Hamburg, 20.11.2023

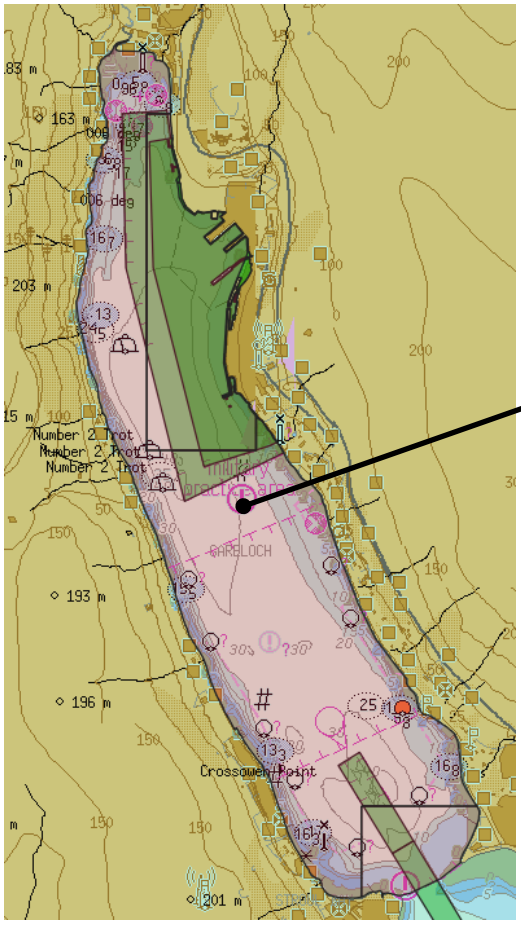
Inconsistent encoding of restricted area object class between different ENC usages

ChartWorld has identified several data inconsistencies in ENCs with respect to the restricted area object class (RESARE). In numerous cases, encoded RESARE polygons are missing in charts of a better usage covering the same area (or part thereof).
Cases of data inconsistency were observed between charts of the different chart producers, but also between charts of the same chart producer.

The following examples use the same colour coding:

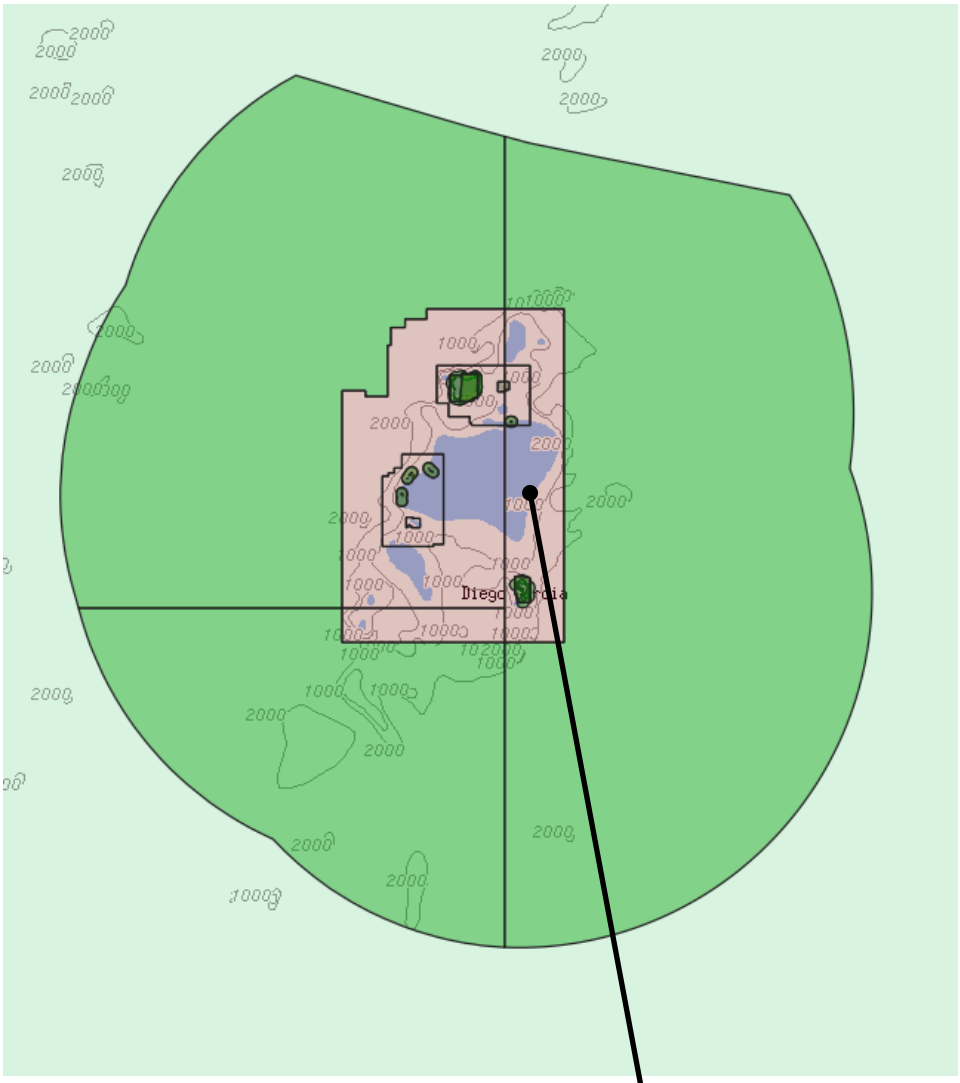
- Green = RESARE object found in best usage chart
- Red = RESARE object of a worse usage, not covered by a corresponding RESARE object from the chart of best available usage

1) UK: 56.04370068, -4.81883798



class_code	RESARE
usage	3
best_usage	4
cell_name	GB302131
best_cell_name	GB40782K
cell_cscale	45.000
best_cell_cscale	12.000
area_objnam	NULL
area_restriction	entry restricted
area_scamin	54.463
area_cscale	Not applicable
area_category	NULL
area_datsta	NULL
area_datend	NULL
area_inform	SPECIAL AREA - FASLANE PROTECTED ...
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	540/10117688/1
geometry_type	Area

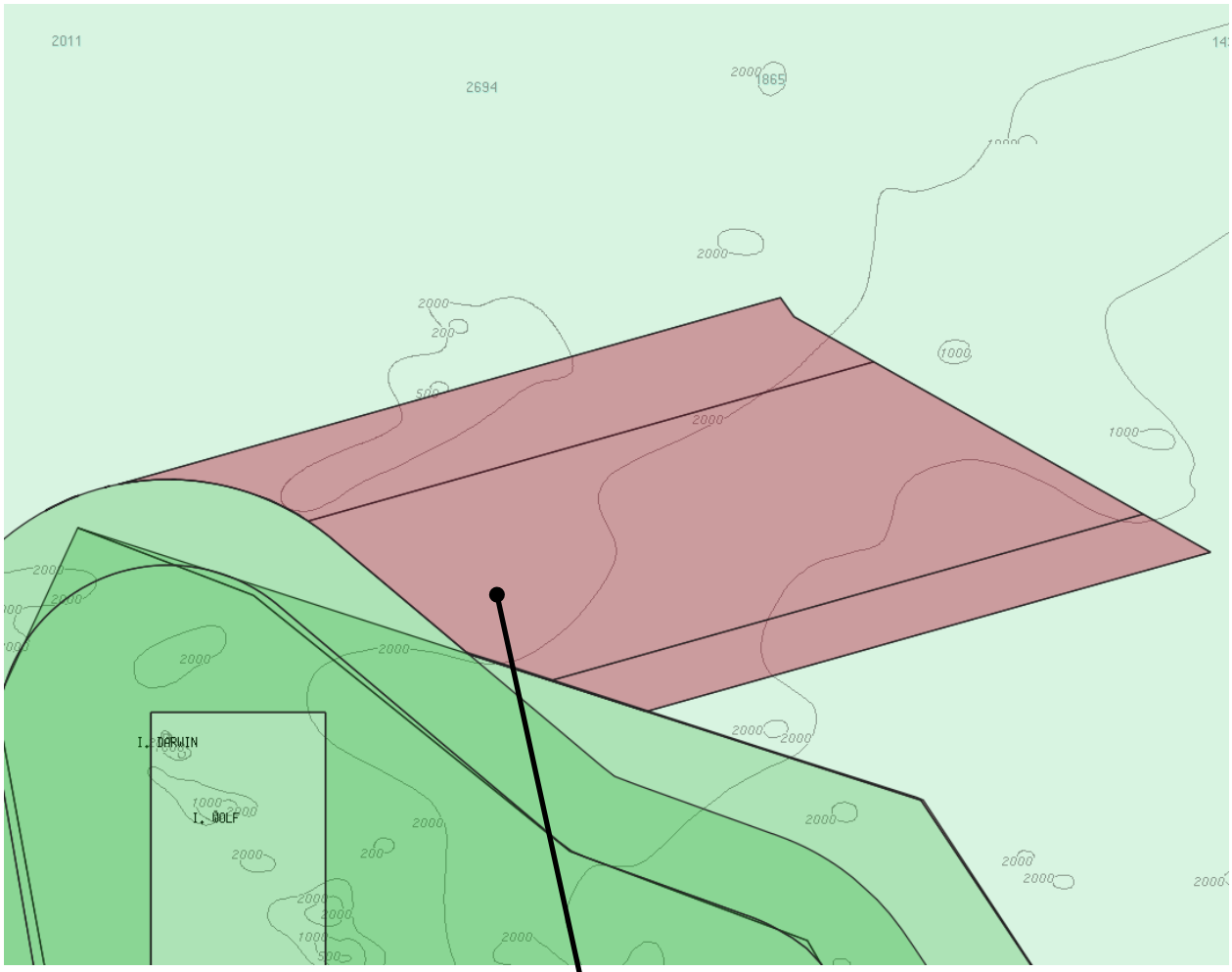
2) Chagos Archipelago: -6.21813694, 71.86604923



Restricted area encoded in chart of usage 1 but not in chart of best usage 2.

class_code	RESARE
usage	1
best_usage	2
cell_name	GB104707
best_cell_name	GB200003
cell_cscale	3.500.000
best_cell_cscale	350.000
area_objnam	NULL
area_restriction	entry restricted
area_scamin	11.519
area_cscale	Not applicable
area_category	nature reserve
area_datsta	NULL
area_datend	NULL
area_inform	MARINE PROTECTED RESERVE
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	540/12860944/1
geometry_type	Area

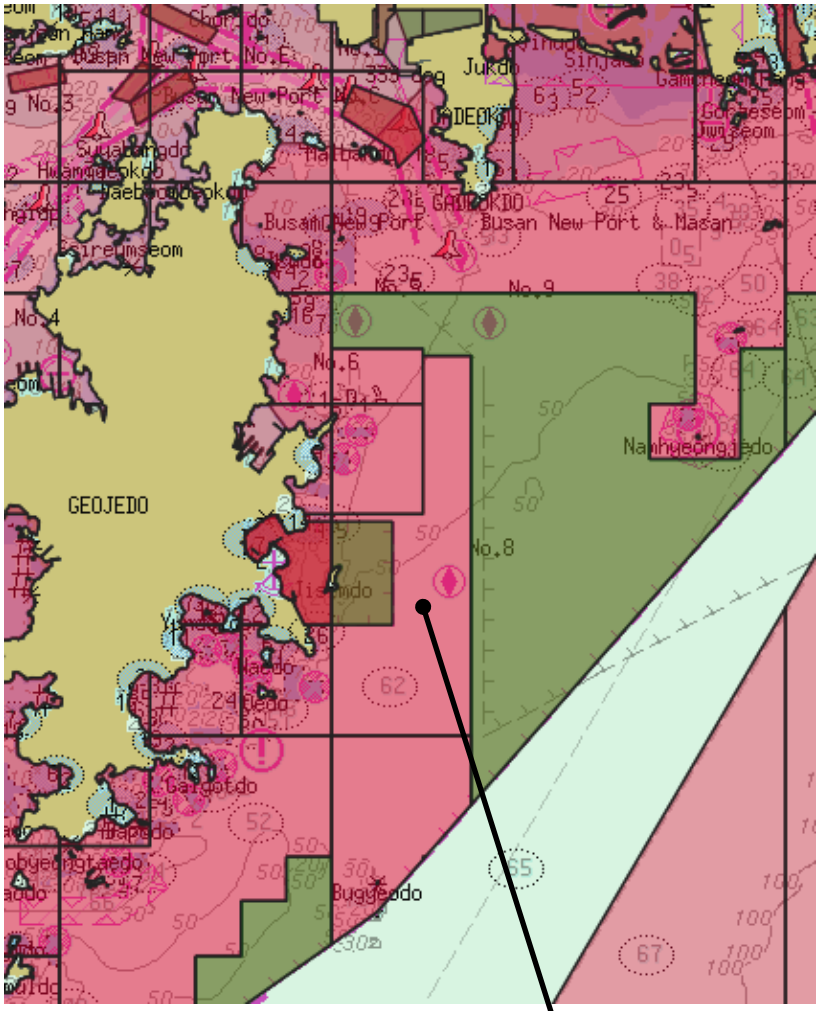
3) Galápagos Islands: 2.52929627, -89.99360468



Restricted areas encoded in chart of usage 1 but not in chart of best usage 2.

class_code	RESARE
usage	1
best_usage	2
cell_name	GB1BQ000
best_cell_name	EC200020
cell_cscale	3.000.000
best_cell_cscale	700.000
area_objnam	NULL
area_restriction	entry restricted
area_scamin	11.519
area_cscale	Not applicable
area_category	nature reserve
area_datsta	NULL
area_datend	NULL
area_inform	NO TAKE ZONE
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	540/3926959939/1
geometry_type	Area

4) South Korea: 34.78952595, 128.80092065



Restricted area encoded in chart of usage 2, 3 and 4 but not in chart of best usage 5.

More issues can be seen, indicated by the red coloured polygons. The darker the red colour, the more issues:

- RESARE object found in several other usages, except for best usage chart

or

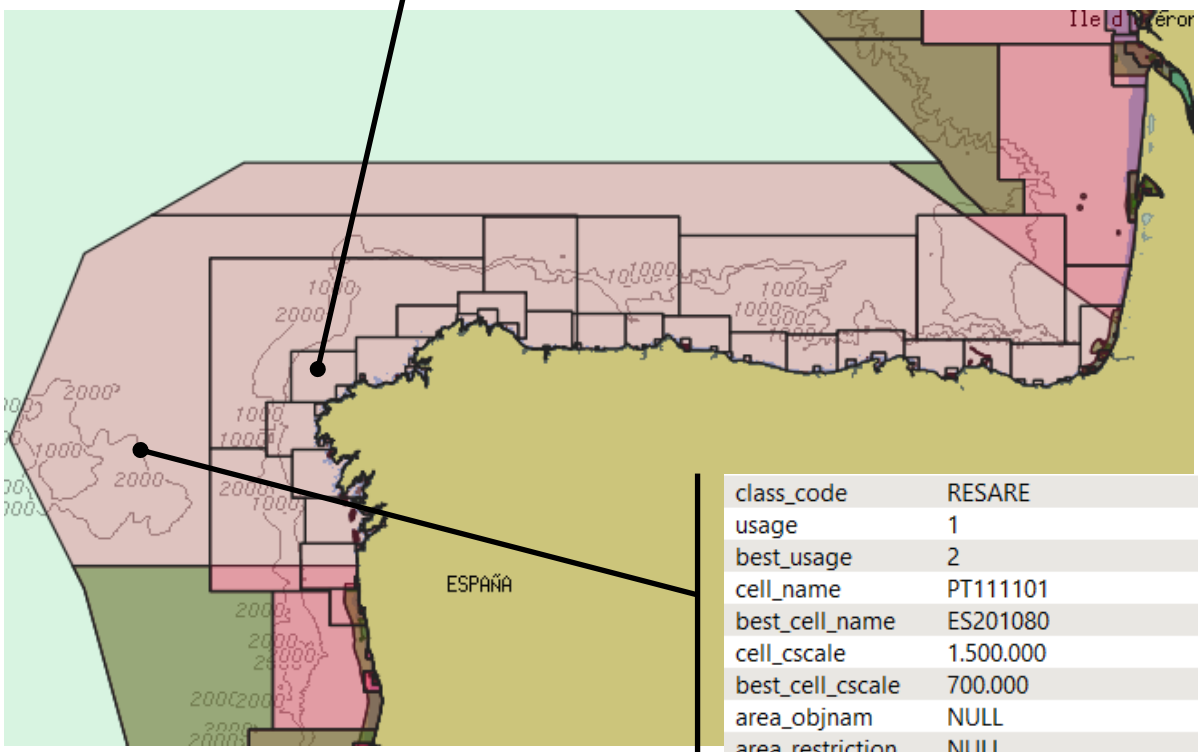
- several different RESARE polygons (cases) over one another.

class_code	RESARE
usage	4
best_usage	5
cell_name	KR4G3E20
best_cell_name	KR5G3E22
cell_cscale	75.000
best_cell_cscale	25.000
area_objnam	NULL
area_restriction	entry prohibited
area_scamin	48.927
area_cscale	Not applicable
area_category	NULL
area_datsta	NULL
area_datend	NULL
area_inform	Traffic Prohibited Area for Tanke
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	280/2491666/10001
geometry_type	Area

5) Off Cap Finisterre: 43.18641317, -11.07985927

Restricted area encoded in charts of usage 1 but not in chart of best usage (2 or 3 or 4 or 5).

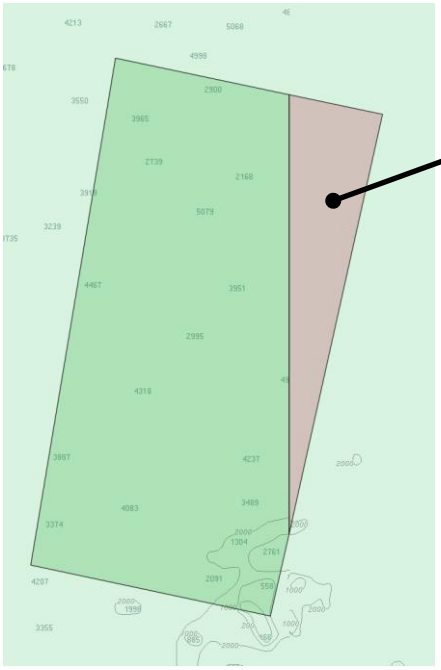
class_code	RESARE
usage	1
best_usage	4
cell_name	PT111101
best_cell_name	ES400413
cell_cscale	1.500.000
best_cell_cscale	45.000
area_objnam	NULL
area_restriction	NULL
area_scamin	38.527
area_cscale	Not applicable
area_category	Particularly Sensitive Sea Area (PSSA)
area_datsta	NULL
area_datend	NULL
area_inform	Particularly sensitive sea area (PSSA).
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	410/657675/1
geometry_type	Area



class_code	RESARE
usage	1
best_usage	2
cell_name	PT111101
best_cell_name	ES201080
cell_cscale	1.500.000
best_cell_cscale	700.000
area_objnam	NULL
area_restriction	NULL
area_scamin	38.527
area_cscale	Not applicable
area_category	Particularly Sensitive Sea Area (P
area_datsta	NULL
area_datend	NULL
area_inform	Particularly sensitive sea area (P
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	410/657675/1
geometry_type	Area

6) Atlantic Ocean: 40.24618075, -13.53452617

A restricted area in the Atlantic Ocean, off the Portuguese coast, only existent in usage 1 but not in usage 2.

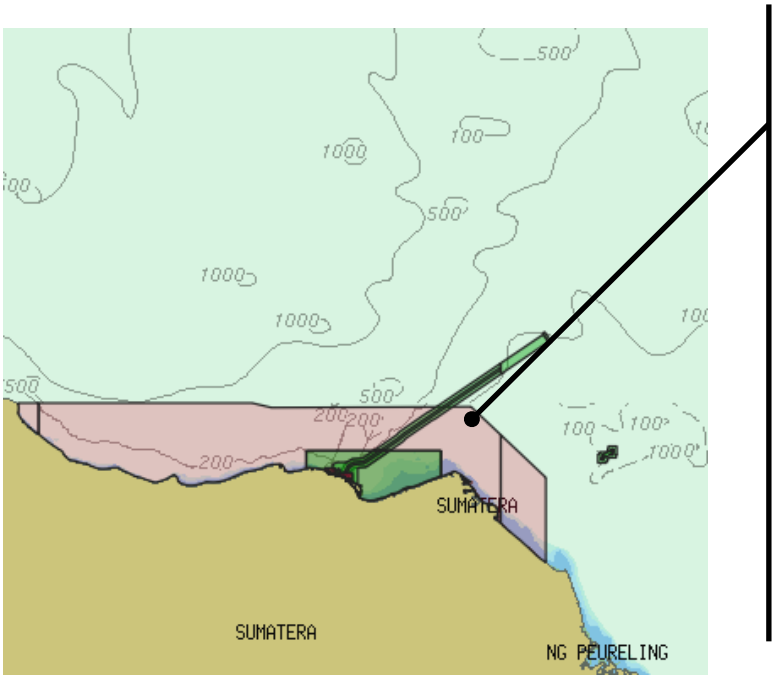


class_code	RESARE
usage	1
best_usage	2
cell_name	PT111101
best_cell_name	PT221101
cell_cscale	1.500.000
best_cell_cscale	700.000
area_objnam	NULL
area_restriction	area to be avoided
area_scamin	38.527
area_cscale	Not applicable
area_category	NULL
area_datsta	20.230.101
area_datend	20.230.131
area_inform	Rocket debris fall. Temporary nc
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	410/787819/1
geometry_type	Area

Note: *This issue may be caused by the fact that the restricted area should have been deleted from the usage 1 chart, given the timeframe of validity (DATSTA & DATEND).*

7) Malacca Strait: 5.37009339, 97.54577521

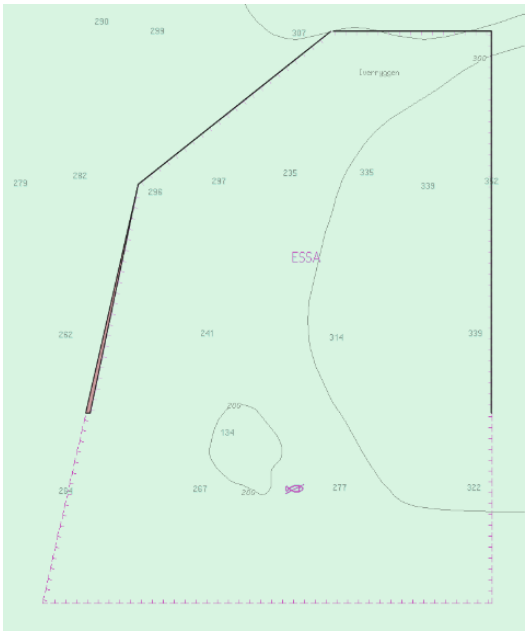
A restricted area in the Malacca Strait exists only in GB chart of usage 2 but not in Indonesian chart of usage 3:

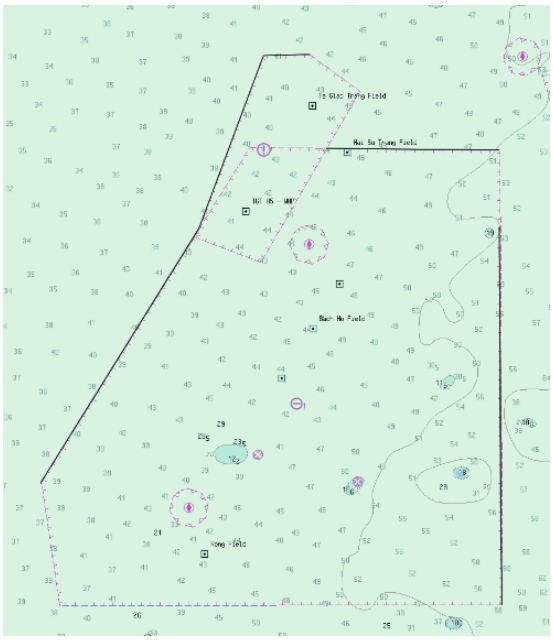


class_code	RESARE
usage	2
best_usage	3
cell_name	GB22777A
best_cell_name	ID300436
cell_cscale	350.000
best_cell_cscale	180.000
area_objnam	NULL
area_restriction	entry restricted
area_scamin	16.959
area_cscale	Not applicable
area_category	NULL
area_datsta	NULL
area_datend	NULL
area_inform	RESTRICTED AREA
area_persta	NULL
area_perend	NULL
area_status	NULL
area_foid	540/24219389/1
geometry_type	Area

Final Remarks

The exact number of issues is hard to quantify. The research conducted revealed more than 18000 findings but the majority of those originate from imprecisions and discrepancies in polygon geometry between different usages. These are not considered real issues.





Filtering could be done by the calculated area, but it's certainly not ideal.

In any case, the research revealed numerous real data inconsistency issues in the range of several hundred.

Issues of this kind are particularly undesirable, since mariners are generally advised to use the best usage chart available for navigation. Restricted areas can contain important information relevant to navigation and should be available in the best usage to ensure that ECDIS alarms are triggered accordingly.

The intention should be that vital information contained in a worse usage chart is also found in a better usage chart. This data inconsistency should therefore be addressed by the IHO, to work out a solution and to put mechanisms in place to detect these issues during data validation checks.