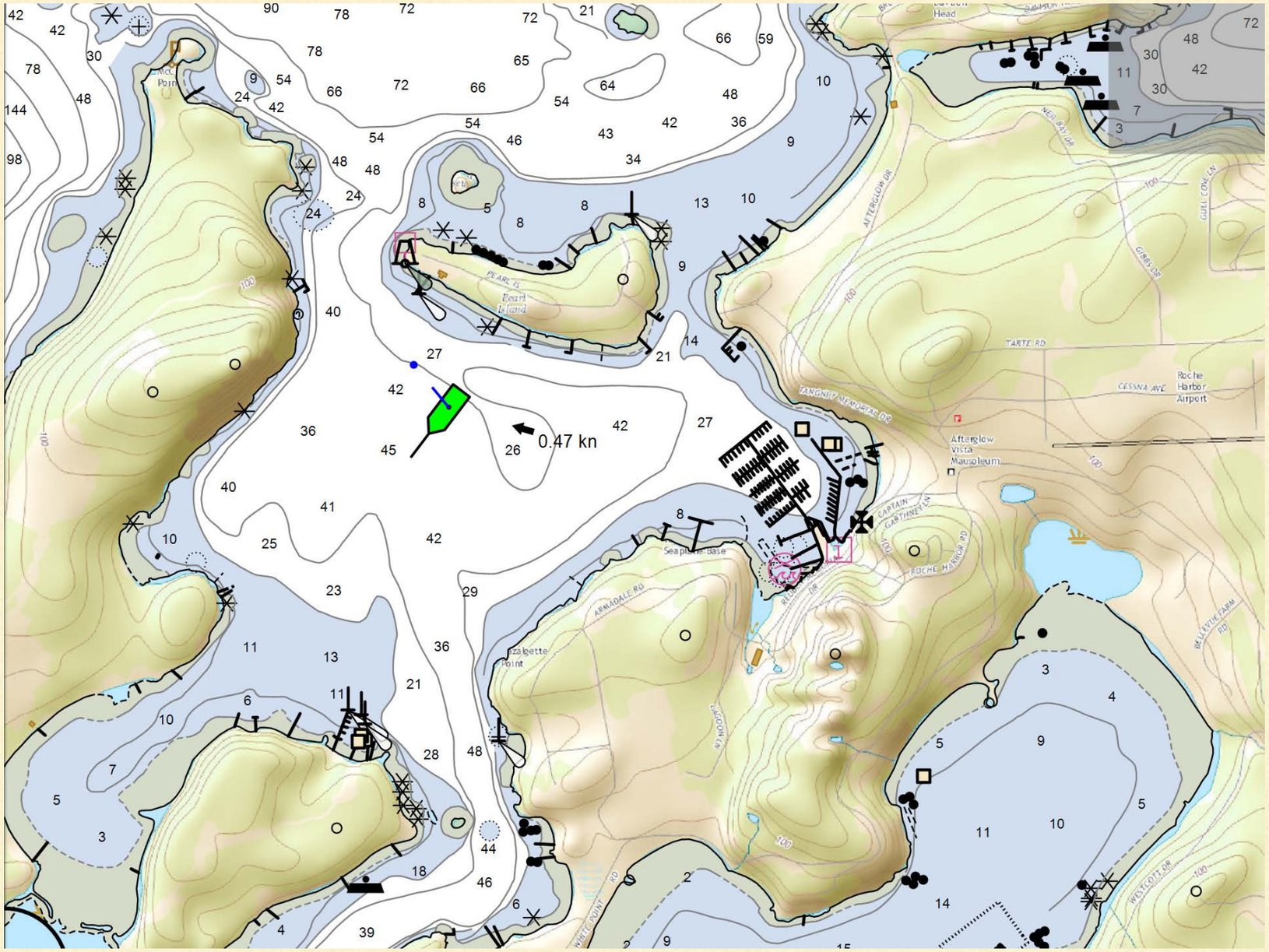


FROM PAPER TO ELECTRONIC CHARTS

Lessons learned, new directions,
and a vision what lies ahead

FROM PAPER TO ELECTRONIC CHARTS

- A look at the past
- New directions - Where do we go from here?
- A glimpse of what lies ahead

“Progress is made by moving forward, but understood by looking backward”

*–Søren Kierkegaard**

*OK he did not actually say this but something darn close

LOOKING BACKWARD

- The Regan era “Contract with America” had a proposal to privatize NOAA and USGS production of Charts and Maps

- In 1993 Al Gore’s “Reinventing Government” triggered a request from NOAA, to convene the National Research Council (NRC) to assess national needs, trends, and opportunities in nautical charting information

- Their 1994 report was used as a roadmap. It included key recommendations regarding various aspects of chart production, privatization and dissemination of data

THE DRIVING PRINCIPLES

- CHARTING A COURSE INTO THE DIGITAL ERA, 1994
- The underlying concept of the NRC report was that the US, and the world, were heading to a new era and that electronic charts would be the focus of all future commercial navigation
- The report included recommendations for the following topics; Changing Needs for Nautical Information, Survey Activities, Data-Base Development, Chart Production and Distribution, Resources for NOAA’s Nautical information Programs

1994 NRC REPORT

- *“NOAA should establish new processes aimed at minimizing the time between the acquisition of new data and the publication of those data for public use.”*

- In the early 1990’s NOAA updated approximately 300 charts per year, with about 50-100 discrepancies being required to trigger an update.

PRIVATIZATION

- *“NOAA should explore avenues for entering into arrangements with private companies in which NOAA will obtain a share of revenues, royalties, or fees in exchange for use of NOAA-certified data in value-added nautical information products produced and distributed by the private company. Where necessary, NOAA should seek enactment of legislation to enable it to retain funds generated from arrangements with private-sector partners.”*

- At the time NOAA was looking at shrinking revenue for chart production

NOAA CREATES PROPRIETARY RASTER CHART FORMAT

- NOAA Developed and patented methods used in their digital charts
- NOAA licensed the format under a Cooperative Research and Development Agreement (CRADA) to **Bl**ue Marble Geographic, **S**eoul and the **B**etter Boating Association (BSB)
- The format was modified and became the property of BSB. All US raster charts were issued in this format. Companies supporting the format were required to get a license from BSB
- BSB was later sold to Maptech, Maptech went bankrupt in 2007

THE BSB FORMAT AND CRADA

- The format was licensed to companies and countries world wide
- BSB, Maptech and NOAA benefitted from technology which should have been in the public domain.
- NOAA attempted to promote a new CRADA for vector charts. This effort was defeated by a wide ranging consortium of domestic and international companies
- NOAA decided to offer vector and raster charts for free
- Who owns the format today? Uncertain…

NOAA STARTS PRODUCING RASTER AND VECTOR CHARTS

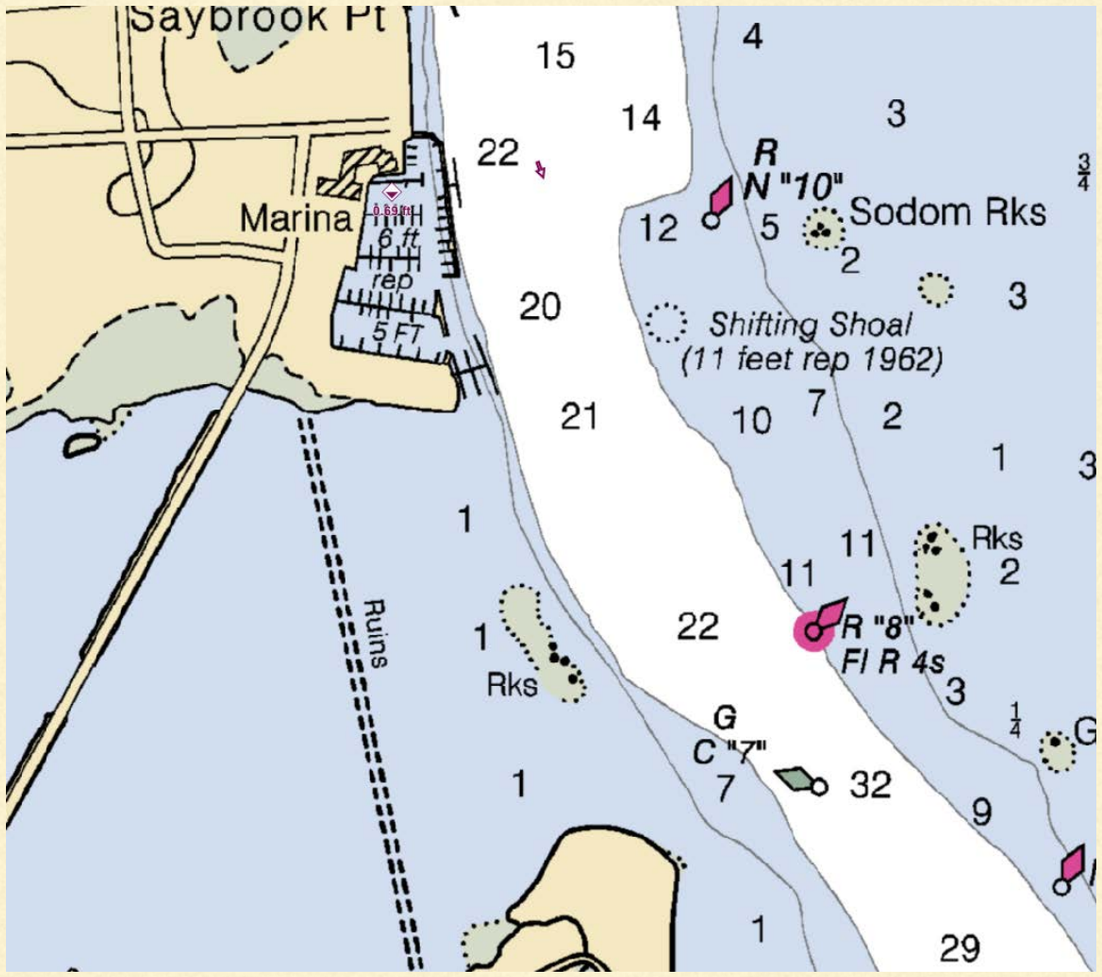
- In 1995 NOAA begins producing raster charts based on paper charts

- NOAA believed that the adoption of Electronic Charting Systems (ECS) would occur prior to the completion of official Electronic Nautical Charts (ENC’s), so they promoted an alternative, raster charts

RASTER & VECTOR

NOAA embarked on a two pronged approach, embracing the ideas that:

- Raster charts could be made available faster than vector, and
- It did not make sense to produce new vector charts based on old Raster data.



Old Paper (Raster)

RASTER & VECTOR

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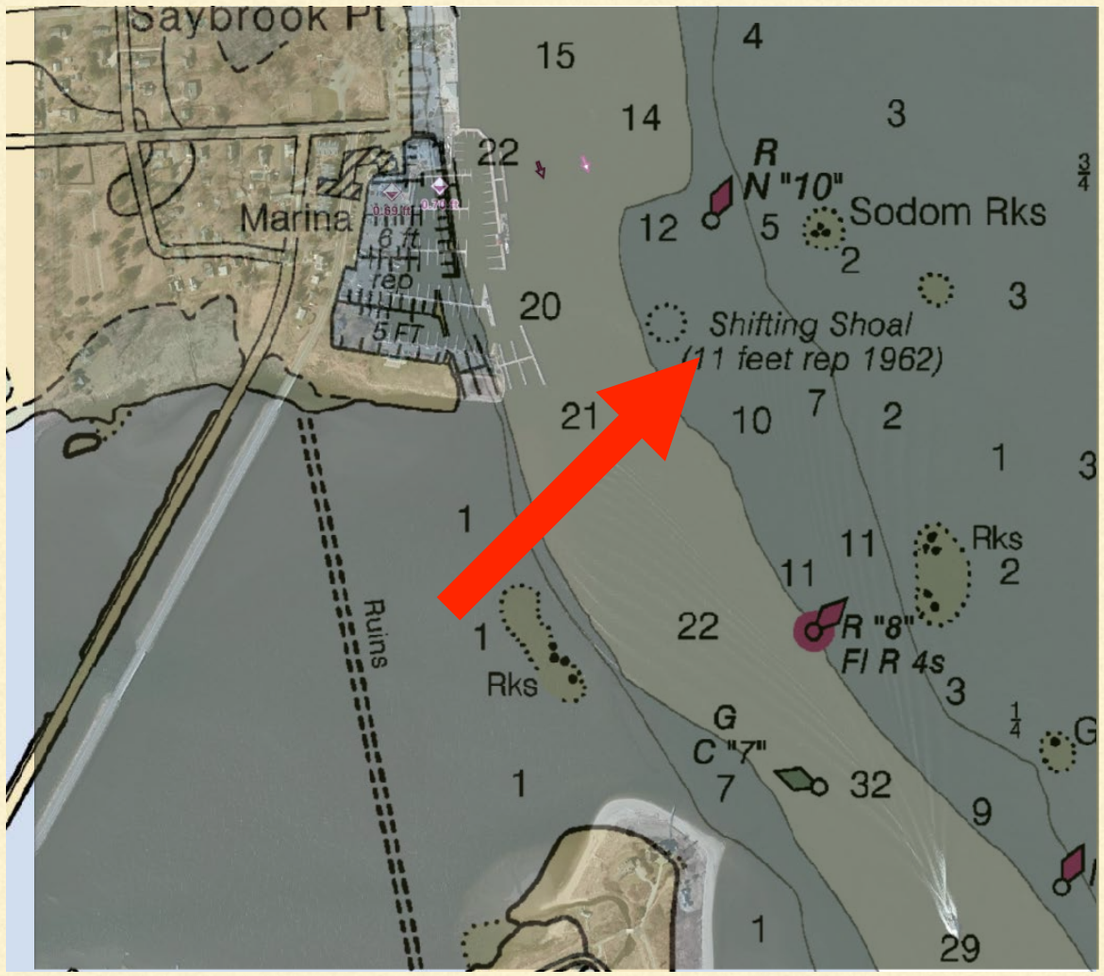

Discrepancy

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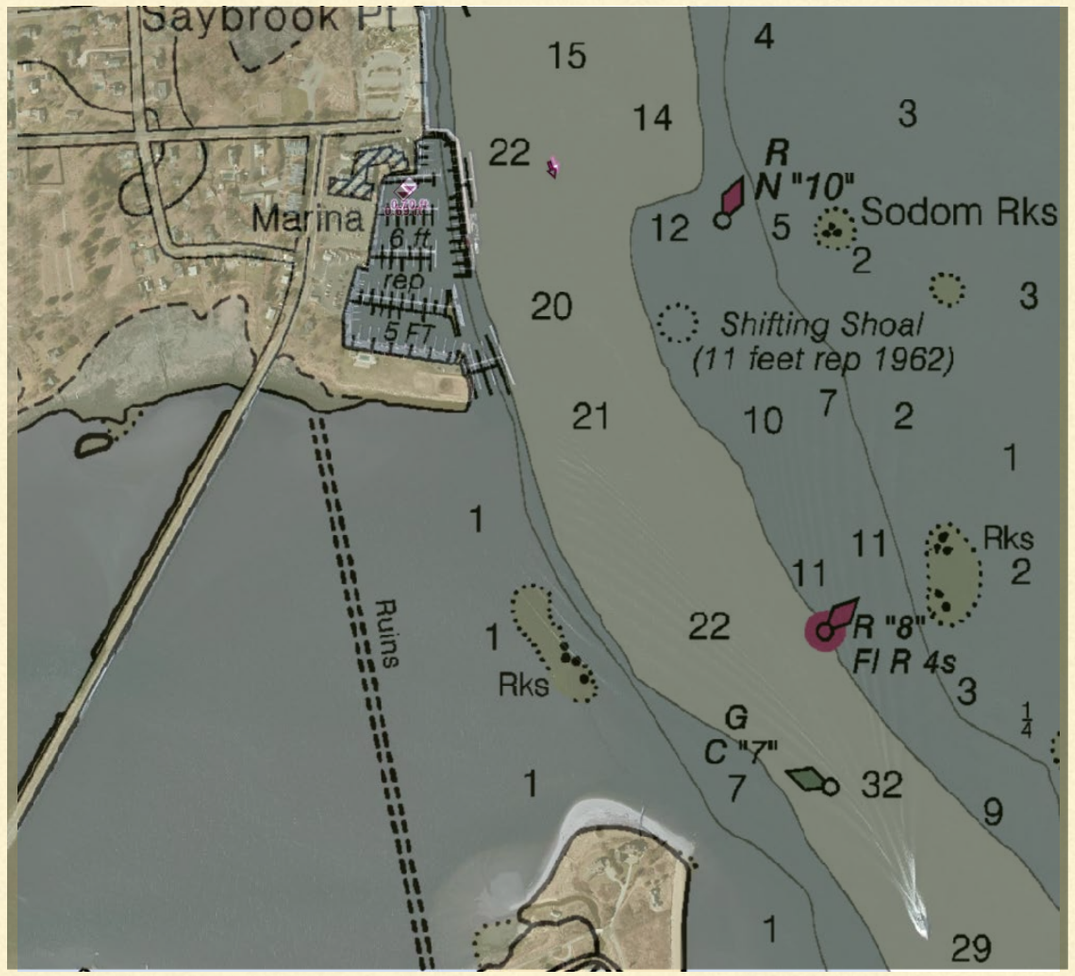

Shifted Raster Image

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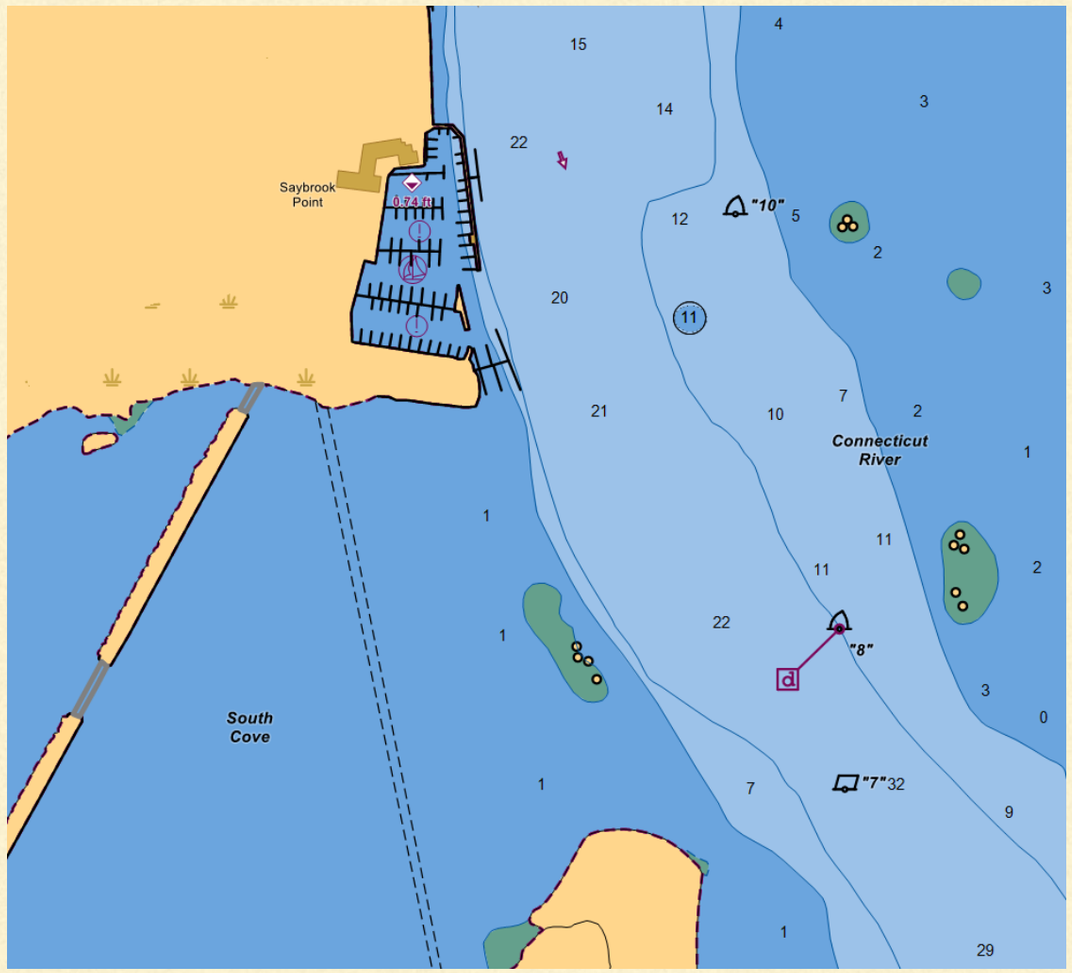


Corrected Vector Chart

SUCCESS

- NOAA’s plan to get charts into the market quickly was very effective
- NOAA’s plan created a revenue stream that was directed back to the agency to fund certain activities related to chart production
- Chart updates now come out as often as every week
- Eventually the charts became freely available on the Internet

FAILURE

- The plan created a cartel and unfairly rewarded an alleged technology parter in a non competitive process
- Initially charts prices were not dictated by the free market
- Ultimately the cartel was defeated by industry
- The maintenance, ownership and control of the standard should have been the responsibility of a non profit industry association

NRC PLAN WAS MOSTLY EFFECTIVE

- The 20-25 year plan for directing NOAA’s efforts was very effective

- The NRC plan was good governance in that it included many voices but resulted in a small number of clear suggestions

- If possible, NOAA should embark on this effort again to define a clear path for the next 10-20 years

THE NRC PLAN MISSED ONE MAJOR ISSUE!

Reliance on the United States Coast Guard as the source of expertise to create and implement performance standards for ECS systems

- This role was delegated to the USCG and outside the scope of the report and suggestions.
- NOAA should take on this role as the USCG has not acted in a timely fashion.
- The USCG’s role should be to enforce regulations, not create standards

NOAA’S ROLE IN ELECTRONIC CHARTING SYSTEMS

- NOAA creates and maintains the data, but has only a small roll in defining how they are used onboard US Vessels.

- Who can better articulate this, or understand the relationship between an electronic chart and the use of the chart?

- NOAA leadership should initiate whatever steps are necessary to take on the role of managing ECS standards for the United States

NATIONAL EMBARRASSMENT

- Vessels in nearly every other country in the world can legally navigate within their waters with electronic charts

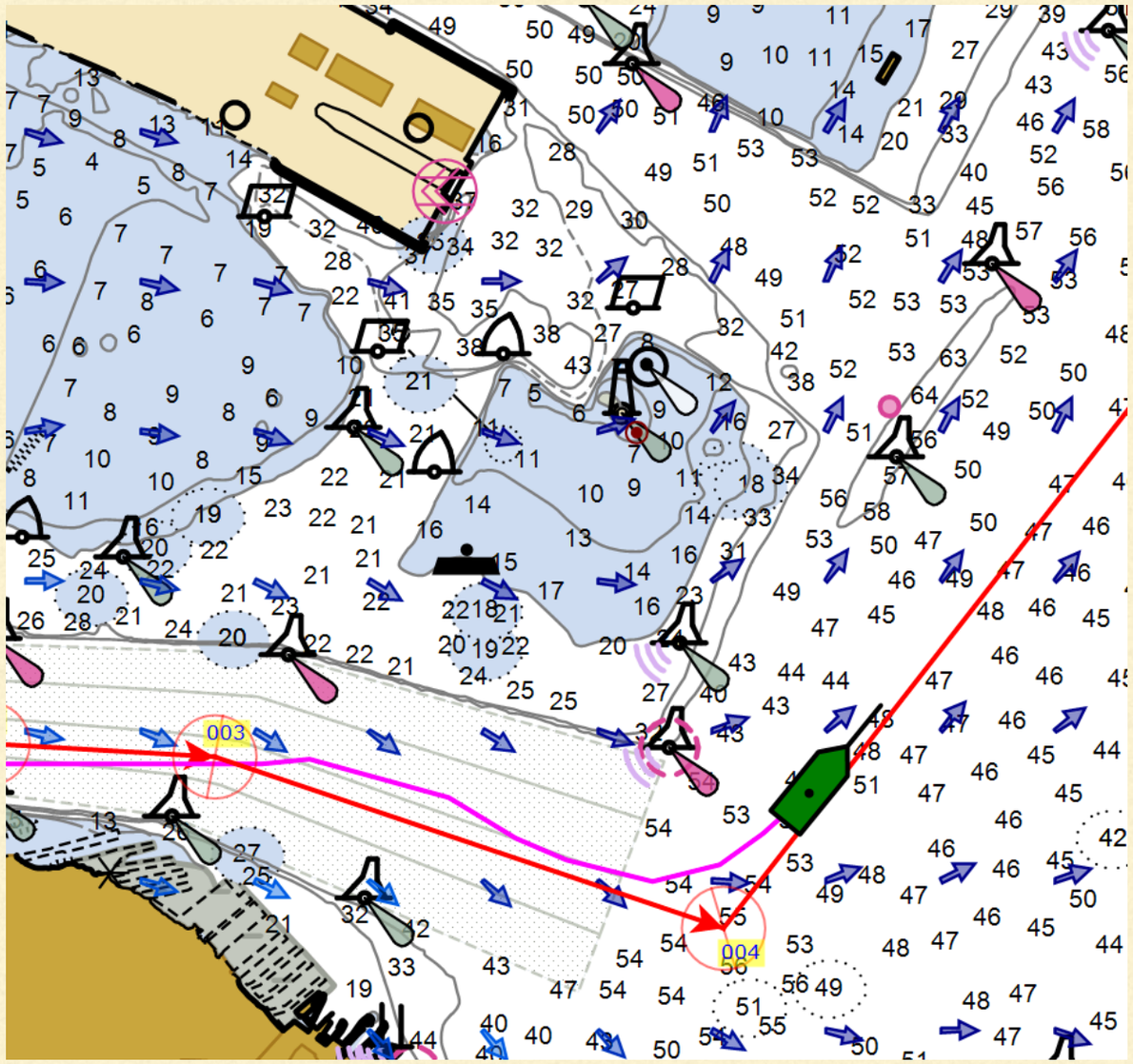
- In the US, this has only become available in the last few months, in fact the RTCM SC 109 standard for ECS was only released a week ago

- The United States should establish a leadership role in electronic navigation and strive to lead, and not lag the rest of the world by 15+ years

IMAGINE A DIFFERENT WORLD

- What if the United States put a man on the moon 15 years after the Russians? 1984 rather than 1969?
- This is our level of success with regards to ECS. WE ARE 15 YEARS BEHIND the rest of the world
- When did it become OK to follow rather than lead?

HERE’S AN EXAMPLE OF WHAT WE COULD DO…



- Here is an example provided by Neil Weston at NOAA
- It shows high resolution gridded tidal current predictions
- This system could massively reduce CO^2 emissions in the US
- It will also coincidentally save industry $ billions…

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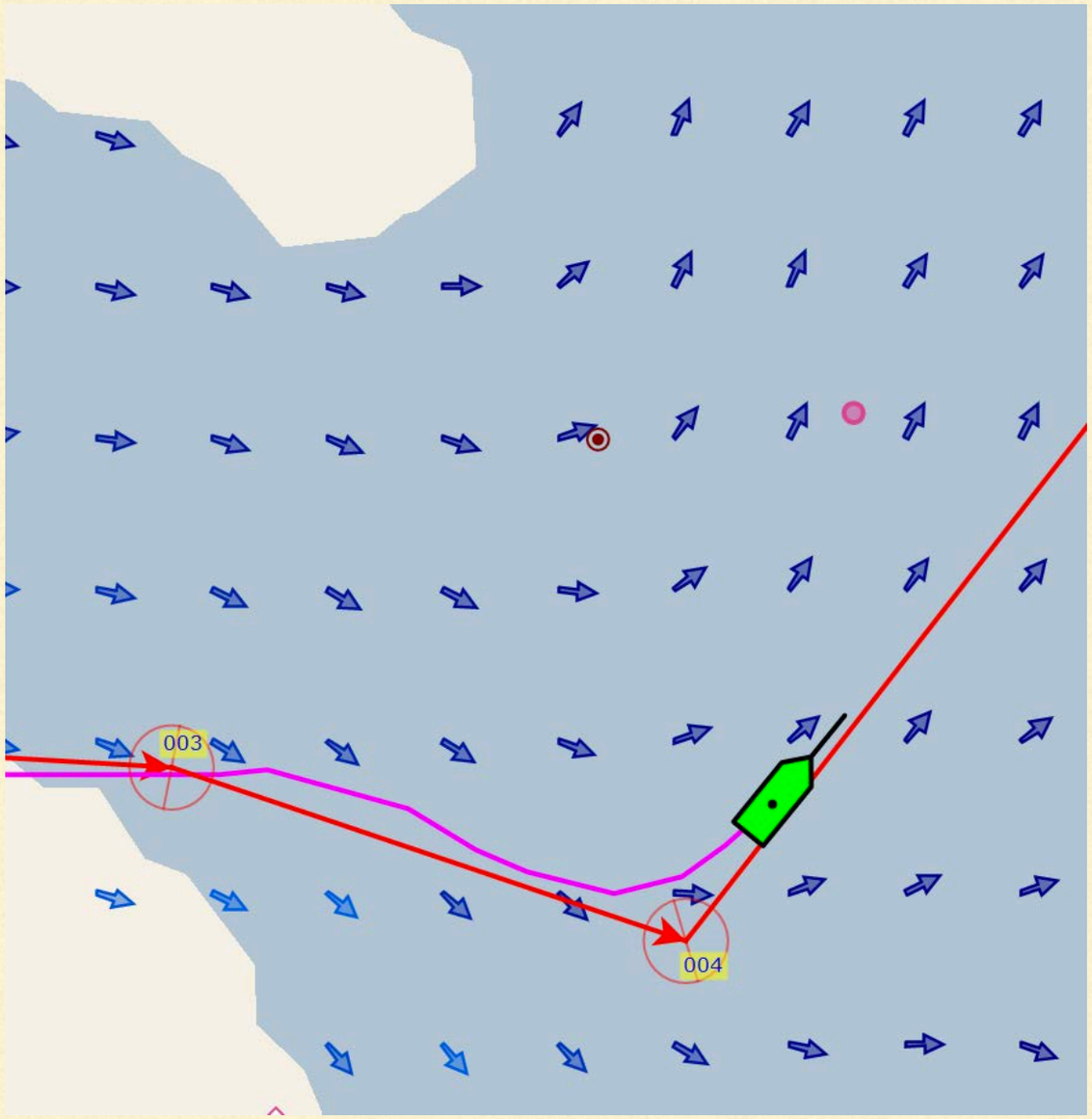

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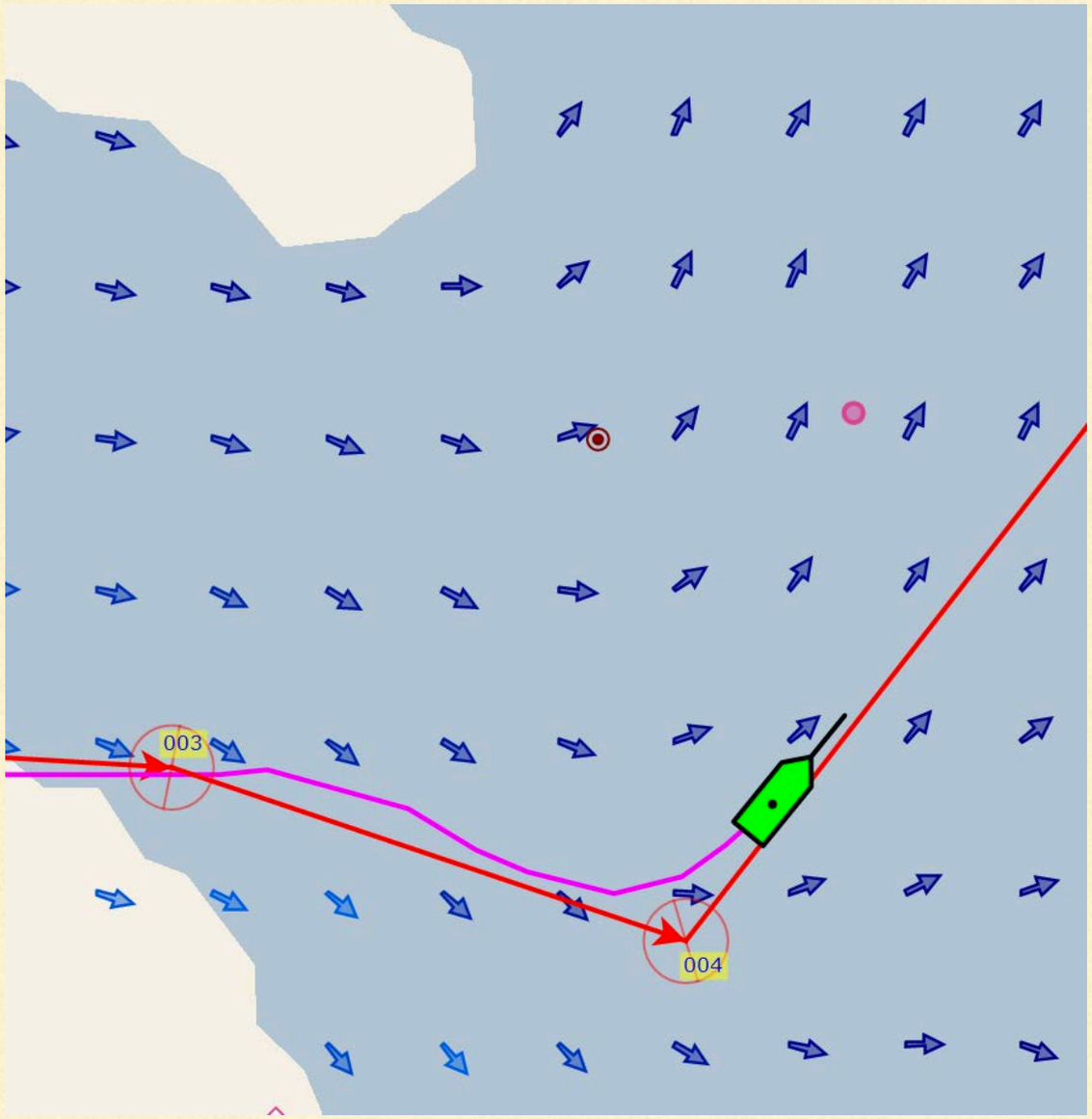
GRIDDED HIGH RESOLUTION TIDAL CURRENT DATA BASED ON SENSOR INPUTS



- Sensor driven CFD model create high resolution tidal current models
- Route optimization algorithms alter the route to save time and fuel
- NOAA already has the expertise, knowledge and data needed

SURFACE CURRENT OVERLAYS

- NOAA should come up with a clever name for this concept
- The system should cover all coastal and near coastal and offshore, including parts of Canada such as British Columbia
- The system should be rolled out using existing, open, data standards, with an eye to the future S-100 standard
- It should include other types of predictable and interesting data types such as wave height and wind

OTHER BENEFITS

- The recent tragic loss of he El Faro could have been prevented as the system would have indicated excessive seas along the route of the ship

- All vessels on international voyages arriving and departing US ports would benefit from the system

- What can we learn from our success and missteps along the way? NOAA should focus on open standards and not create non-competitive exclusive relationships with private industry

- Where could better decisions and stronger leadership take us in the future? Relieve the USCG of their role in defining ECS systems in the US.

- What are the key technologies and features we can expect in the future? Further integration of important data into a dynamic chart

- Where should we focus limited resources to make the biggest impact? Requisition a new NRC report and follow their guidance