numerous broken shoals southeastward of Nantucket Island – and one of the most dangerous parts of the Coast of the United States for the navigator”*

*-- Coast Pilot 2*



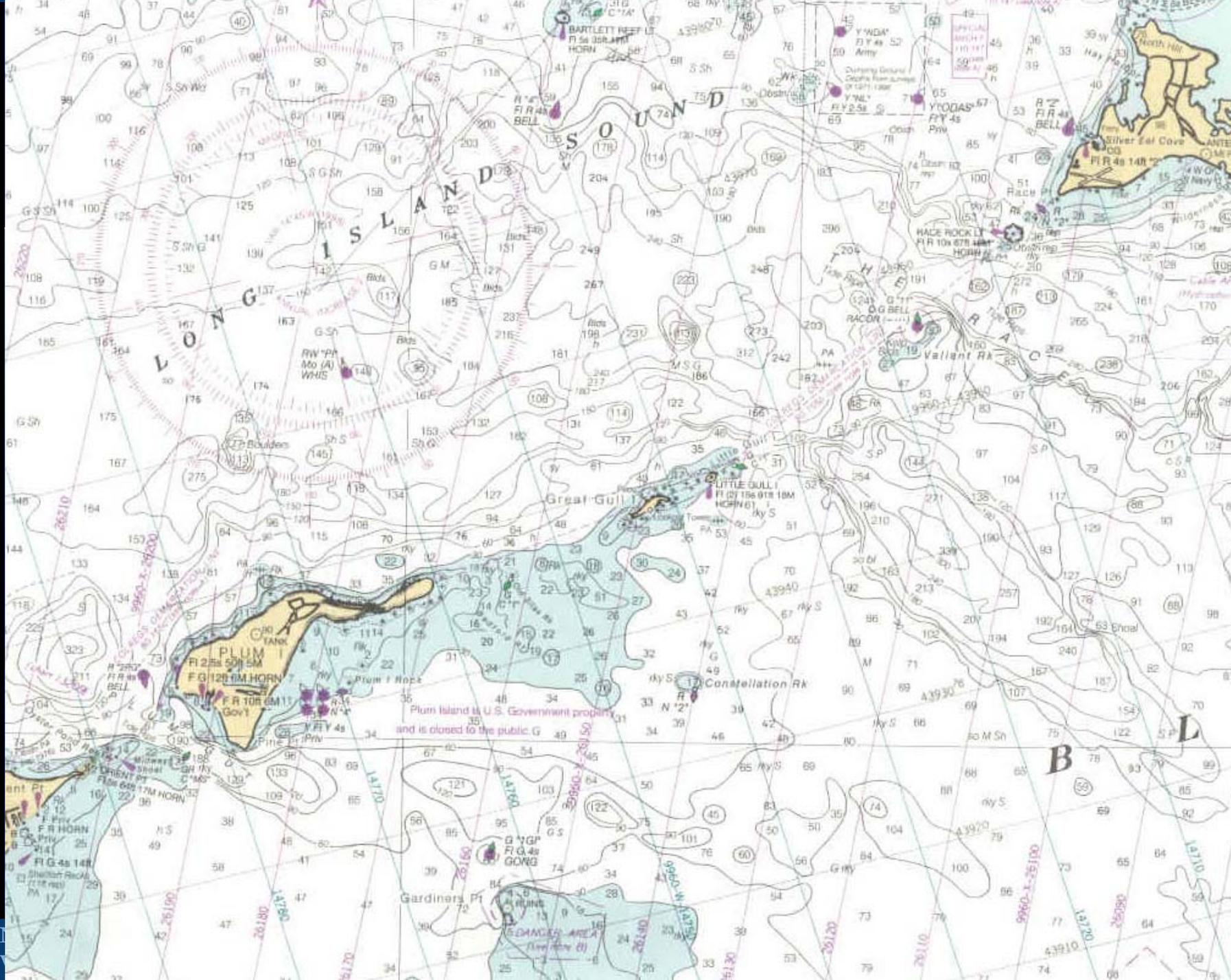
# DANGERS AND OBSTACLES

## Currents

- ❑ Range of tide (9 feet in western sound, 6 feet in Cape Cod) *“it’s more like a sluice compared to the Chesapeake”*
- ❑ *“Tidal current charts absolutely essential”*
- ❑ *“Timing of tide and current absolutely determine the decision of Plum Gut versus the Race”*

*– Henry Morgan*





Plum Island is U.S. Government property  
and is closed to the public. G

# DANGERS AND OBSTACLES

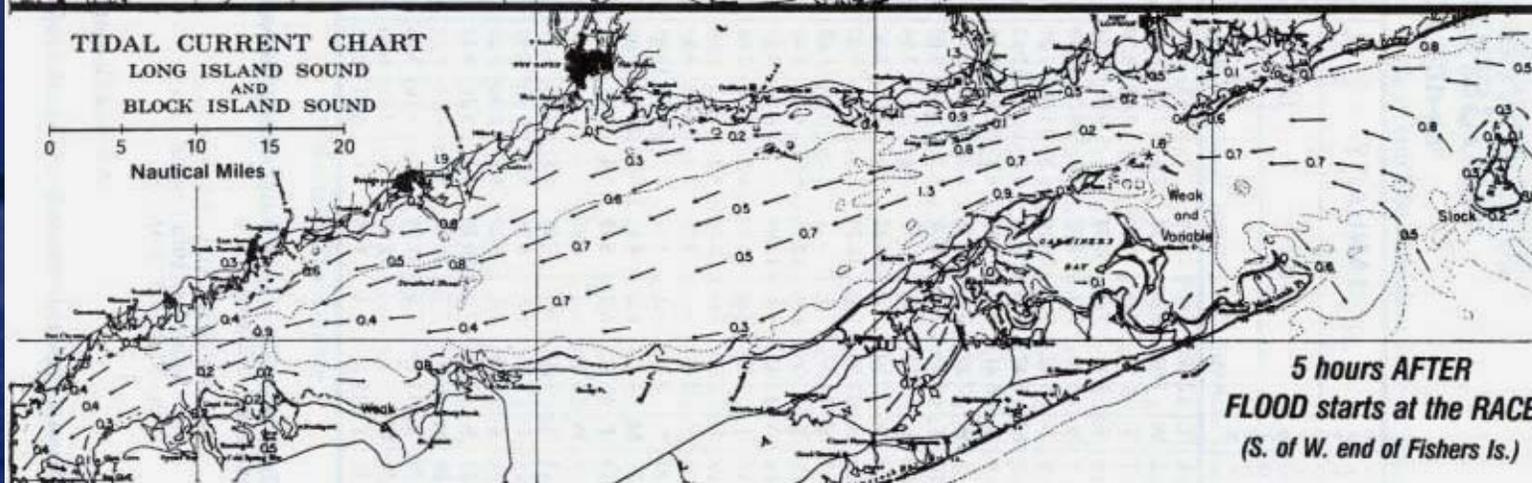
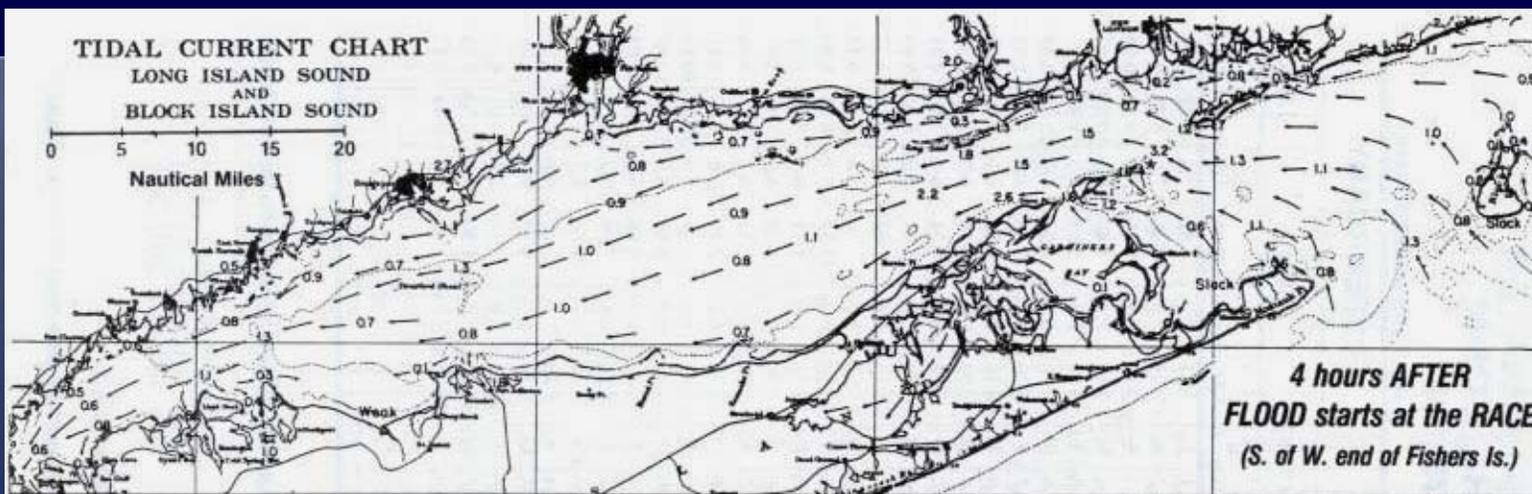
## AROUND LONG ISLAND RACE (ALIR)

- ❑ *Constant attention to your position and estimated location at current changes are key.*
- ❑ *Current changes first close to shores of Long Island; ebb starts at the “Race”.*
- ❑ *Current close to CT and NY shores starts East while mid-sound current still West.*

*--Alan Frank, Ernie Messer*

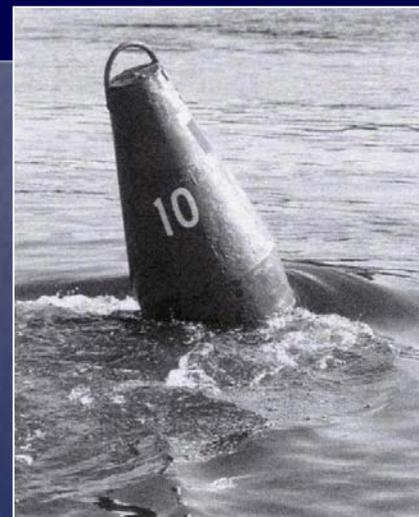


# DANGERS AND OBSTACLES



# DANGERS AND OBSTACLES

- ❑ A strong current can “set” you on a rock or buoy.
- ❑ In a long distance race, a 1/10-knot difference due to current can be the difference between winning and losing.



# DANGERS AND OBSTACLES

- ❑ In 2002 Corinthian 200 Race (187 nm), *Vigilant* took second place by 1 second on corrected time over third-place boat.
- ❑ In 2001 Annapolis-Newport Race (473 nm), *Flirt* won by 56 seconds on corrected time – approximately 0.12 sec/nm.



# DANGERS AND OBSTACLES

## REMINDERS

### DEPTH AND BOULDERS

- ❑ NE area is a terminal moraine -- in 1940, a 15-foot boulder was found 1 mile outside the location of an outer buoy (that outer buoy has since been moved)
- ❑ 10 years ago, the QE-2, with supposedly 15 feet under her keel, hit a boulder in Vineyard Sound



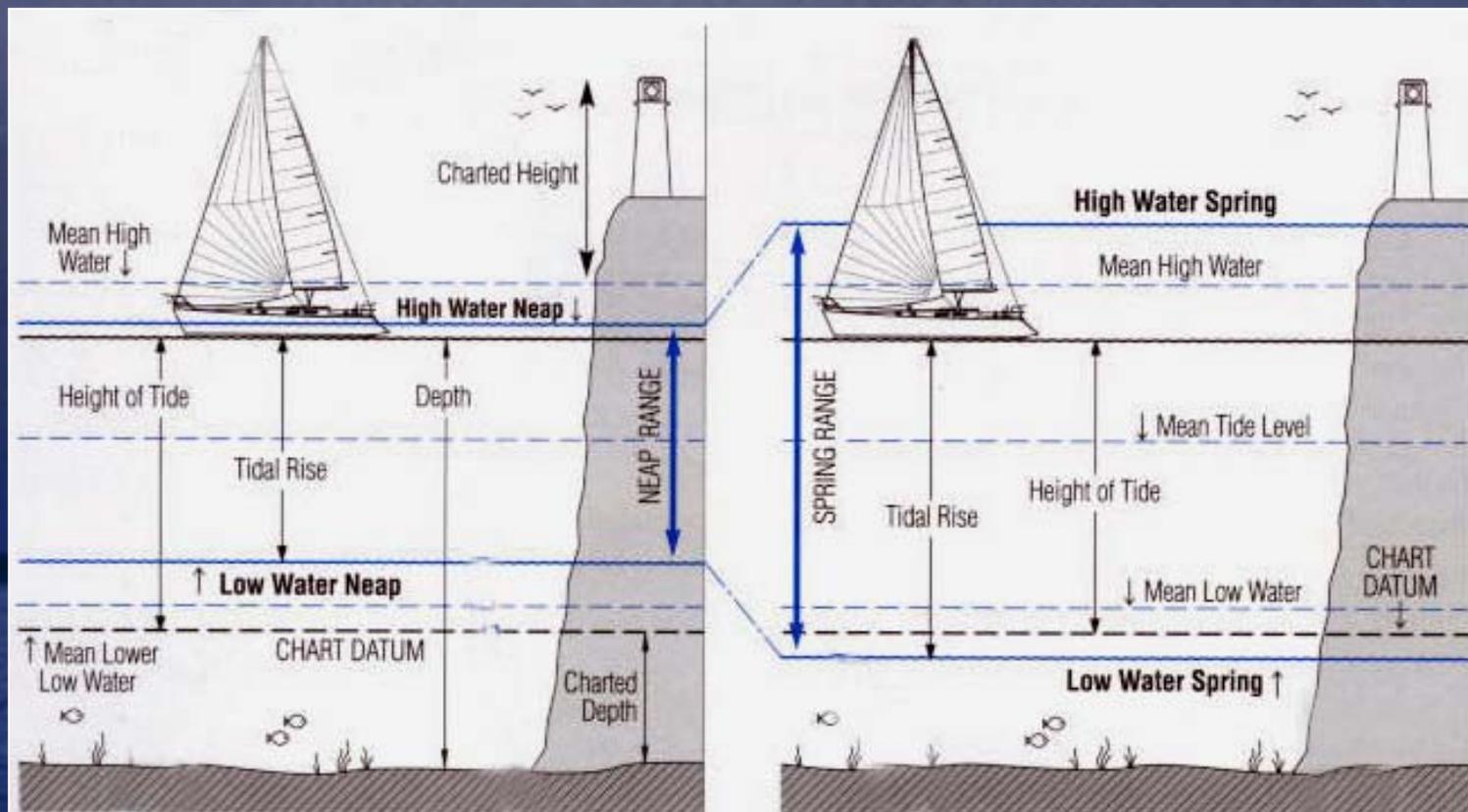
# DANGERS AND OBSTACLES

## *Situational Awareness*

- ❑ Be aware of **Spring Tides** – In a lunar month, highest tides occur at time of new moon and full moon (when gravitational forces of sun and moon are in line). These “spring” tides generally occur 1-2 days after the new and full moon (or, roughly, every 14 days).
- ❑ Highest of these “spring” tides occur during winter months of December, January, and February as well as summer months of June, July, and August.
- ❑ So, tidal ranges are usually greater than those noted in tide tables; consequently, there may be considerably less water than indicated.



# DANGERS AND OBSTACLES



# DANGERS AND OBSTACLES

- ❑ A prudent mariner will check for Spring Tides, occurring in June, July, and August in 2003.



# SUMMARY

As the OIC or Coach or Safety Officer, you are always

- ❑ responsible for the navigation, safety, and security of the STC and crew...



# SUMMARY

- ❑ and, as the one responsible for navigation, you are the one who must be situationally aware of the

SHIP'S POSITION  
and WHERE SHE IS HEADED,

the wind and weather conditions,

the tides and currents,

and dangers and obstacles.



# ADVICE FROM DNAS

Be sure the Midshipmen

*“Plan the sail...”*



# ADVICE FROM DNAS

*...and  
sail the plan.”*

*-- CAPT Harold J. Flammang, USN-Director of Naval Academy  
Sailing (2002)*



# A FINAL THOUGHT

REDUNDANCY

“No Hits”





*Photo by A. David*