At NIPWG4 in 2017 the development of the S-126 (physical environment) Product Specification was put on hold due to lack of resources and the fact that the S-126 dataset is not a SOLAS carriage requirement.

However, there were a few outstanding items from previous meetings (NIPWG3, ice related info and NIPWG4, gaps in listed S-126 items) that were completed as well as other S-126 related work

I asked in an email prior to the meeting for everyone to bring samples of their own SD/CP data and highlighters, so now would be the time to pull all of that out and follow along with me.

Think of what your data contains and how you see it and its use….

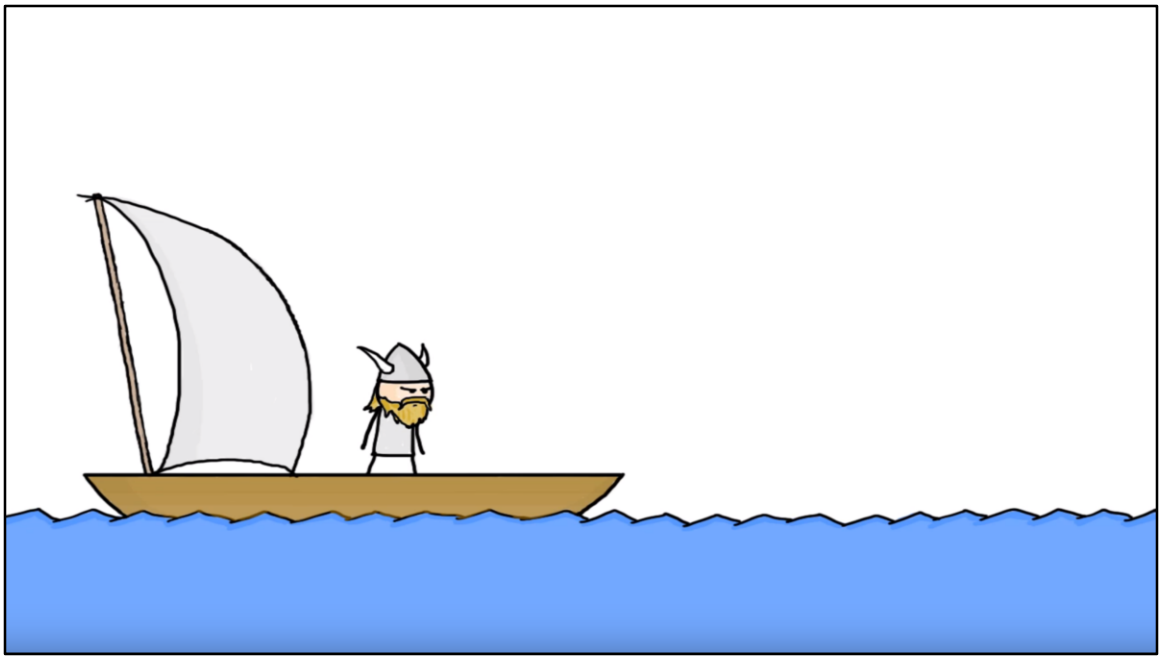
Discussion points

- How is the specific information going to be used by the mariner?
- What are use case scenarios for this type of information?
- What information is expected to be shown and how will this help the mariner make better situational decisions?
- Will this be used mostly for planning, underway, or both?
- Are there other data that is related to the specific physical environment information in order to make decisions? (What other factors are involved?)
- How are notifications for this physical data typically sent out? (If any)
- What other groups are modelling data related to this information and what type of information is it exactly?
  - How can any of our physical environment information supplement that other domain's information?

I was going to start off and get straight to the discussion points….at the end of the submitted paper, so we could just get straight to work.

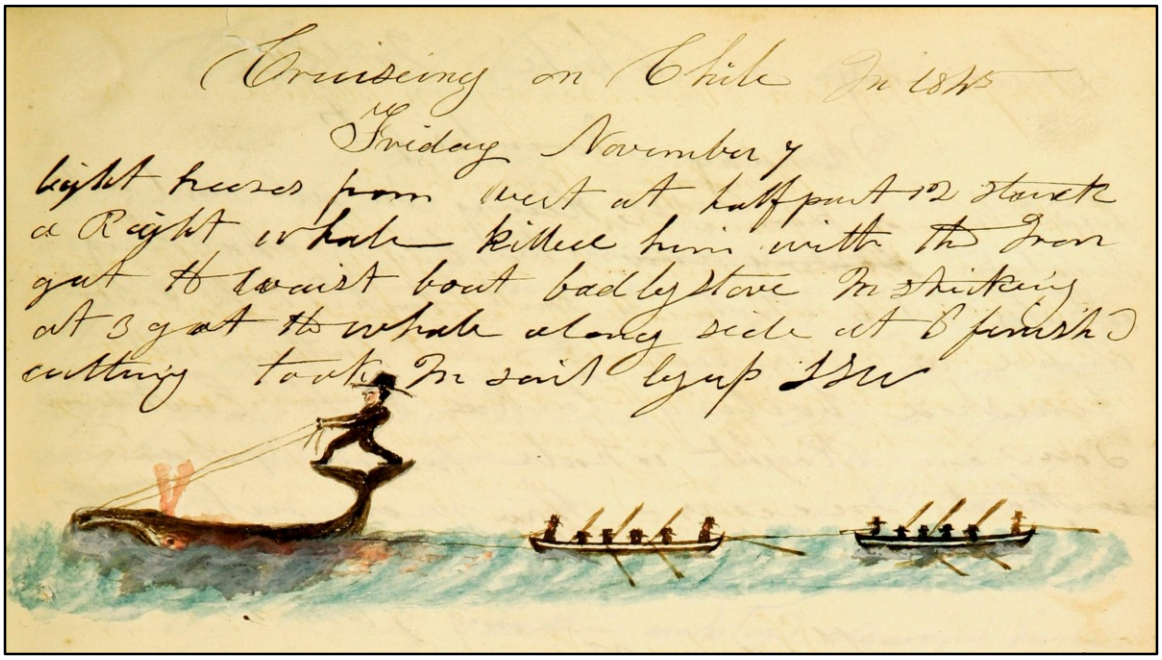
But then I realized it's no good to start like that…
We can't really make informed judgements without first being on the same page, understanding the same things….first you need to hear the whole story.
(and I've got some graphics to help keep you awake so we can ease into the nitty gritty details….)

So, here goes…
Once upon a time…



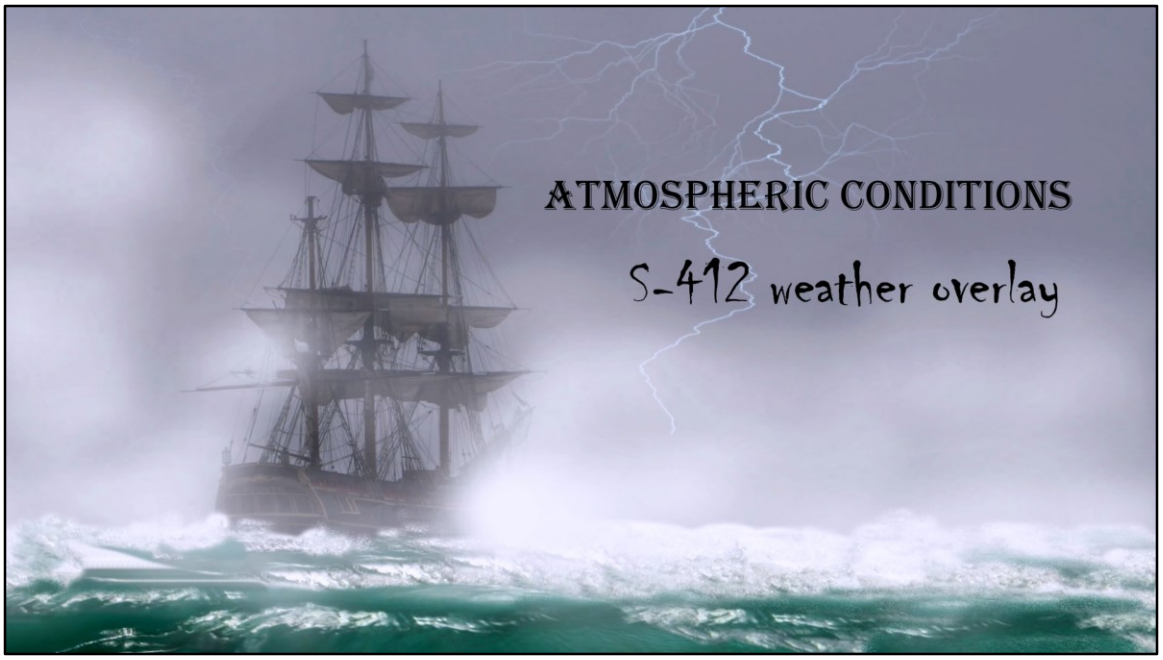
People began using water to journey from place to place.

As they did they experienced many things, some of which they hoped others would not have to.

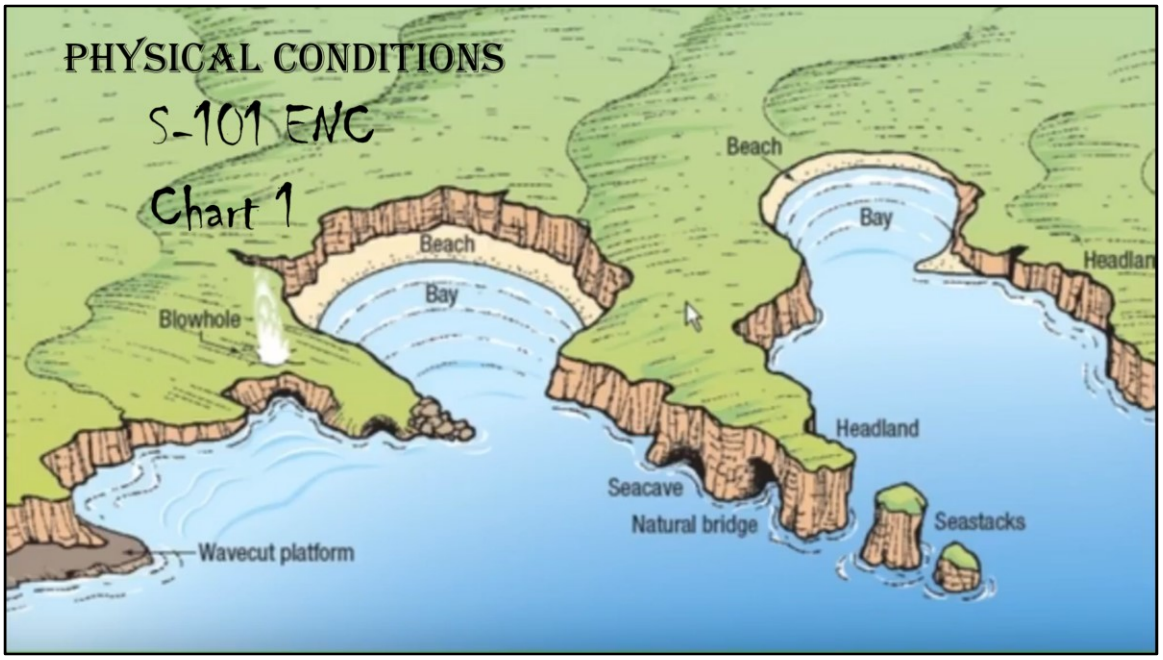


So, they wrote down all the things that were important so they could share them with others.

They wrote to not forget…
…as well as to be clear about what to expect.

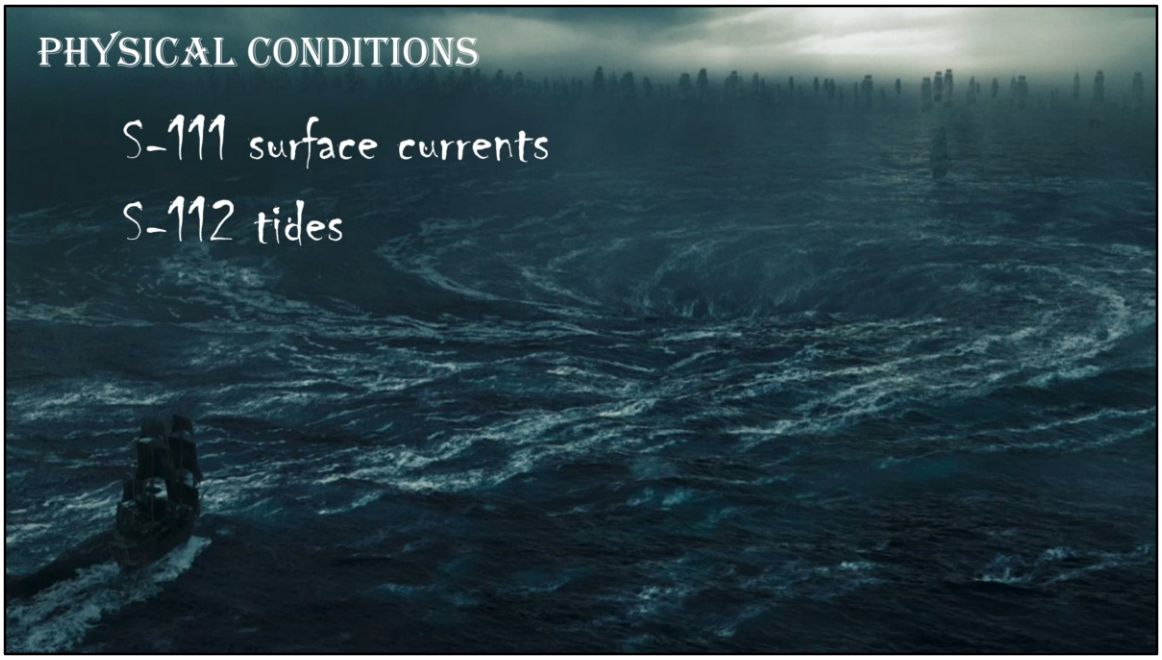


Some of these things came from looking up…
and noticing seasonal activity in the skies.



Others came from looking down and out…
describing markers along the path

…that would aid in safe passage and arrival,



as well as how the waters around you typically affected the ride.

And what obstacles to avoid.

In Plain English

(aka German-style)

Atmospheric conditions

- S-412 weather overlay

Land descriptions

- S-101 enc features
  - INT chart 1

Man-made Nav aids

- S-101/S-201

Sea descriptions

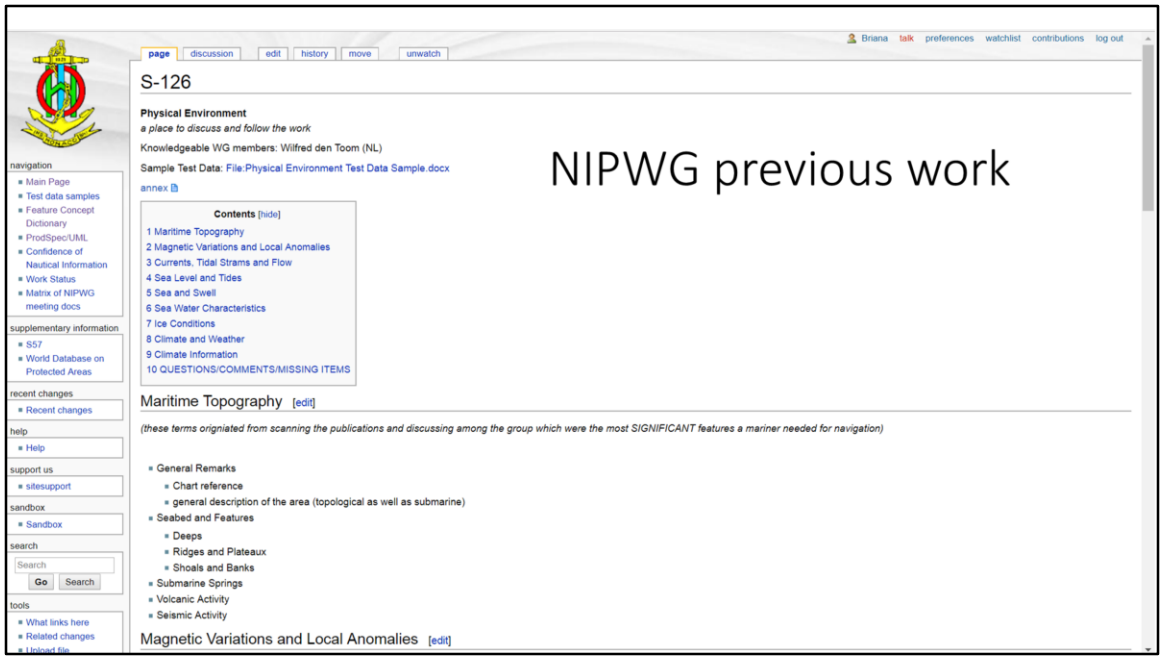
- S-111 surface currents
- S-112 tides
- S-411 ice information

Rules and regulations

So we see there are four basic areas of description that would contain different elements of information.

Oh and recently the US combined the Coast Pilot with related rules and regulations


Transition American style
To breakdown the components and start the real discussion



NIPWG previous work

(173)

Weather, Bar Harbor and vicinity

(174) Bar Harbor averages about two days each year with maximum temperatures in excess of 90 °F. July is the warmest month with an average high of 78 °F and an average minimum of 57 °F. January is the coolest month with an average high of 32 °F and an average minimum of 15 °F. The highest temperature on record for Bar Harbor is 101 °F recorded in August 1975 and the lowest temperature on record is -17 °F recorded in January 1981. About 141 days each year see temperatures below 32 °F. Every month has seen temperatures below 40 °F and every month except June, July and August has recorded temperatures below freezing.

(175) The average annual precipitation for Bar Harbor is 50.3 inches (1278 mm) with an annual maximum during early winter and a minimum during mid-summer. Precipitation falls on about 341 days each year. The wettest month is November with 5.9 inches (150 mm), and the driest, July, averages only 3.0 inches (76 mm). An average of 6 thunderstorm days occur each year with July and August being the most likely months. Snow falls on about 65 days each year and averages about 65 inches (1651 mm) each year. December through March each average greater than a foot (305 mm) per year while February averages 18 inches (457 mm). One-foot (305 mm) snowfalls in a 24-hour period have occurred in each month November through March. About 15 days each year have a snowfall total greater than 1.5 inches (38 mm), and snow has fallen in every month except June through September. Fog is present on average 53 days each year and is evenly distributed throughout the year with a slight maximum during mid-summer.

(176) (See Appendix B for **Bar Harbor climatological table**.)

(177)

Quarantine, customs, immigration and agricultural quarantine

(178) (See Chapter 3, Vessel Arrival Inspections, and Appendix A for addresses.)

(179) **Quarantine** is enforced in accordance with regulations of the U.S. Public Health Service. (See Public Health Service, Chapter 1.)

(180) Bar Harbor is a **customs port of entry.**

(181) The town **harbormaster** assigns moorings and maintains an office on the municipal pier.

(182) The large municipal pier, on the north shore of the town, has reported depths of 8 to 10 feet at the end. Diesel fuel by truck is available at the pier. Floats for yachts and commercial craft are on each side of the pier; water pier; marine supplies, provisions and bottled gas can be obtained in town. Charter and excursion boats operate from the municipal pier and the other wharves.

(183) There are no repair facilities in town, but boatyards at Hulls Cove and Sand Point have marine railways and make repairs.

(184) **Cromwell Cove**, westward of the end of the breakwater, is seldom used. A pier in ruins is on the south side of the cove.

(185) **Burnt Porcupine Island**, northeastward of Bar Harbor, is about 0.5 mile eastward of Sheep Porcupine Island. A deep clear channel to the upper part of Frenchman Bay is between the islands. A bell buoy is on the west side of the channel. **Ram Key** is between Burnt Porcupine and Long Porcupine Islands.

(186)

Chart 13318

(187) Another deep channel to the upper part of Frenchman Bay is between **Long Porcupine Island** (44°24.4'N., 68°09.8'W.), 0.4 mile east of Burnt Porcupine Island, and Ironbound Island. **The Hop** is off the northeast side of Long Porcupine Island.

(188) The southeast shore of Mount Desert Island between Bar Harbor and Seal Harbor (44°17.5'N., 68°14.5'W.) is rocky and precipitous. Several dangers are off the shore, but the most dangerous either show above water or are marked by buoys.

(189) **The Thrumcap**, 1.4 miles southward of Bald Porcupine Island, is a round, rocky island with a clump of trees in its center. It is reported that there are downdraft wind currents around Thrumcap Island, and, accordingly, small sailboats should keep offshore.

(190)

Caution

(191) An 8-foot spot is 0.2 miles north-northwest from The Thrumcap. It is unmarked and has been struck by several yachts navigating along the coast at this point.

(192) **Newport Ledge** is 400 yards from shore, midway between The Thrumcap and Schooner Head. The ledge uncovers at extreme low water; a buoy is on its eastern side. The bottom west of the ledge is broken and should not be crossed by vessels.

(193) **Schooner Head** (44°20.7'N., 68°10.6'W.), 1.2 miles south of The Thrumcap, and **Great Head,** 0.9 mile farther southward, are prominent rocky headlands on the eastern side of Mount Desert Island. On the summit of the eastern hill at Great Head, the ruins of a small round flat-topped stone building are conspicuous. Numerous boulders lie awash between the two headlands.

Coast Pilot/SD Headers

Natural Features C

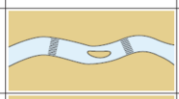
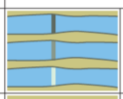
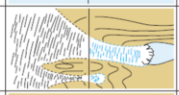
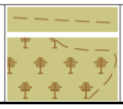
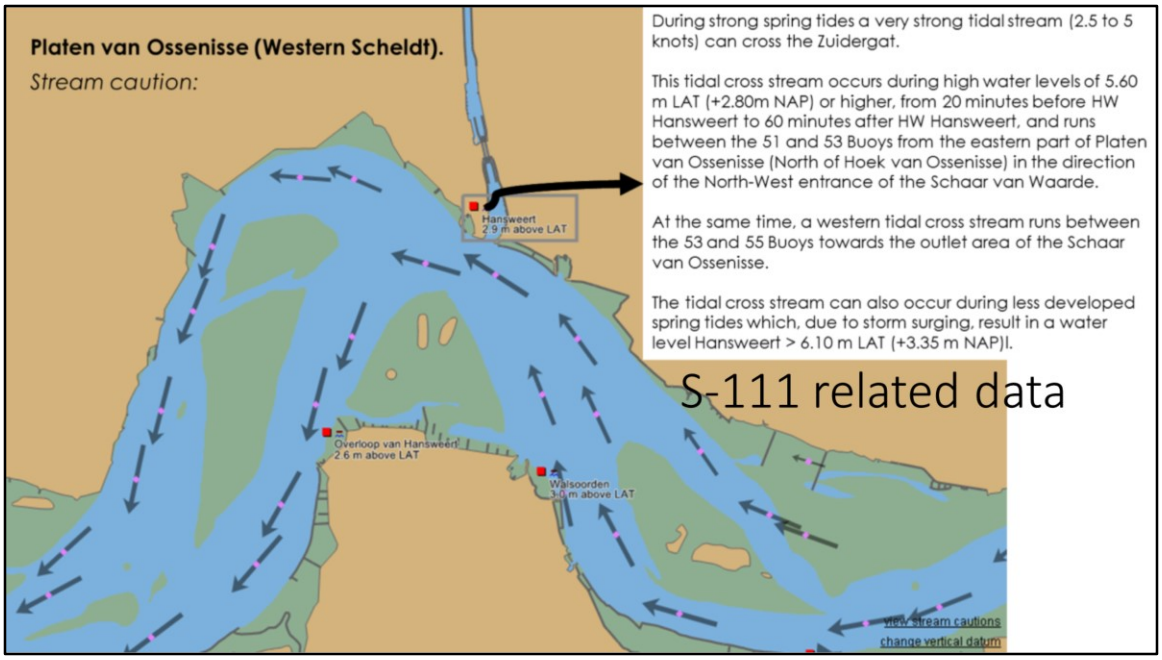
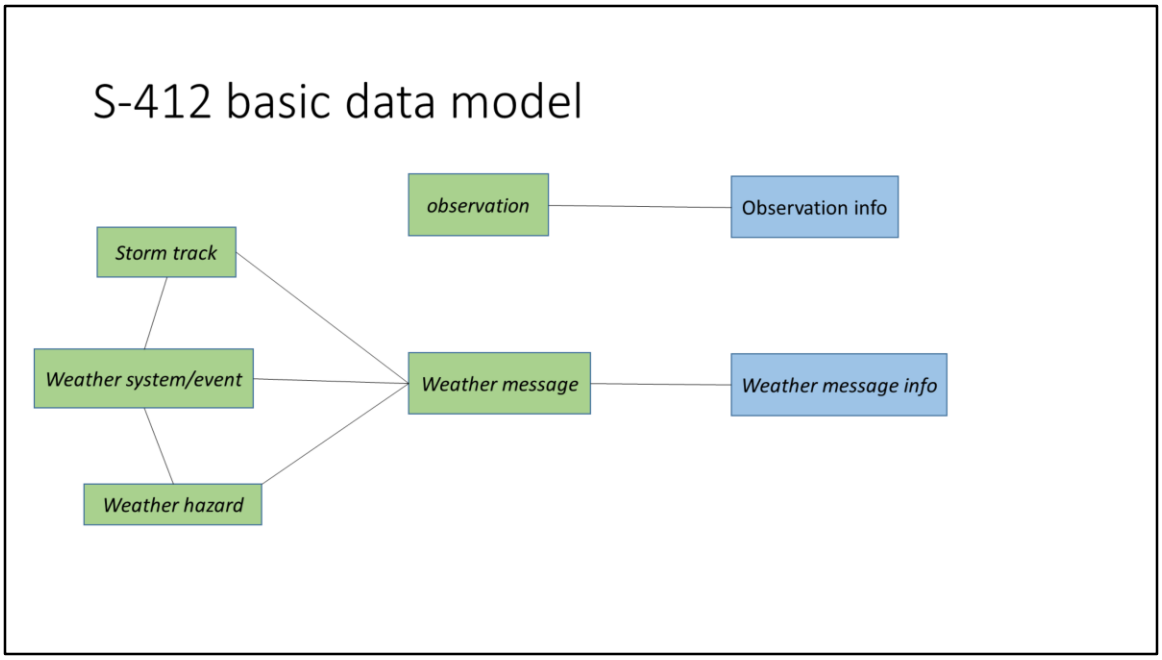
No.	INT	Description	NOAA	NGA	Other NGA	ECDIS
22		Rapids, Waterfalls				 Rapids Waterfall Waterfall, visually conspicuous
23		Lakes				 Lake
24		Salt pans				
25		Glacier				 Continuous pattern for an ice area (glacier, etc.)
26		Lava flow	 †			
Vegetation						Supplementary national symbols: i–t
30		Woods in general	 †			 Line of trees Wooded area

Chart 1 descriptions


Platen van Ossenisse (Western Scheldt).
Stream caution:
During strong spring tides a very strong tidal stream (2.5 to 5 knots) can cross the Zuidergat.
This tidal cross stream occurs during high water levels of 5.60 m LAT (+2.80m NAP) or higher, from 20 minutes before HW Hansweert to 60 minutes after HW Hansweert, and runs between the 51 and 53 Buoys from the eastern part of Platen van Ossenisse (North of Hoek van Ossenisse) in the direction of the North-West entrance of the Schaar van Waarde.
At the same time, a western tidal cross stream runs between the 53 and 55 Buoys towards the outlet area of the Schaar van Ossenisse.
The tidal cross stream can also occur during less developed spring tides which, due to storm surging, result in a water level Hansweert > 6.10 m LAT (+3.35 m NAP)I.
Hansweert
2.9 m above LAT
Overloop van Hansweert
2.6 m above LAT
Walsoorden
3.0 m above LAT
view stream cautions
change vertical datum
S-111 related data

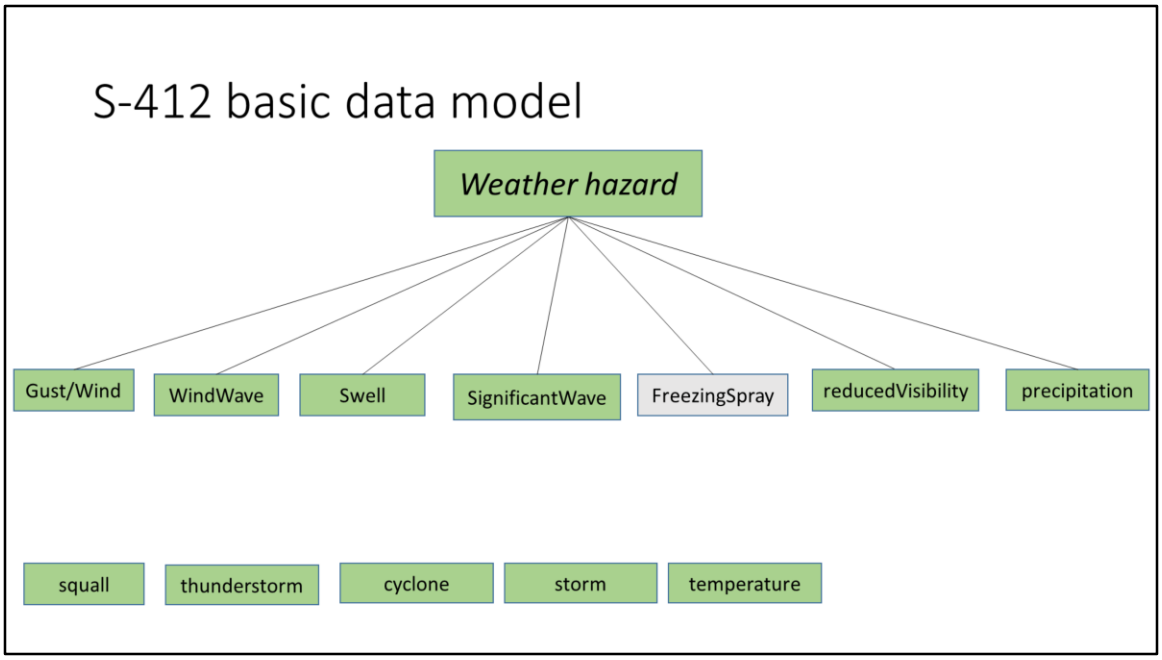


Recently the S-412 group released their latest version of the weather overlay data model.
This is still in development so it is a good time to compare our data with theirs to see how it might work together.

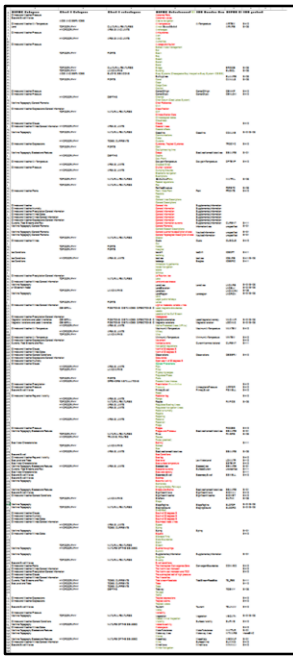
Because having foresight will help with our future hindsight…..

This is the very basic data model as it relates to the S-126.
The green items are S-412 abstract feature objects and the blue items are S-412 information objects.

Where the overlap applies most is …



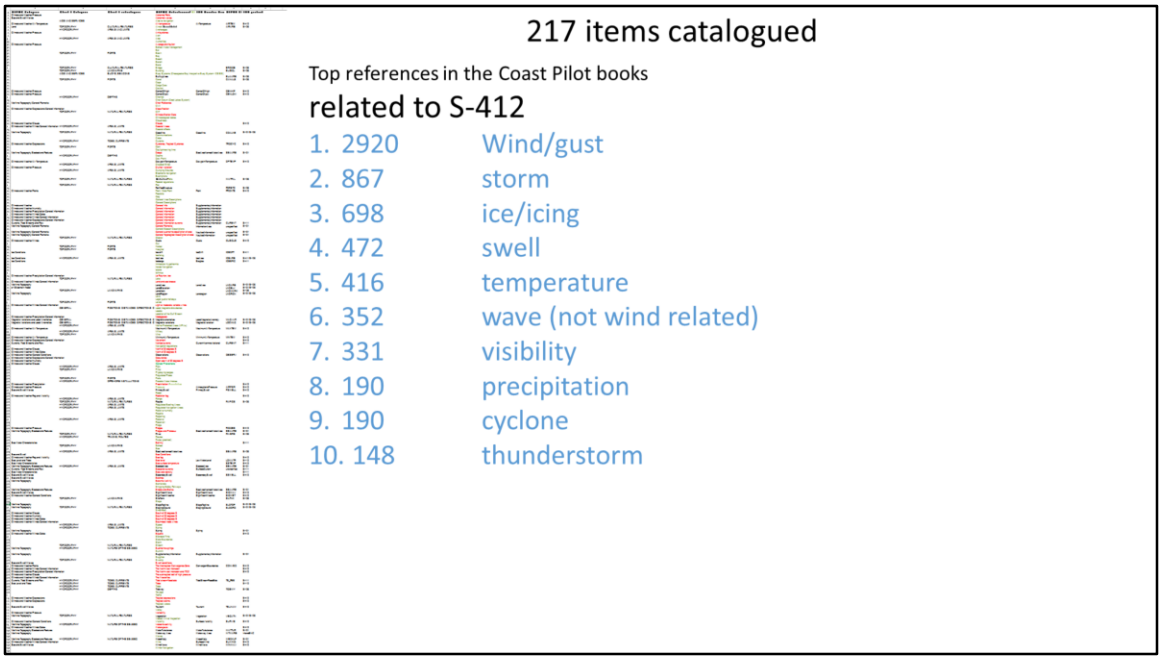
Within the “weather hazards” where the mariner is directly affected.



217 items catalogued

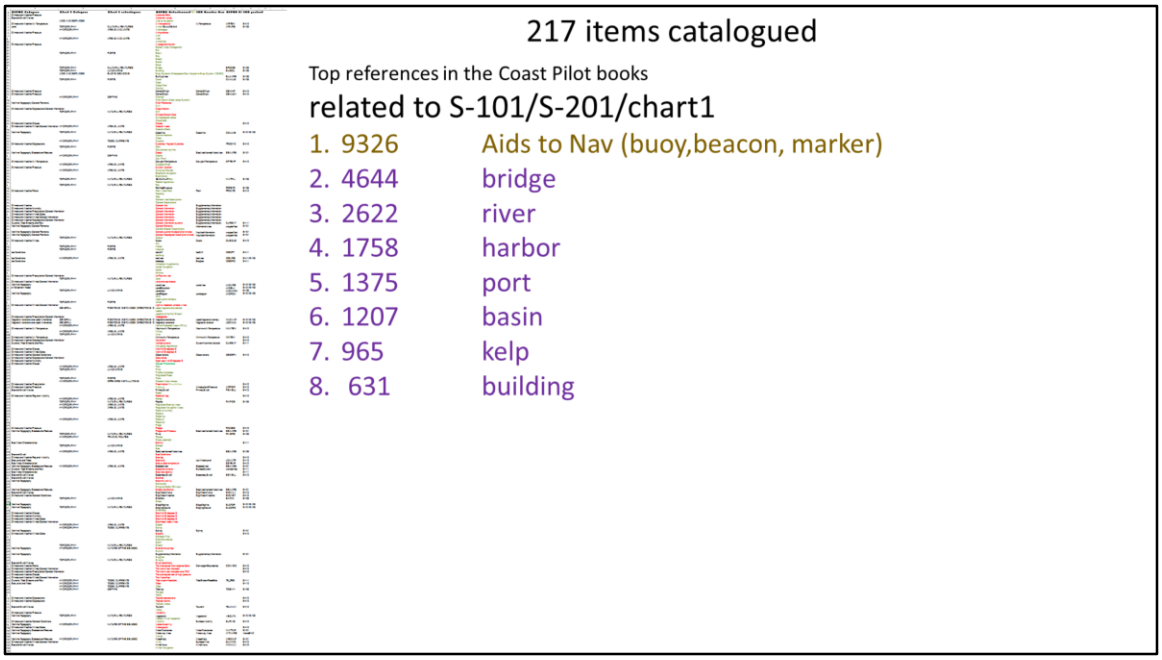
Sources:
(NIPWG wiki previous work)

Related S-101 ENC features
Related S-412 features
Coast Pilot terms/topics
Int Chart 1



Stats from word frequency within the coast pilot books

Related to the weather hazard feature:
622 gust, 2298 wind
10 wind wave
472 swell
352 wave (not wind wave)
0 spray
331 Visibility
190 precipitation
--
72 squall
148 Thunderstorm
190 cyclone
867 storm
416 temperature



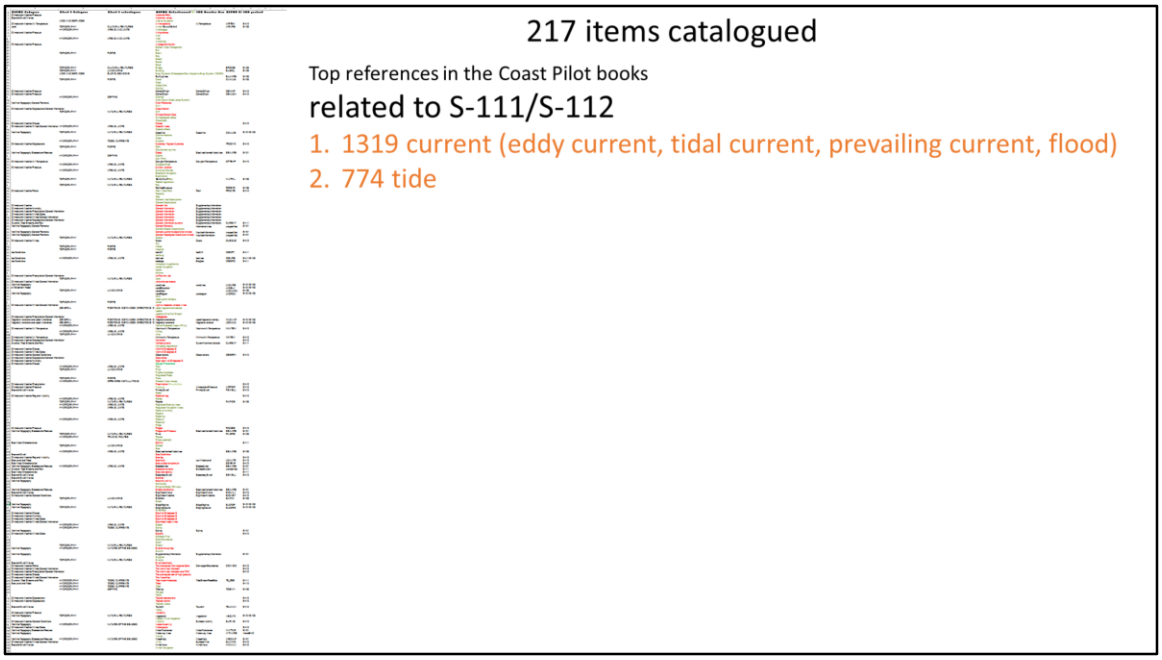
Stats from word frequency within the coast pilot books

Related to the descriptions of the environment and of various types of nav-aids:
179 aids to navigation/29 aid to nav = TOTAL 4823
- 3277 buoy
- 1217 beacon
- 121 marker

Topography = TOTAL 4780
- cultural features
  - 4644 bridge
  - 136 airport/32 airfield
- landmarks = TOTAL 1115
  - 631 building
  - 359 landmark
    - 73 school
    - 19 mine
    - 19 pillar
    - 14 silo
- natural features = TOTAL 6334

2622 river
621 lake
594 cliff
484 stream (not air or jet stream)
111 coastline
98 waterfall
(flat? Too hard to tell)
98 glacier
44 rapids
71 vegetation -> 965 kelp -> 6 seaweed
26 swamp

ports = TOTAL 11,564
1758 harbor
1375 port
1207 basin
485 canal
416 lock (this wasn't in original list)
109 dam
62 hospital
14 levee



Stats from word frequency within the coast pilot books

Related to the descriptions of the effect the water has on navigation

774 tide
1319 current (eddy current, tidal current)
567 flood tide/ 422 flood current
462 ebb

Ranking of object use

1. 9326	AtoN (buoy,beacon, etc)
2. 4644	bridge
3. 2920	Wind/gust
4. 2622	river
5. 1758	harbor
6. 1375	port
7. 1319	current
8. 1207	basin
9. 965	kelp
10. 867	storm

1. 631	building
2. 774	tide
3. 698	ice/icing
4. 472	swell
5. 416	temperature
6. 352	wave
7. 331	visibility
8. 190	precipitation
9. 190	cyclone
10. 148	thunderstorm

How to use the data - use cases

1. 9326	AtoN (buoy,beacon, etc)
2. 4644	bridge
3. 2622	river
4. 1758	harbor
5. 1375	port
6. 1207	basin
7. 965	kelp
8. 631	building
9. 1319	current
10. 774	tide

1. 2920	Wind/gust
2. 867	storm
3. 698	ice/icing
4. 472	swell
5. 416	temperature
6. 352	wave
7. 331	visibility
8. 190	precipitation
9. 190	cyclone
10. 148	thunderstorm

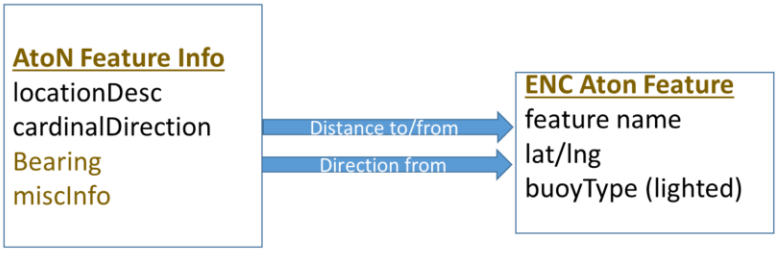
aids to navigation - Data Samples

- Vessels then proceed along the Recommended Route to Frenchman Bay Lighted Buoy FB. (CP)
- The pilots will board arriving vessels 3 miles seaward of Frenchman Bay Lighted Buoy FB, along the recommended route, in about 44°18'06"N., 68°04'00"W. (eastern approach) and 44°16'06"N., 68°07'48"W. (southern approach). (CP)
- Anchorage can be found according to draft anywhere in the outer harbor, and in soft bottom in the entrance to the inner harbor about 200 yards northward of a line between **Clark Ledges Daybeacon 5** and the end of the cannery wharf on **Clark Point**. (CP)
- A 5.5m shoal lies offshore about 1.3 miles W of the beacon on Entrance Island, and another 5.5m patch lies 1 mile WSW of the beacon. (SD)
- Three range beacons stand close SW of Grave Point. In line bearing 225°, astern, the beacons lead through Old Ferolle Harbor. These beacons should not be depended upon. A flag-staff stands close SE of the center range beacon. *(??? Shouldn't the beacons be moved then ???)*

In light of yesterdays S-127 discussion it dawned on me that these descriptions in the CP/SD are very related to traffic management topics. (pilot boarding, routes, etc)
It seems we

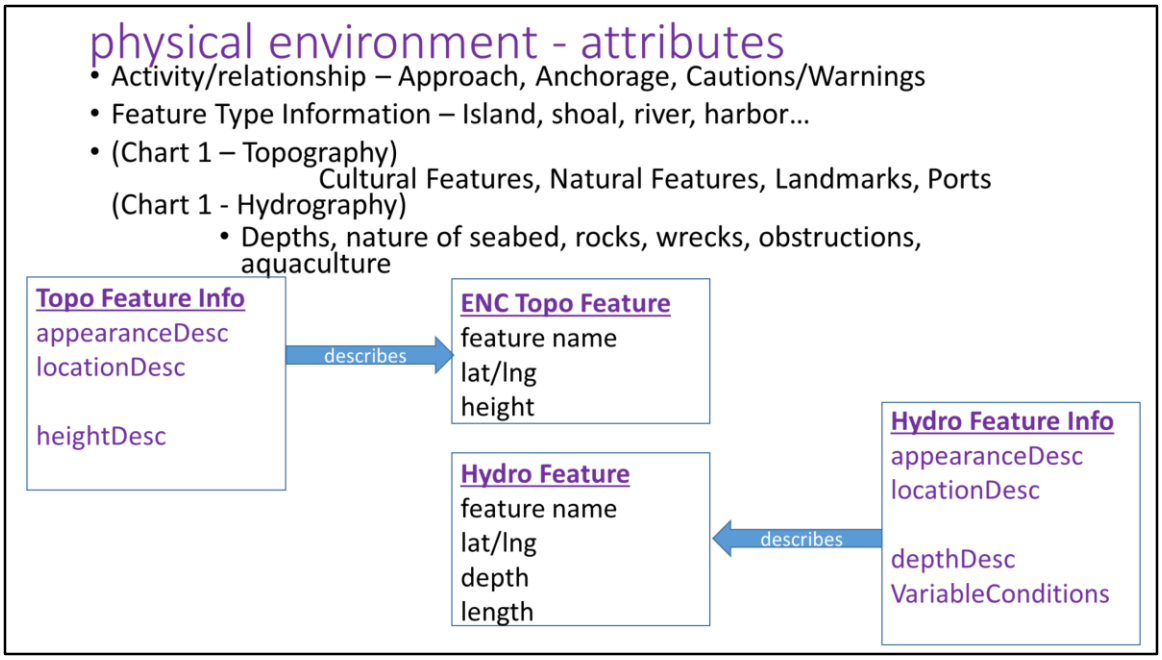
aids to navigation - attributes

- Activity/relationship – Routing, Pilot Boarding (S-127?)
- Feature Type – NavAid (Lighted Buoy FB.)



physical environment - Data Samples

- Wastikun Island is the most conspicuous landmark in the vicinity. When approaching Fort George, the island appears as a black crater formation from seaward. (SD)
- **15.55 South Twin Island** (53°06'N., 79°54'W.), 5.5 miles SSE of North Twin Island, rises gradually to a height of 42m. It is not a good radar target. (SD)
- **Caution.**—A shoal, awash, was sighted by helicopter 11 miles ENE of South Twin Island. The position and extent of this shoal has not been determined and the area should be avoided. (SD)
- **15.53** The **Grande Riviere** (53°50'N., 79°04'W.), one of the largest rivers flowing into James Bay, forms a large delta between its mouth and Fort George Anchorage. A depth of 3m can be carried up the river at HW for about 5 miles. The best channel lies close off the N side of the river. Silting and erosion is constantly changing the channels and depths in the river and delta. The river bottom is generally gravel or sand, but boulders may be encountered

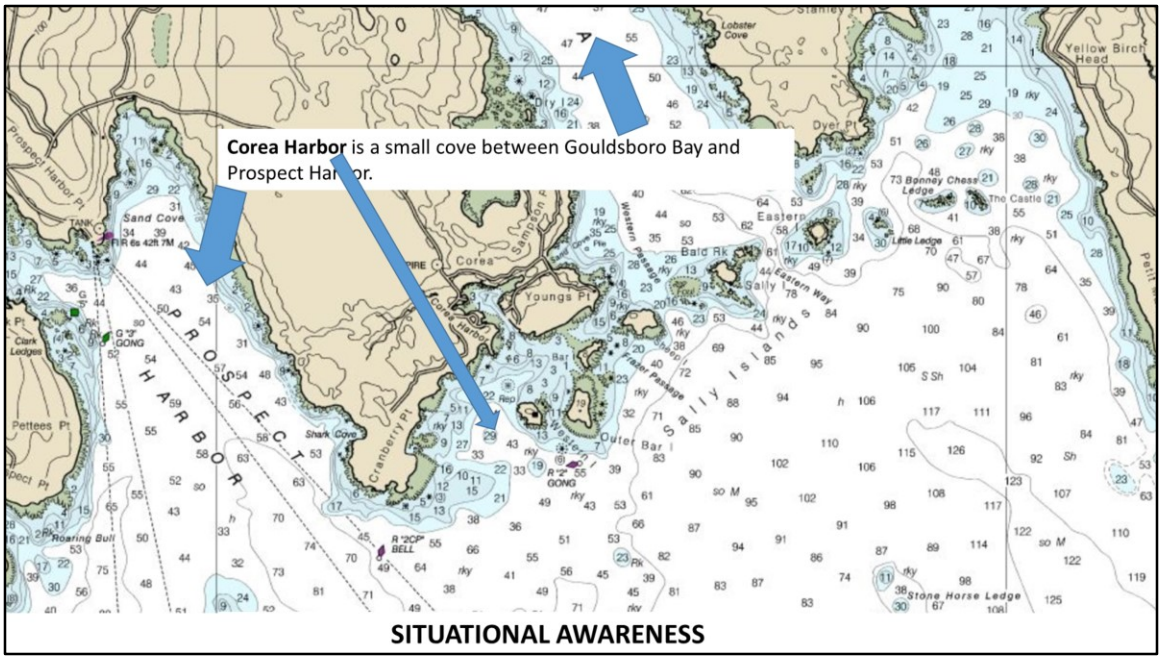


These could be complex attributes that could break down the specific components for the description:

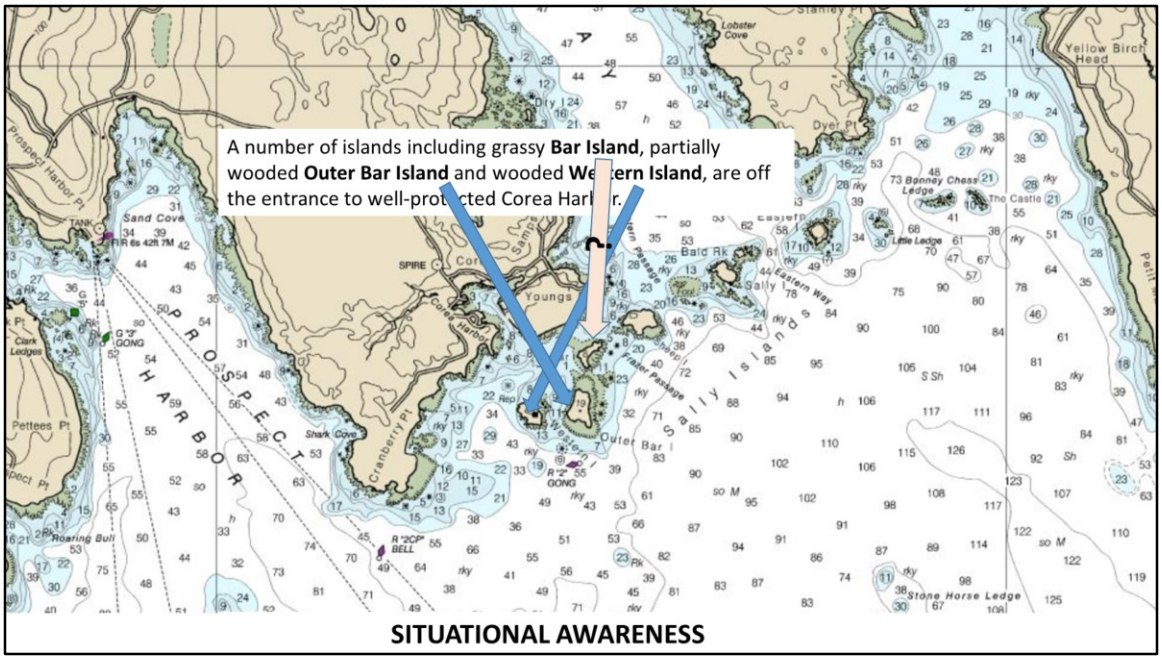
physical environment – Example of use

- **Corea Harbor** is a small cove between Gouldsboro Bay and Prospect Harbor. A number of islands including grassy **Bar Island**, partially wooded **Outer Bar Island** and wooded **Western Island**, are off the entrance to well-protected Corea Harbor. A rock that uncovers 6 feet about 300 yards southeast of Western Island is marked on the southeast side by a gong buoy. An unmarked rock, covered 23 feet, is 0.7 mile southeast of Western Island. **Corea** is a small village at the head of the harbor. The principal industries are fishing and lobstering. The most prominent objects are a church spire and a group of houses at the head of the harbor and a gray cottage with red roof on Western Island, which are visible for a considerable distance offshore. (CP)

U.S. Coast Pilot 1, Chapter 6 - chart **13324**



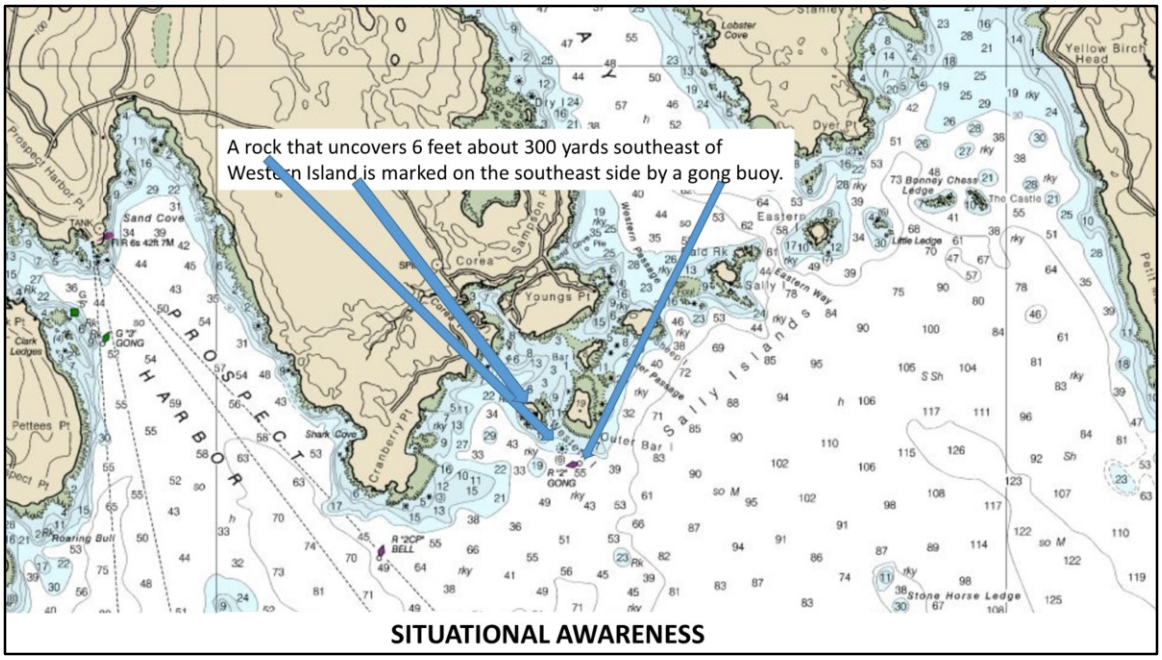
The picture says all these words,
but it helps to have them identified while reading for better situational awareness to get familiar with the area.
But why and when would we need this information?



SITUATIONAL AWARENESS

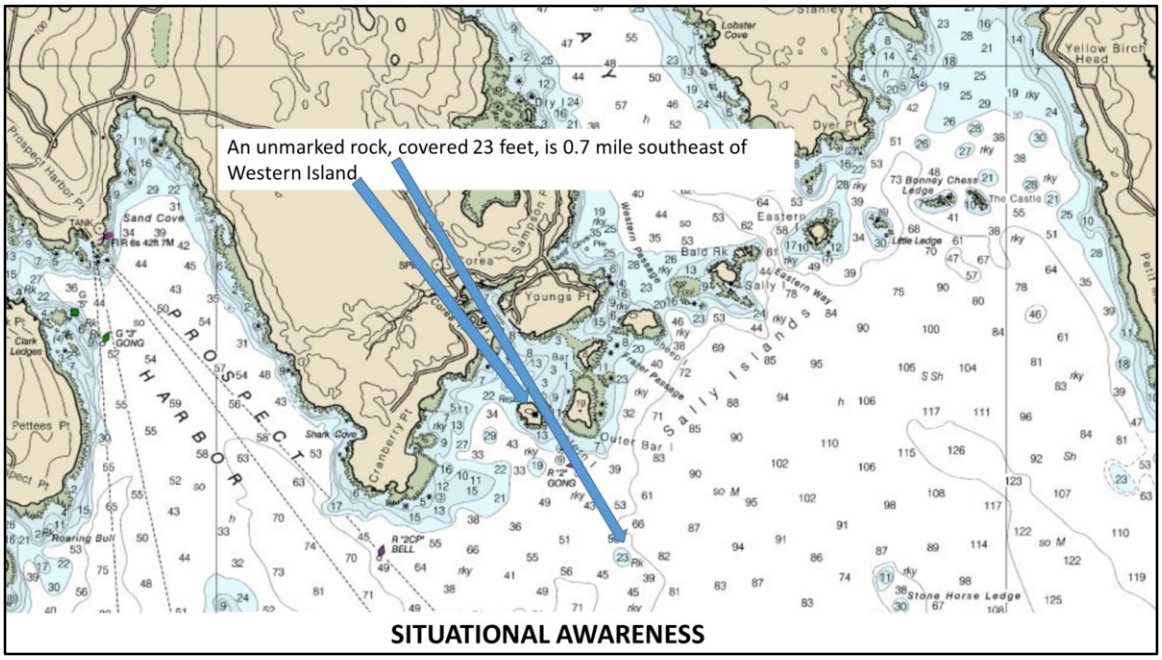
Bar Island the name is NOT listed on the map….if this feature was attached to the ENC features it would actually help the mariner identify the landmasses that are not labeled on the chart due to space constraints.

Also, I now know for sure that one is grassy and the other two are wooded for possible planning purposes.

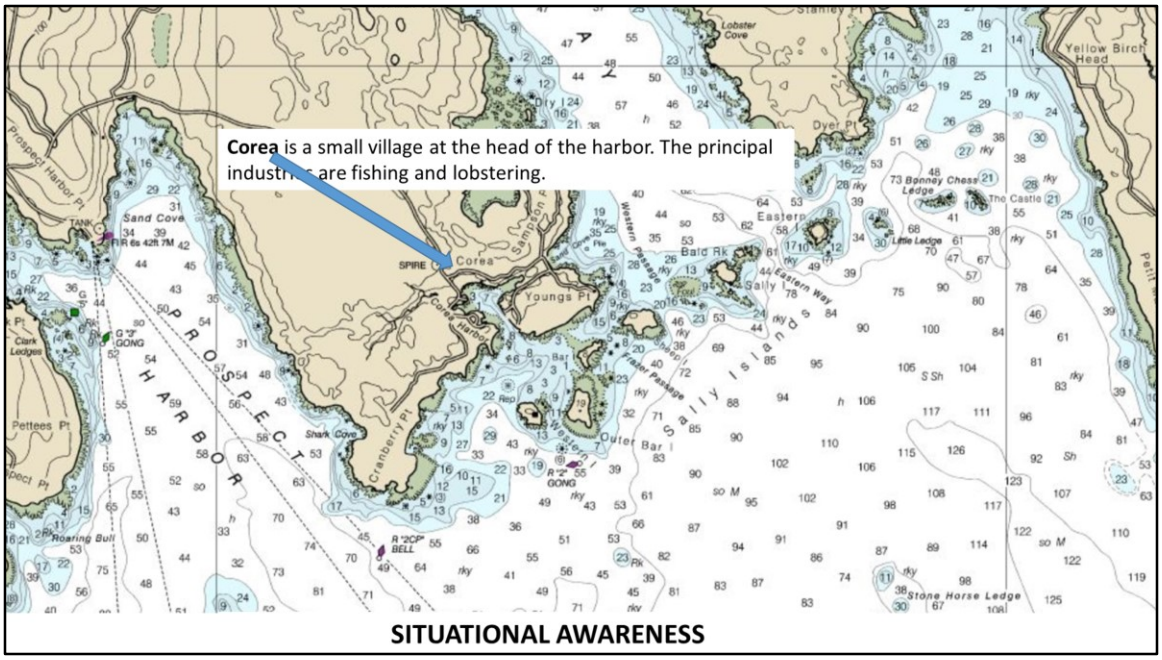


SITUATIONAL AWARENESS

Understanding why the gong buoy was placed in this location.
Verifying the location of a hazard

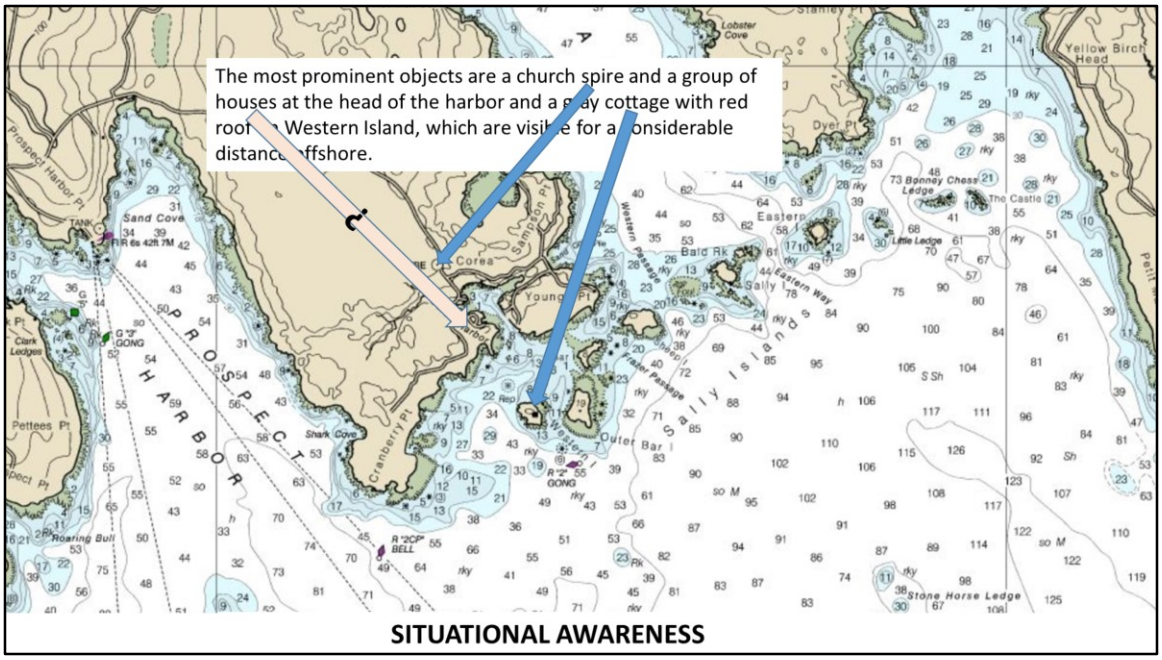


This one could be reduced to a warning while planning the mission to call your attention to a hazard…but doesn't really need to be shown if not transiting the area.



SITUATIONAL AWARENESS

Now this could be an info box linked to Wikipedia info to tell more about the village.



SITUATIONAL AWARENESS

This one helps on the approach to the harbor…describing prominent objects for dead reckoning.

The chart shows the symbol for the cottage on the island…but the text describes what it looks like (hopefully they haven't changed the roof color in a while!)

The text also points out location of houses that are not shown on the chart….
…could this be used as cross-checking the ENC to make sure the text and the ENC are both up to date?

water related - Data Samples

- Vessels should be prepared to contend with **strong currents** in the Loon Islands area, **setting to the N or S**. (SD)
- Anchorage is available in the river, but the outgoing tidal current runs at rates of **more than 3 knots**. (CP – also a USE CASE)
- Approaching Gouldsboro Bay from eastward and entering through Eastern Way from off the fairway bell buoy southward of Petit Manan Light, steer **310°** for 4.5 miles until abeam of the southern tip of Eastern Island, bearing **040°**, distant 550 yards, then steer **000°** through the passage. The tidal currents set across this course with considerable velocity with the flood northeastward and ebb southwestward.(CP)

Is it necessary to keep the beginning of the first and second items?
Should it be a “caution” or is it necessary?
Or do we just need the general direction ?

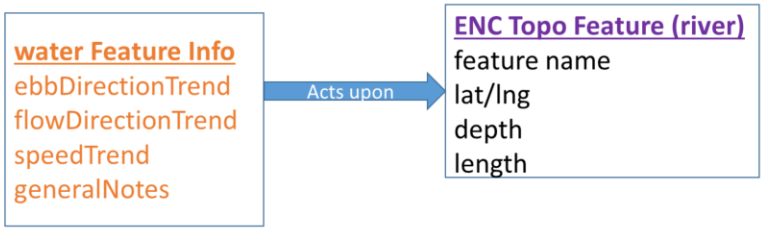
water related - Data Samples

- On the W coast of Newfoundland, the ebb current generally sets NE and the flood current SE. The current is scarcely appreciable from Cape St. George to the Bay of Islands, but then to Point Riche it may be considered constant, with a velocity of about 1 knot. It is stronger nearer the land and, in the vicinity of bays and inlets, is deflected by the inset and outset of the tidal currents. It is of greater than usual force before a SW wind begins, but a strong NE wind causes it to slacken and even turn SW.

Currents related to wind….do we model these relationships? Or just add it as a general note…to winds and/or currents?

Water related - attributes

- Activity/relationship – approaching, warnings/cautions, anchorage
- FeatureInfo – related to featureType

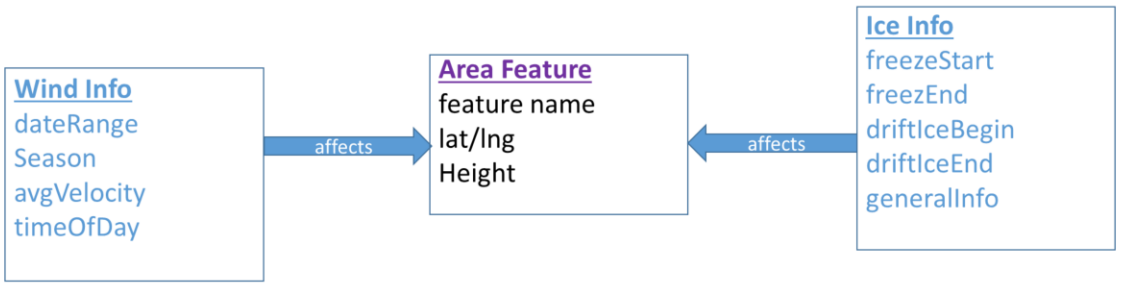


weather related - Data Samples

- Winds on the coast of Newfoundland are affected by the topography and tend to be strongest in and out of inlets and harbors. From November to January, the average wind velocity at St. George's is 18 knots; in summer the velocity falls to about 13 knots. Winds average strongest throughout the year at approximately 1500. In winter the winds average lightest from 0300 to 0400, and in summer are lightest at about 0600. From October to February, gales blow an average of 4 days a month. (SD)
- **Ice.—**Back Arm freezes about December 15; the ice breaks up about May 20. However, the arm has been blocked as late as June 9. Drift ice arrives about mid-January and leaves about May 15. (SD)
- Ice obstructs navigation in the bay from December to March. In severe winters the bay is closed to the entrance. Clusters of piling in the bay, the remains of old fish weirs, are hazardous to small craft. It has been reported that most of the weirs can be avoided by remaining in the middle of the bay.(CP)

weather related - attributes

- Activity/relationship – Situational Awareness, Navigation
- Feature Type Information – wind, ice



Example use case from US Sailing Directions

Caution.—The following cautionary notes should be firmly adhered to when navigating in James Bay:
1. Care should be exercised in firmly fixing one's position.
2. Navigate by the use of established visual and radar landmarks. The radar domes on Pointe Louis XIV, as well as Bare Island and Grey Goose Island, can be used to good advantage.
3. The use of established and recommended tracks is very important.
4. Passage from Pointe Louis XIV to Narwhal or Fort George Anchorage should only be made in daylight, with visibility of at least 3 miles.
5. Assistance of other vessels in the area should be sought, if any doubt arises.
6. When anchored in the Fort George Anchorage, care should be exercised in the event of strong NW winds, at which time vessels should proceed to the sheltered Narwhal Anchorage. Winds in this region generally start from a S-SW direction, gradually veering around to the NW. September and October involve unpredictable weather conditions. Winds of 60 knots from the NW have been experienced in this area.
7. Vessels should be prepared to contend with strong currents in the Loon Islands area, setting to the N or S.

summary:

- The S-126 data contains general trends/historical data supporting dynamic data in both physical phenomenon as well as specific physical descriptions of ENC features.
- The S-126 would be used for passage planning/situational awareness, anchoring, navigation/approaches, warnings/cautions
- There are four main categories of data that support other products:
  - nav-aids (s-101),
  - Physical descriptions (S-101)
  - weather related (S-214),
  - water dynamics related (S-111/S-112)
- Some information may not necessarily add value to the mariner beyond what the chart or other sources already provide.
- Some information absolutely extends what is available…but what's the best way to model it and use it?
- There are historical cautions and warnings to deal with.

Recommendations

- For now, use only historical ice information from CP/SD if ice information is considered an important topic for *supplementary* data. And liaise with S-411 to see how this information could be useful with real-time ice data.
- To maintain contact with S-412 WG to be aware of their data model and how the historical MetOcean data from CP/SD could be useful to supplement the real-time data.
- Reach out to the S-101 group and find out how we would be able to link physical characteristics with their ENC features.
- Select top 10 items as a starting point for further research.
- Maintain a use-case scenario list to help support decision being made regarding the data model
- To keep researching possibilities for use-cases and data structures for a possible S-126 data structure.

M