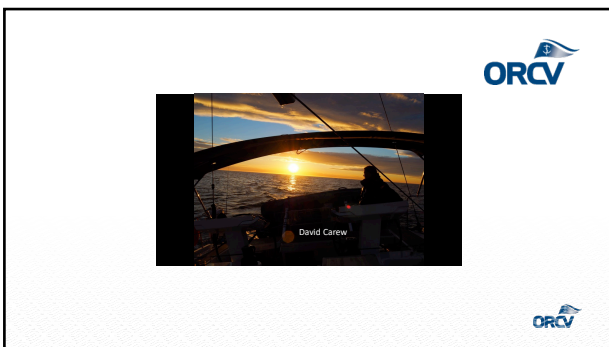


OCEAN RACING CLUB OF VICTORIA

FUNDAMENTALS OF NAVIGATION






1




2

Introductions

- Instructors
 - Rod Smallman
 - rod.smallman@orcv.org.au
 - Simon Dryden
 - simon.dryden@orcv.org.au
- Moderator
 - Neville Rose












3



House rules & explanation

The sessions will go for approximately 2 hours including presentations, chats and exercises
There will be a 10 min break in the middle

Teams – protocols and tools

- Chat – general chit-chat. Attendee participation is very much encouraged 
- Q&A – specific Questions & Answers 
 - Moderator – might not raise a question to the presenter if they know the topic is coming up
- Raise hand 
- Audio and Video selections  
- Polls, Quiz's 
- Select "View" then "Focus on content" will provide a better experience 



4

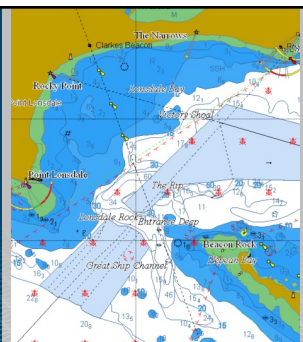
Acknowledgements



5



Session TWO



6



Predictwind Offer

1 month's FREE professional subscription

<https://forecast.predictwind.com/register/change/package>

Code ORCV1



7

Exercise #02

- You passed Fawkner Beacon at 10am when your GPS stopped working. You keep sailing on a reach when after 2hrs fog sets in. You weren't really keeping track
 - The course you have steered, using the magnetic compass was 165 Deg
 - The wind is strong, from the West (270 Deg True)
 - You expect around 5 degrees leeway
 - Your boat has been doing 8 knots
- Where are you ?



Light 37 56.915s 144 55.627e



8

Exercise #02 solution

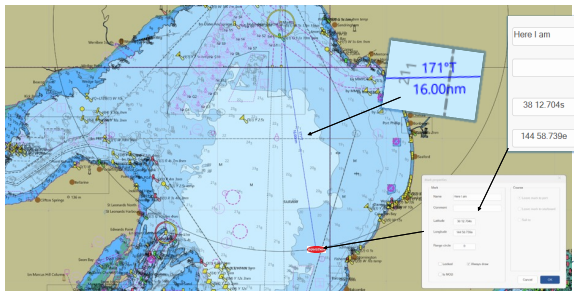
Compass bearing (magnetic)	165 degrees
Adjust for compass variation	+11 degrees east
True direction steered	176 degrees T
West wind – adjust for leeway	-5 degrees to the east
True direction sailed (COG)	171 degrees
2 Hours at 8 Kn = around 16 nm	



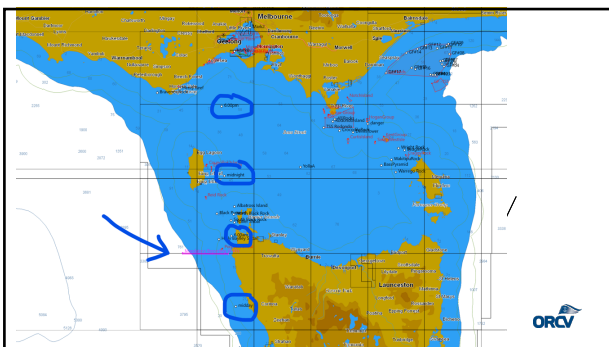
9





Exercise #02 solution



10




11



Electronic Charts – Quality aspects

Ocean Racing Club of Victoria (ORCV) 2023 Navigation Course

Alvaro Sanchez
Director National Challenge



12

Agenda

Introduction
 'Official' vs 'Unofficial' Charts
 Chart currency & Distribution channels
 Chart Accuracy and Reliability



13

WHAT IS AN OFFICIAL CHART?

IMO - SOLAS Chapter V/2

2.2 Nautical chart or nautical publication is a special purpose map or book, or a special compiled database from which such a map or book is derived, that is issued officially by or on the authority of a Government, authorised HO or other relevant government institution and is designed to meet the requirements of marine navigation.

AHO's authority – Navigation Act 2012 (Commonwealth Law)

National guidance on AMSA's:

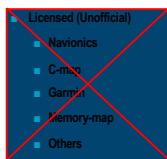
Marine Notice 06/2017 – Official nautical Charts

Marine Notice 07/2017 – Guidance on ECDIS for ships calling at Australian ports.

14

WHAT IS AN UNOFFICIAL CHART?

- A number of commercial companies are licensed to copy paper charts or ENC into their own proprietary electronic format. These are for use in small chart plotters and other electronic devices such as tablets, phones, laptops, etc by recreational vessel operators only.
- The quality of copying is variable and the update services are generally very delayed, even though they may appear relatively frequent.



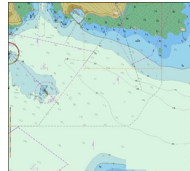
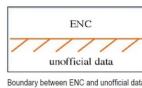
15

Official ENC vs non-official

** Compliant ECDIS equipment will distinguish between an official ENC and any unofficial chart data by clearly displaying a warning on the screen when unofficial chart data is being used.

Two possible messages:

- "Unofficial data displayed; refer to official RNC or paper chart."
- "No official data available; refer to official RNC or paper chart."



16

Unofficial Charts? ...The risky option

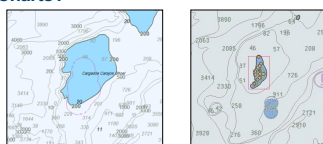
The yacht "Vestas Wind" destroyed itself after hitting a reef in the Indian Ocean at night on 29 Nov 2014

The yacht was using C-Map charts poorly captured from official ENC, along with bespoke software



17

Unofficial Charts?

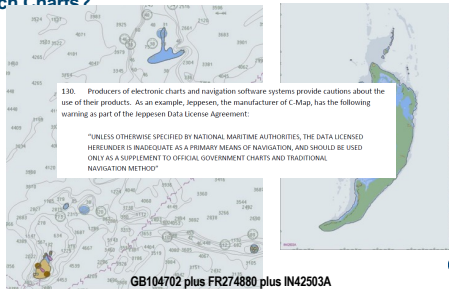


C-Map 1:3.3M vs ENC 1:3.3M (GB104702)

"The investigation team considers the cartography in this particular case to be deficient. The omission of the islands, reefs and dangers at display levels A, B and most of the C presentations of C-Map data failed to fulfil the primary function of a chart and warn the mariner of a potential danger."

18

Which Charts?



19

DCV – Darwin to Broome



20

Official chart but ... Is it up to date?

CHART DETAILS FOR AUS4

Chart Number	AUS4
Title	Australia - North Coast - Queensland - Approaches to Whips
Geog Location	Australia
North Lat	12 50 00 S
South Lat	12 50 00 S
East Long	141 55 00 E
West Long	141 25 00 E
Scale	1:70000
Projection	mercator
Edition Date	25-Jun-2016

CHART IMAGE



OTHER INFORMATION

For pricing and purchasing information on the above charts, please refer to our [Price Distribution Agent](#) on this website

Chart No.	Chart Title	Scale	Projection	Revision	Revision Date
AUS4	Australia - North Coast - Queensland - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS5	Australia - South Coast - New South Wales - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS6	Australia - West Coast - Western Australia - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS7	Australia - East Coast - Victoria - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS8	Australia - South East - Tasmania - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS9	Australia - North East - Queensland - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS10	Australia - South West - Western Australia - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS11	Australia - East Coast - Victoria - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS12	Australia - South East - Tasmania - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS13	Australia - North East - Queensland - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS14	Australia - South West - Western Australia - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS15	Australia - East Coast - Victoria - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS16	Australia - South East - Tasmania - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS17	Australia - North East - Queensland - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS18	Australia - South West - Western Australia - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS19	Australia - East Coast - Victoria - Approaches to Whips	1:70000	mercator	1	25-Jun-2016
AUS20	Australia - South East - Tasmania - Approaches to Whips	1:70000	mercator	1	25-Jun-2016

Preliminary Notice
Preliminary Publication Notice



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ENC Distribution Services

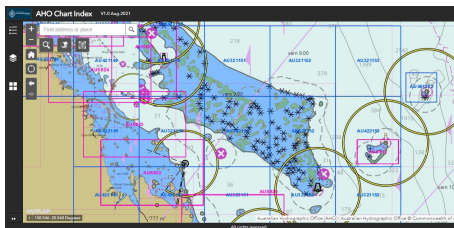
- Australian ENC are available through:
 - "AusENC"** service (covers Australian Charting Area* only) www.hydro.gov.au/prodserve/digital/digital.htm
 - "International Centre for ENC (IC-ENC)"** distributors, (merged with ENC from other nations) www.ic-enc.org/distribution



* Australian Charting Area includes PNG, Solomon and Antarctica

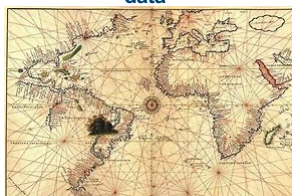


22

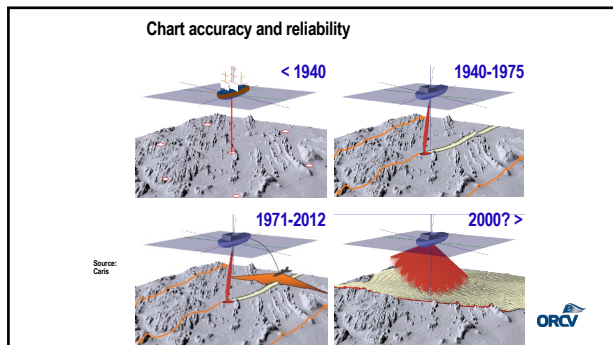


23

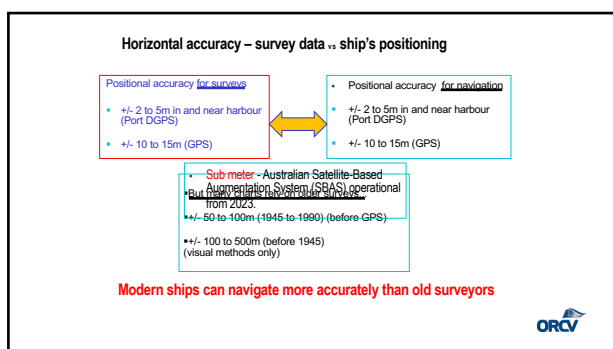
Quality and limitations of charted data



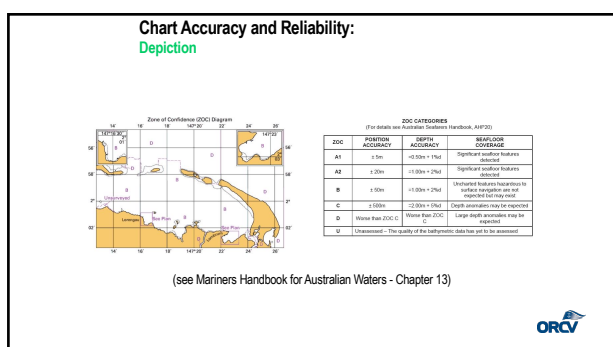
24



25

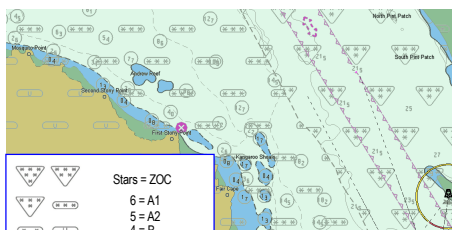


26




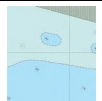

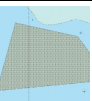
27

Chart accuracy and reliability: Zones Of Confidence - ENC



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Quality Indicators: ENC

Soundings			
Normal depth sounding symbology (matches ZOC)	Soundings less accurate than the ZOC value e.g. A sounding from a ZOC C survey that couldn't be displaced by a ZOC B survey.		
2	(3)		
Depth Contours			
Continuous depth contours ZOC A1, A2, B and C in depths >50m	Dashed depth contours ZOC C in depths <= 30m	Broken and discontinuous depth contours ZOC D	Unsurveyed area ZOC D
			

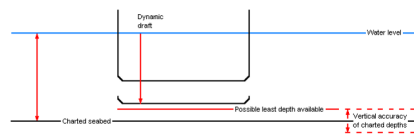
29

Depth accuracy and feature detection: allowances that should be considered

- ZOC A1
 - Positional Accuracy +/- 5m
 - Depth Accuracy 0.5m +/- 1% d
 - Full search undertaken, all significant seafloor features detected and depths measured (1m feature)
 - Controlled systematic survey achieving high accuracies, using swath system
- ZOC A2
 - Positional Accuracy +/- 20m
 - Depth Accuracy 1m +/- 2% d
 - Full search undertaken, all significant seafloor features detected and depths measured (1m feature)
 - Controlled systematic survey achieving accuracies less than A1, using modern echo sounder and sonar sweep
- ZOC B
 - Positional Accuracy +/- 50m
 - Depth Accuracy 1m +/- 2% d
 - Full search not achieved, uncharted features hazardous to surface navigation not expected but may exist (2m feature)
 - Controlled systematic survey using modern echo sounder, but no sonar or mechanical sweep

30

Chart accuracy and reliability: ZOC



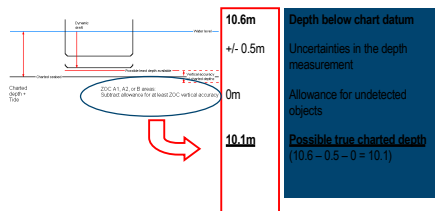
ZOC A1 and A2:
"All significant features detected and measured"

- A1 - Allow at least 0.5m clearance
- A2 - Allow at least 1.0m clearance



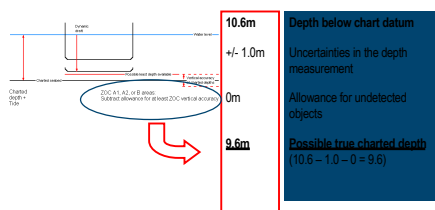
31

Chart accuracy and reliability: ZOC A1 - great



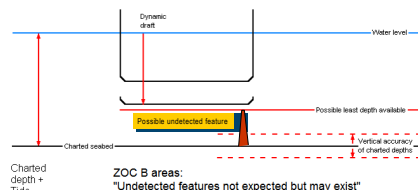
32

Chart accuracy and reliability: ZOC A2 - good



33

Chart accuracy and reliability: ZOC A - *excellent*



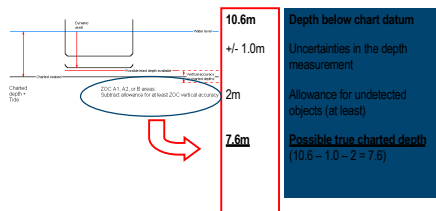
ZOC B areas:
"Undetected features not expected but may exist"

Allow at least 1m accuracy + 2m possible undetected feature
= at least 3m clearance



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Chart accuracy and reliability: ZOC B - *fair*



35

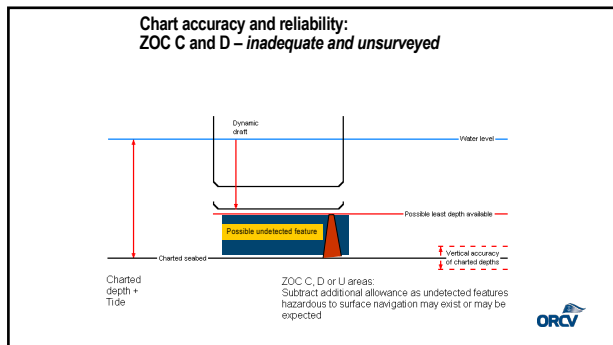
Chart accuracy and reliability: ZOC C and D - *inadequate and unsurveyed*

- Positional Accuracy +/- 500m
- Depth Accuracy 2m +5%*d*
- Full search not achieved, depth anomalies may be expected
- Low accuracy survey or data collected on an opportunity basis such as passage sounding
- Variable

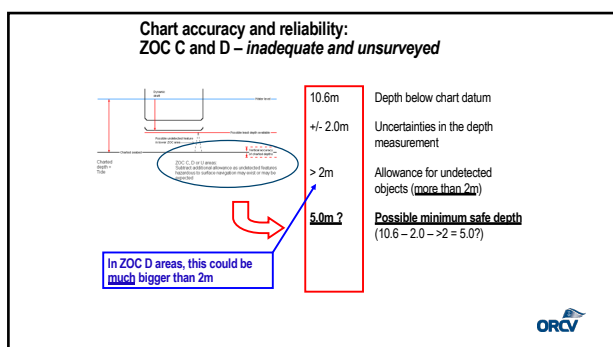
- Positional Accuracy worse than 500m
- Depth Accuracy worse than 2m +5%*d*
- Full search not achieved, large depth anomalies may be expected
- Poor quality data or data that cannot be quality assessed due to lack of information
- Poor!



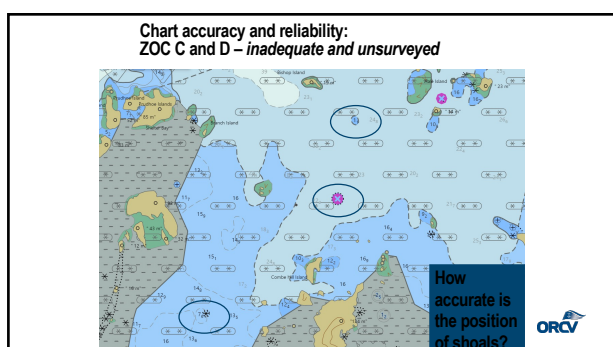
36



37



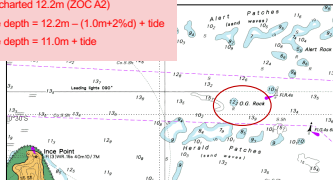
38



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ZOC A2 – OG Rock, Torres Strait

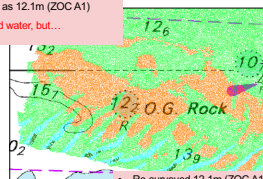
- Currently charted 12.2m (ZOC A2)
- Clearance depth = $12.2\text{m} - (1.0\text{m} + 2\%d) + \text{tide}$
- Clearance depth = $11.0\text{m} + \text{tide}$



40

OG Rock re-surveyed

Resurveyed as 12.1m (ZOC A1)
Less charted water, but...

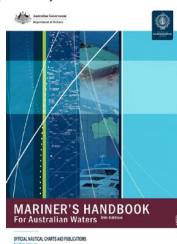


- Re-surveyed 12.1m (ZOC A1)
- Clearance depth = $12.1\text{m} - (0.5\text{m} + 1\%d) + \text{tide}$
- Clearance depth = $11.5\text{m} + \text{tide}$
- 0.5m more navigable water

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More information:

Mariner's Handbook for Australian Waters
(AHP20)

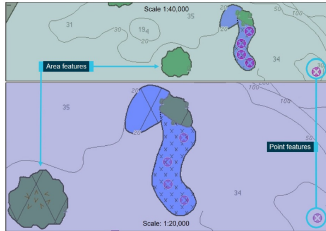


- AHP20 Ed5 (2019)
 - Chapter 13: Accuracy of depth information
- Download for free as PDF from AHO website

42

➤ Over scale display

- Area features grow as display is zoomed in.
- Point feature symbols stay the same as display is zoomed in.
- When display is zoomed in beyond the intended scale (compilation scale), the symbol may no longer cover the feature it represents.

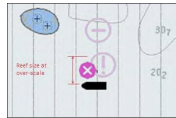


43

➤ Over scale display



Symbol covers true size of reef at correct scale
= looks too close
= good decision

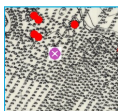


Symbol no longer covers true size of reef
when over-scaled
= looks OK
= poor decision

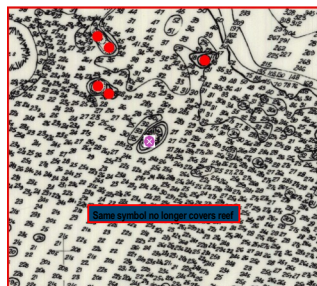


44

➤ Over scale display



Symbol covers reef



Same symbol no longer covers reef

45

➤ **Over scale warning**
Example – Kea Trader 2017



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➤ **Over scale warning**
Example – Kea Trader 2017



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➤ **Over scale warning**
Example – Kea Trader 2017



- ENC displayed at compilation scale
- XTD corridor (red and green lines) difficult to see
- Point feature symbol covers full size of true feature
- Point feature symbol overlaps the XTD corridor
- But...
- Point feature coordinates are outside the XTD corridor
- Point feature does not trigger any alarm

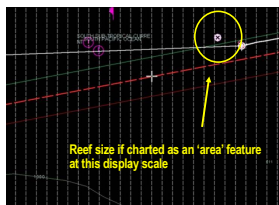


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➤ Over scale warning

Example – Kea Trader 2017

- ENC over-scaled x 9
- XTD corridor (red and green lines) are now clearly visible
- Point feature now appears outside the XTD corridor
- But...
- Point feature symbol no longer represents the true size of the feature (shown yellow)
- And...
- No allowance for charted accuracy



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Summary:

Chart users should always consider:

- accuracy and limitations of the chart data
- accuracy and limitations of the fixing method
- allow room for error
- if a shoal depth is charted, it's there (or somewhere close)

Beware of:

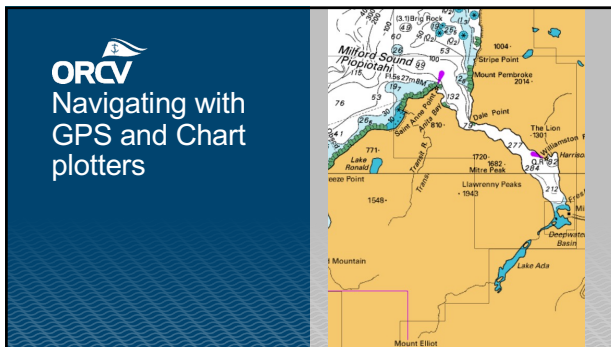
- a fix accuracy better than chart accuracy
- over-confidence (a blank area does not mean 'no dangers')

50

QUESTIONS?



51



52

Reliability of Information

When you turn on your chart plotter the first thing you get is a message like this...

- This product is an aid to navigation. **RONSTAN**
- Does not replace Official Charts
- "Only official Government charts and Notices to Mariners contain all the information needed for safe navigation."

B&G are a bit more strident...

"Do not rely on this product as a source of navigation....."

Behind these messages there are some key points:



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Reliability of Information - key points

- As we discussed last week, the charts used in chart plotters do not contain all of the information available in the Official Charts (ENC or paper charts)
 - "zooming down" to lower levels helps BUT
 - **Zone of Confidence information not shown or used**
- When you look at an image of your boat imposed on a chart with an apparent accuracy of just a few meters it's very easy to have a false sense of security



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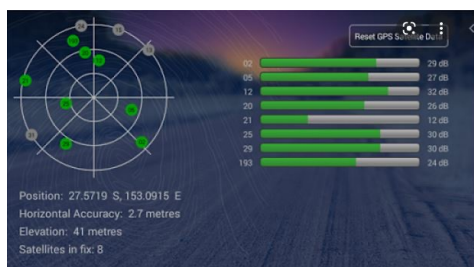
The GPS System

The GPS system comprises:

- 32 coordinated satellites (though only 24 active at any one time) each orbiting Earth twice a day plus ground control stations and the user's GPS receiver.
- Each satellite transmits a unique microwave signal including orbital parameters and very accurate time.
- The user's GPS receiver calculates its distance from the Satellites and with a minimum of three satellites can determine its position (at sea level!), four satellites for a 3-dimensional fix
- The GPS receiver automatically selects the best satellites
- Accuracy at sea level can often be as good as a few metres
- The GPS system uses the WGS84 map datum



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56

How good is your GPS?

GPS effectively solves the problem of knowing where you are on the globe.....

- It's not infallible
- Most boats have numerous GPS receivers on board and they may not all agree!



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GPS – What makes the GPS position shown in your plotter inaccurate ?

- Antenna position and inability to see the satellites
 - crew sitting on it
 - is it under the sail (especially a carbon sail)
 - effectiveness of antenna at severe angles of heel
- The position and number of available satellites
- User equipment failure – antennas do fail and degrade



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GPS – Precautions

- You NEED to KNOW what your plotter does when/if the signal stops
 - Does an alarm sound ?
 - Can the skipper and crew hear the alarm when on deck
 - Does it continue with current position?
 - Does it use dead reckoning?
- Keep watch, cross check where you can
 - Depths, Light houses, transits
- Utilise HDOP & HPE (Horizontal Dilution of Precision),(Horizontal Position Error)
- Satellite tracker/map in your plotter



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Setting up the Chart Plotter

<https://www.youtube.com/watch?v=EiCeUMH1xvU>

- Check all the settings – professional assistance in the initial set up may help – e.g.
- Are GPS and Chart plotter set to the same datum ?
 - GPS set to degrees, minutes and decimal minutes?
 - Helpful to set chart plotter and instruments to display compass True
 - Include "confirming data" on Chart plotter displays - depth sounder readings displayed next to your chart are especially useful
 - Ensure course over ground is displayed ... where you are going is usually more important than where you are pointing!



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Once you're all set up....

Your instruments do all the hard work for you

- Course over ground (no need to adjust for tides and leeway)
- Bearings, distances and expected sailing time to waypoint
- Speed over ground and Boat Speed
- Velocity made good to your course (VMC)
- Boat speed vs target speeds ("polars")
- Tide levels and some tidal flow information
-And the list goes on



61

GPS – your settings



- How is your GPS set
 - dd mm ss
 - dd mm.mmm
 - dd.dddd

• Question

- 38.29934s 144.54397e
- 38 29.934s 144 54.397e
- How far apart are these two positions?



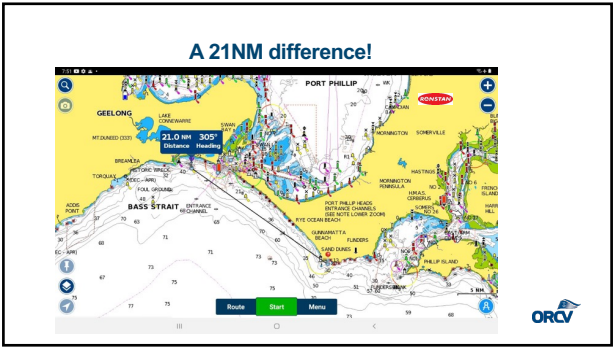
62

Convert decimal degrees to decimal minutes

- To Convert Decimal Degrees 38.29934
- Multiply 0.29934 by 60 = 17.960
- Position in Degrees & Minutes is 38 deg 17.960 minutes
- To convert 144.54397
- Multiply 0.54397 by 60 = 32.638
- Position in Degrees & Minutes is 144 deg 32.638 minutes
- Via the internet <https://www.pcc.smp.edu/apos/convert/>




63




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Quick #02

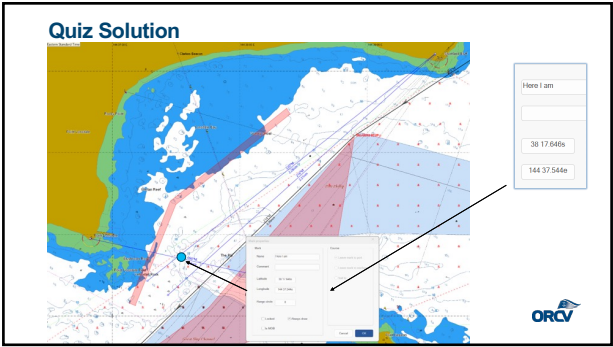


- You're somewhere in the vicinity of Port Phillip Heads in 11m of water
- You take a bearing to the Lonsdale lighthouse of 270° on your hand bearing compass
- You see a white isophasing light just to the left of the Hume Tower

- What is your position in Lat/Long in DD mm?
- What is the light & why?
- What would your bearing be to the light off your hand compass?



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Compass Variation (Declination)

- If your instrument settings are TRUE make sure you are fully aware of the difference between your instruments and your wet compass

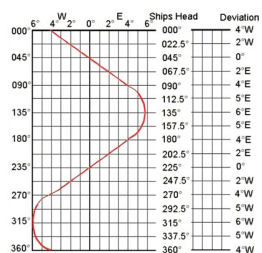


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Compass Deviation

Compass deviation is another magnetic error affecting the steering compass. Variation is a magnetic interference common to all vessels. **Deviation is a magnetic interference unique to the vessel itself.**

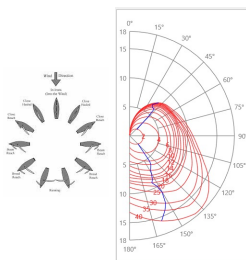
The term 'deviation' is used to describe the effect of interference from magnetic fields created by the vessel's own equipment. This can be from things such as batteries, large metal objects like the engine, speakers, VHF radios etc.



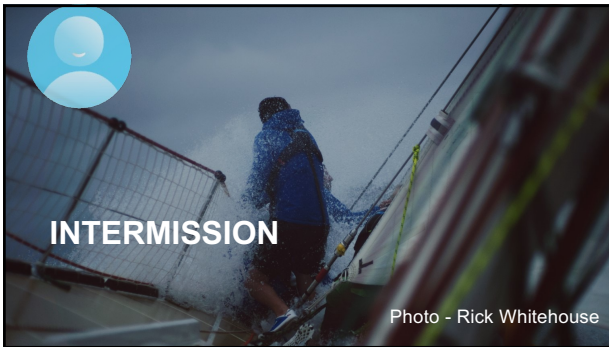
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Predicting boat speed

- Every yacht is different, you should know your approximate boat speeds at various wind angles and wind strengths
- This can be represented on polar diagrams or tables
- If you don't have one, start a diary and create your own
- Most current chart plotters include "polar diagrams" for select yachts and will generate target speeds at measured wind strengths and angles.
- This "polar data" is the basis for weather routing.



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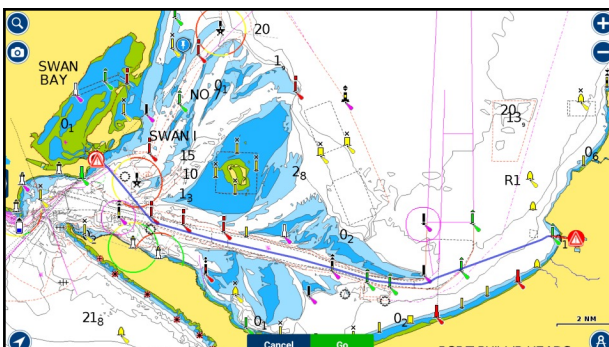
70

Exercise #03 Navionics Exercise

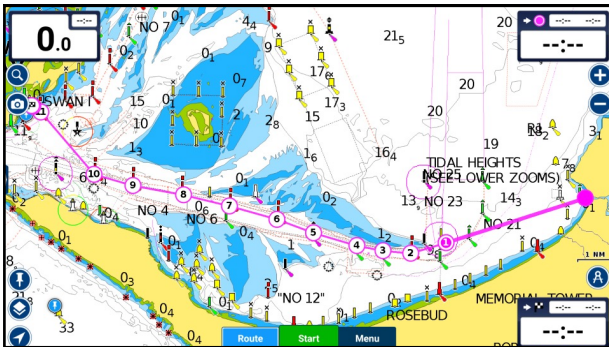
- Plot a course from the exit of the Martha Cove Marina at Safety Beach to the entrance of the Queenscliff Cut (use the automatic course option)
- Any shallow water issues we need to keep an eye on?
- What are the key marks we will encounter on the passage?
- Are there any conventions we will need to obey along the way?
- What is the key danger?



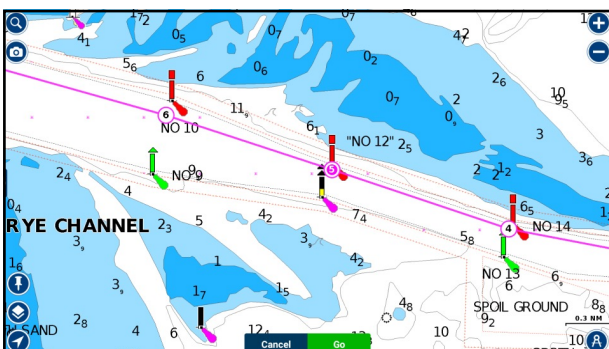
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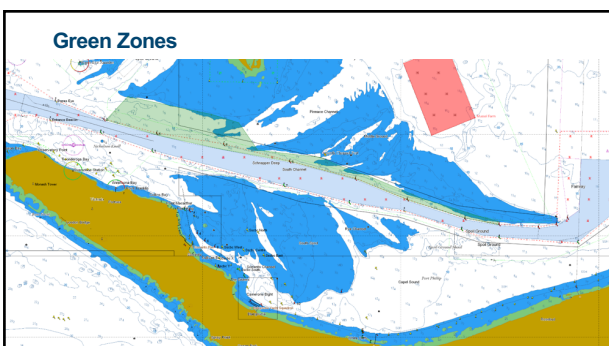
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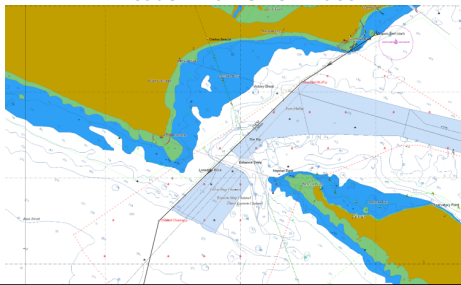
Exiting Port Phillip

The next couple of slides consider how you might prepare for a race start through Port Phillip Heads



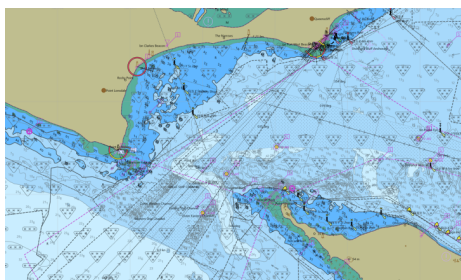
76

Heads Exit – ORCV Race

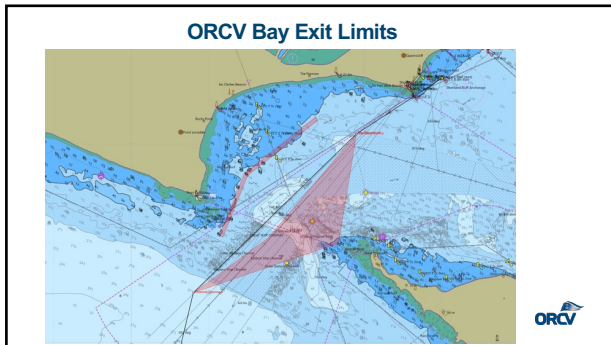


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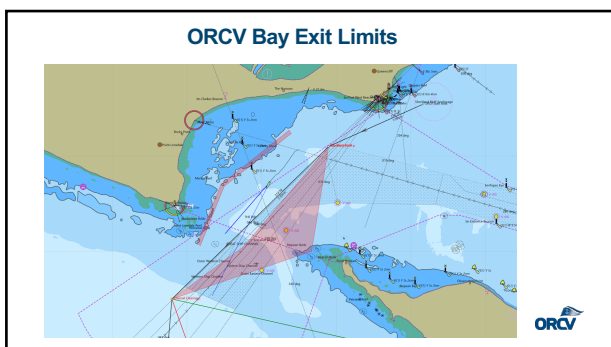
Heads Exit – ORCV Race



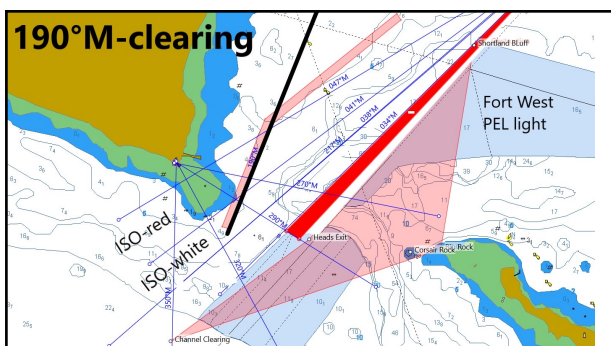
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Exercise #04 – Heads Exit

- What is the bearing from sea of the Clark's Beacon and Marcus Hill transit on the chart ? What does it indicate?
- What would be the bearing when viewed from the land?
- What lights are displayed by the three beacons on Victory Shoal?
- What is the distance between the ORCV Heads Exclusion Zone and the 5m line off Lonsdale platform?



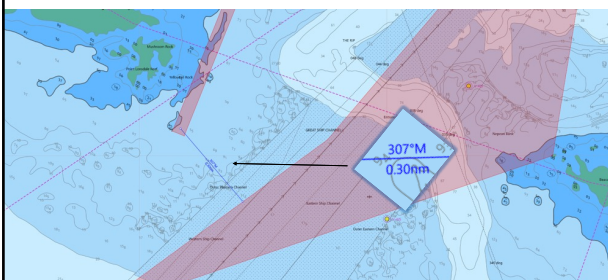
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Exercise #04 Solution

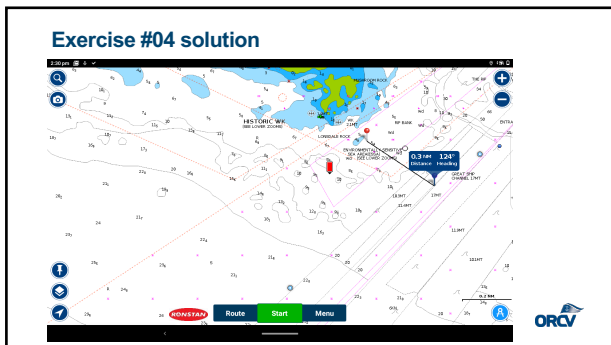


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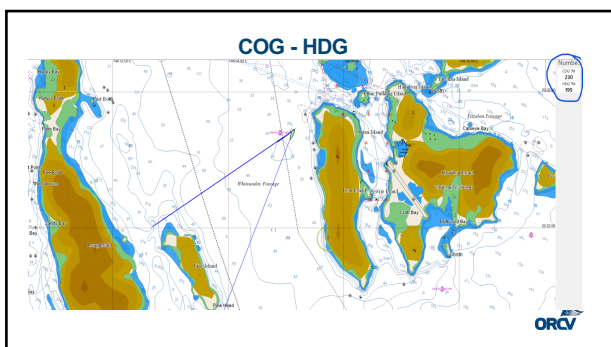
Exercise #04 Solution



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86

Quiz #03 Time – Distance Exercises

- I am travelling at 6 knots. How far will I go in 36 minutes?
- It is 10.00am and the start line for the race is 5 nm away. What speed do I need to motor/sail at arrive by 10.50am?
- I am located at Mornington Pier. I wish to meet another boat at Fawkner Beacon at noon. What time do I need to leave if I think I can travel at 6.5knots



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Answers

- Speed is distance /time. Distance is 6*(36/60) = 3.6NM
- 50 minutes is 50/60 hours, Speed=Distance /Time, speed = 5NM/ (50/60) hours = 6 knots
- Distance to Fawknor Beacon from Mornington Pier is 16.6NM. Speed is Distance/Time so Time= Distance/Speed, the time at 6.5knots is 16.6/6.5=2.55 hours= 2 hours 33 minutes, leave at about 9.30am



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Automatic Identification System (AIS)

- What is AIS? (compulsory Cat 1 & 2 races)
- Automatic tracking system
- Identifies & locates vessels by electronically exchanging data with other nearby ships and AIS Base stations
- Class A and B (smaller vessels)
- Vessels continually transmit their ID, position, course, speed and other data by VHF.
- Receivers only and transceivers

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AIS - Overview

Unlike radar and other aids to navigation, the AIS systems do not need to have visual line-of-sight to share this information.

- Yachts reliant of VHF coverage – ship to ship or ship to station

Benefits of AIS

- Collision avoidance
- Aid to Navigation
- Identify other vessels
- AIS MOB device

Beware of "old" positions

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AIS - Features

- Networked AIS displays show vessel positions across the world (marinetraffic.com)

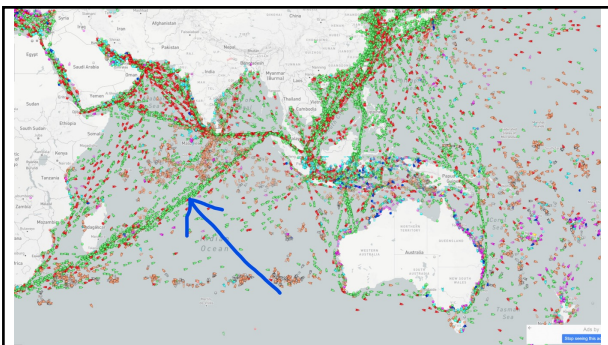


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AIS marinetraffic.com



92



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Collision Avoidance

- Vessel details, position, course & speed shown on chart plotters
- Chart plotters can be interrogated to find:-
 - Whether boats on collision course
 - Passing distance
 - When closest passing distance will be reached.
- Can be linked to alarms

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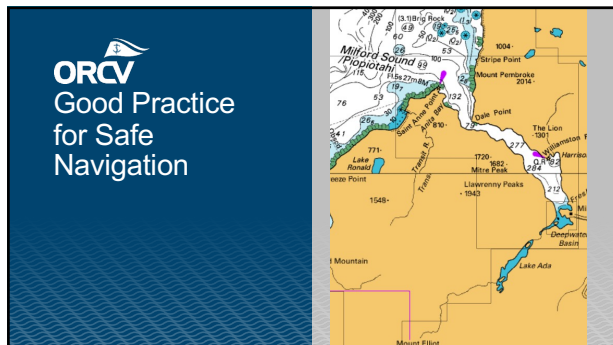


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AIS Additional Features

- AIS AtoN - transmitting position and status of buoys and lights, which can then show up on an electronic chart, display or radar
- Synthetic AIS. Transmitter is located near – but **not on** the object of interest – such as submerged rock
- AIS received by satellites to give extended reception of the VHF signal - even when out at sea
- ORCV exclusion zone marks are turned on during our races

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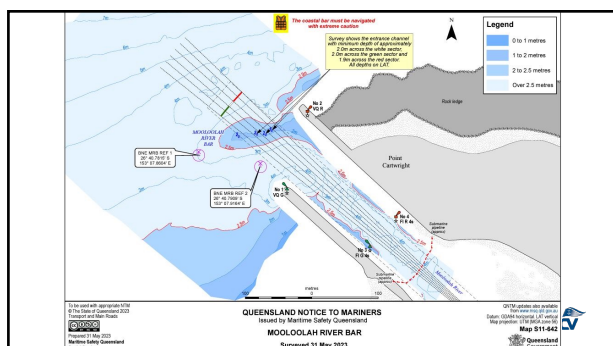
Key points

- Everyone on a boat should take an interest in navigation
- There should be redundancy – in equipment and people
- There should be a plan, made well before the trip, including plan B, C, D, E, F catering to “what if”
- Don't blindly rely on technology, use your observations
- Be conservative !!

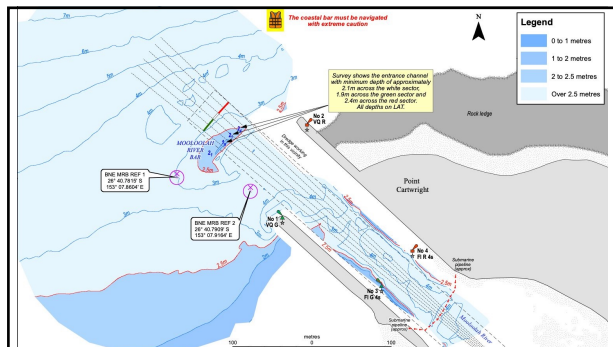
Proper Preparation Prevents Poor Performance



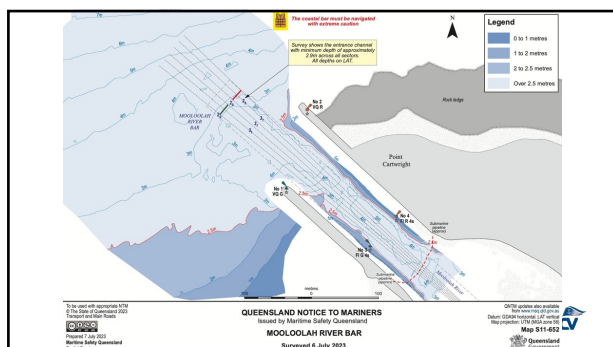
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Passage / Race Planning

Your passage should be a confirmation of what you have already planned.....

- Estimated times along the route
- Conditions to expect
- Dangers & potential dangers

Include contingencies for unplanned eventswhat if

- I need a bolt hole ?
- I break a rudder ?
- I need medical assistance?

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Observations

- Things to note on plan:-
 - Expected sighting of shore line changes (e.g. a headland)
 - Navigation markers
 - Lights and beacons
 - Significant chart features – oil rigs
 - Depth changes
 - Shoaling Water
 - Consider writing them down
 - In your logbook



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Red Zones

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What makes a Red Zone Red ?????

- Potential outcomes if you get it wrong
- Likelihood of getting it wrong..
 - Crew fatigue, especially the helm and navigator
 - Weather - visibility, difficult conditions
 - Tides – possibility of rips, breaking waves
 - Inherent difficulty..... navigation lights and shore lights, condition of leads
 - Been there before ???? do you know what the entrance looks like in the dark ?
 - Reliability of charts
 - Shipping, fishing boats, cray pots
 - Most significant mistakes happen at the back end of the race/passage

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Red Zone Procedures – some general rules

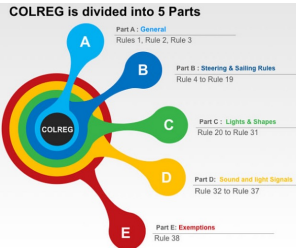
- Identify likely red zones when you do your trip plan....
 - Awareness matters – discuss with crew, watch leaders and both navigators
- One person steering... not steering and navigating
 - Nav Person not down below
 - Lookouts
 - Protect night vision – of skipper and lookouts
- Ensure you have boat under proper control before entering red zone
 - Know the limitations of the boat and crew in the conditions you could expect to experience



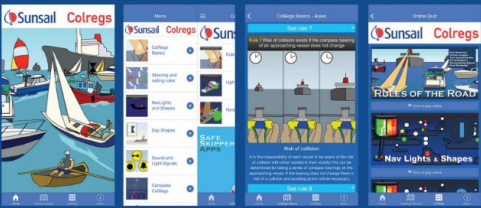
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COLREGS

- Know and follow the rules
- Maintain a proper lookout (windward and leeward)
- Travel at a safe speed
- Allow for the actions of others, both reasonable and unreasonable.
- Know how to recognise lights of ships
- knowledge of the Col Regs



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Available on the App Store

ANDROID APP ON Google play

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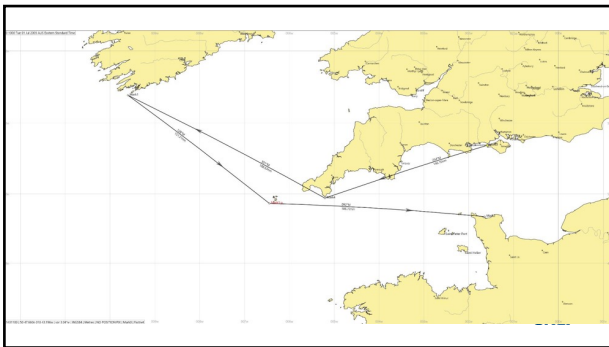


Further Exercises

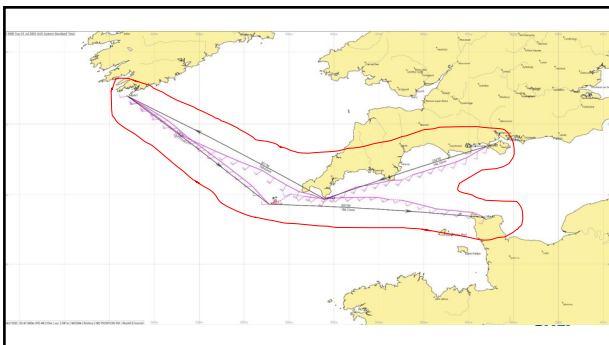
- Exercise #05 – Port Arlington – Cole Channel Beacon
- Exercise #06 – Blairgowrie Yacht Squadron (BYS) – Queenscliff Cruising Yacht Club (QCYC)
- Exercise #07 – Return trip from Hobart – Melbourne
- Exercise #08 – Fastnet



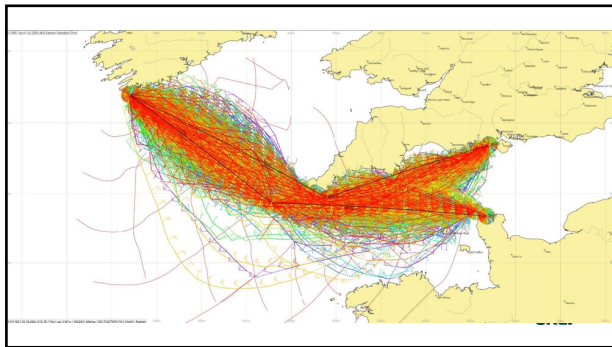
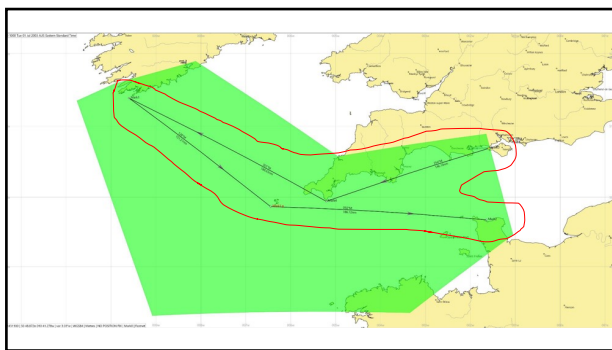
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111

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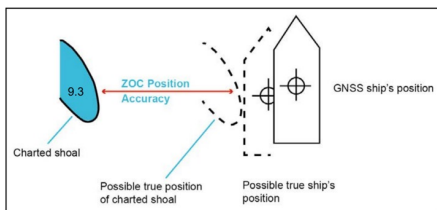
Key Take Home Messages

- Paper Charts have given way to electronic charts
- Only ENC's are the official charts
- No charts are perfect! Zones of Confidence always need to be considered
- GPS, plotters and AIS are great aids to navigation but need to be set up correctly and constantly monitored
- Plan routes well in advance to identify potential hazards
- Crew vigilance is critical in addition to instrumentation
- Risk management – What could go wrong and how would we cope?

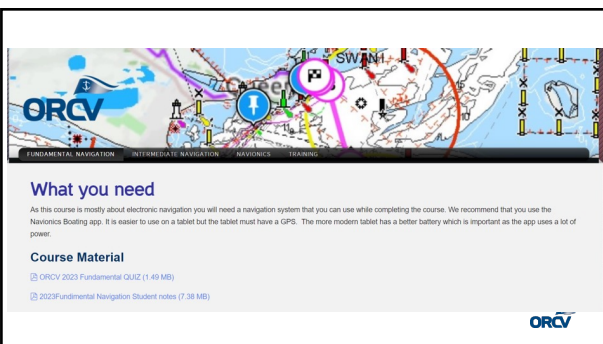


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ZOC Zones of Confidence



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What you need

As this course is mostly about electronic navigation you will need a navigation system that you can use while completing the course. We recommend that you use the Navionics Boating app. It is easier to use on a tablet but the tablet must have a GPS. The more modern tablet has a better battery which is important as the app uses a lot of power.

Course Material

- ORCV 2023 Fundamental QUIZ (1.49 MB)
- 2023 Fundamental Navigation Student notes (7.38 MB)

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- SENIOR MEMBERSHIP \$250.00*
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Upcoming Courses

July 25 - Weather for Sailors - Module 1
Aug 6 - Practical Radio
Aug 12 - Bowmans Course
Sep 10 - Safety & Sea Survival

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Weather for Sailors

The Fundamentals-Enclosed Waters

Starts Tues 25 July online

www.orcv.org.au

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What we want you to do before the Q&A



Complete the major exercise using your electronic charting software

Email training @orcv.org.au

A written Voyage plan

Screen captures of your electronic route

A GPX file of your routes

121

What we want you to do before the Q&A



It would be great to know what you're asking beforehand so that we can prepare better for your questions.

Any questions sent to training@orcv.org.au beforehand will head the queue.

122

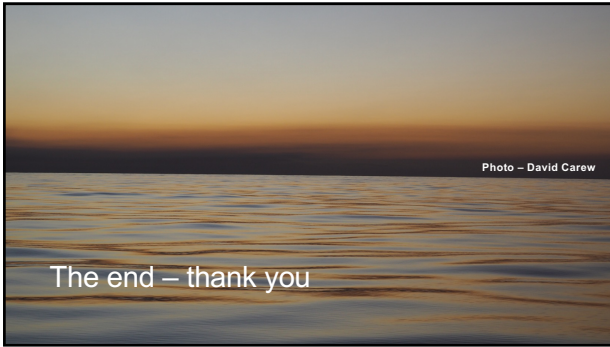
Ocean Racing Club of Victoria

What's Next

- Q&A Session next Wednesday night 19th August 7pm
- Expressions of interest for the intermediate course on the website
- Practice and Practice and you will become a better navigator
- Get to know the instruments on your own boat
- Join the Facebook group for your instrument's

Photo – Cath Steel

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