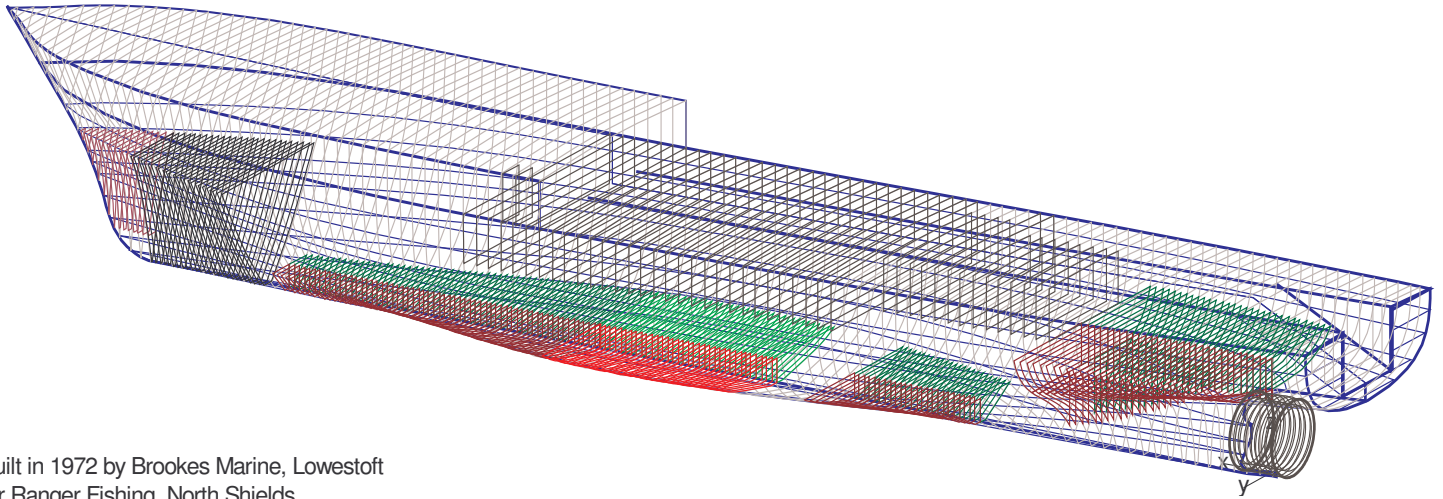


The stability of the trawler Gaul

To bring in the New Year with a bang, we would like to briefly advise the outcome of an independent, critical and detailed investigation into the operational stability reserves of the freezer trawler Gaul. The results of this investigation reveal that, contrary to the many official pronouncements that were made on this matter (in 1974, 1980, 1999 and 2004), **the Gaul's reserves of intact stability did not in fact meet the minimum standards and norms that were expected for a fishing vessel built in the early 1970s** (ref. IMCO "Recommendation on Intact Stability of Fishing Vessels" 1968).

Trawler Gaul *ex Ranger Castor*

Stability model including hull, steering nozzle, tanks and factory space



Built in 1972 by Brookes Marine, Lowestoft
for Ranger Fishing, North Shields
Capsized and sank in the Barents Sea in
February 1974 with all 36 crew onboard

An extract from the final report of the Formal Investigation into the loss of the Gaul (1974) gives the first pronouncement on this matter:

10 THE STABILITY OF GAUL

- 10.1 An independent investigation into the safety of *Gaul* as built was made on behalf of the owners by Y-ARD, Marine Consultants of Glasgow. This investigation examined the stability and seaworthiness characteristics of the vessel in the condition of loading in which she was judged to be immediately prior to the disaster. Similar investigations have been carried out by the Department of Trade. There was substantial agreement between the two reports which were presented to the Court. Both showed that the initial and large-angle stability criteria recommended by the Inter-governmental Consultative Organisation (IMCO) for trawlers were met with a substantial margin. These recommendations require a minimum value for the meta-centric height (GM) and minimum areas under the curve of statical stability at angles of heel of 30° and 40°.

When the stern-trawler Gaul and her crew left Hull at 6 AM on the morning of 22 January 1974 for the Barents Sea fishing grounds, they were not putting to sea in an “**exceptionally seaworthy vessel**” nor in one that “had excellent sea-keeping characteristics and a large range of intact stability”¹ as the hyperbole in the 1999 MAIB report into the loss of the Gaul would have us believe, instead they were setting out for a destination notorious for poor weather, in a ship, which did not meet the IMCO basic stability standards² in the sailing conditions that were normal for her service.

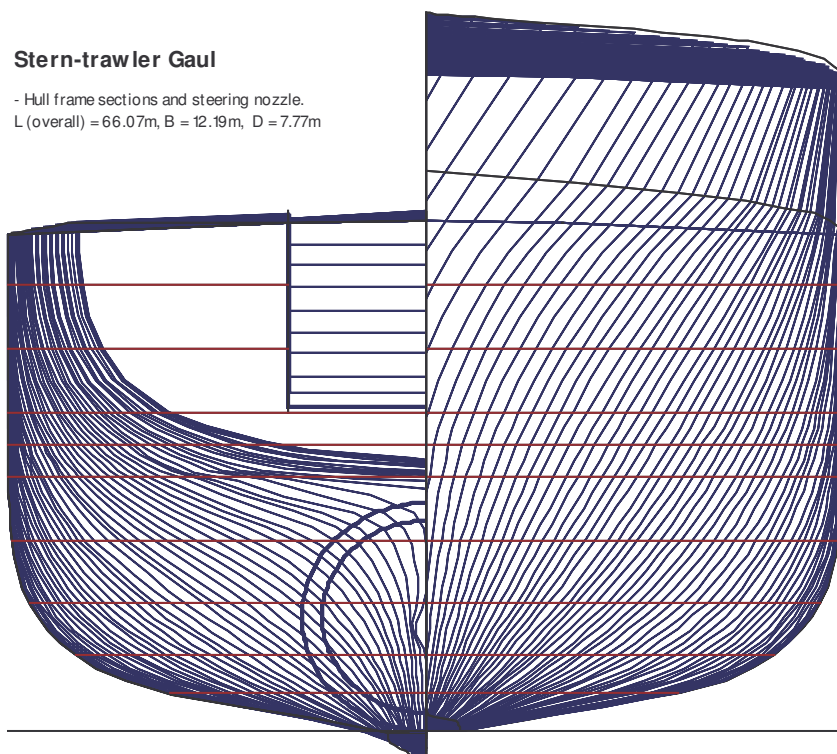
¹ MAIB - the Marine Accident Investigation Branch of the DfT

² The IMCO stability criteria have been recognized for more than forty years now as being the minimum base stability standard that should be met by seagoing trawlers to ensure safety at sea.

What made things worse, however, was the fact that due to a number of oversights and design errors, the official stability documentation that was provided onboard the Gaul for the use of the Skipper (although certified by the Department of Trade) over-estimated the vessel's reserves of intact stability to such an extent that anyone using it would not have been able to identify when the vessel was approaching any marginal or critical stability conditions.

Added to that, and most important of all, was the fact that, shortly after her delivery, the Gaul's owners converted two of her double bottom tanks to enable them to carry fuel oil instead of ballast water (ballast water was required on the Gaul to ensure that the vessel could maintain adequate stability in all anticipated sailing conditions), but the stability documents were not revised to take account of this significant modification.

The effects of this alteration could only be described as disastrous from the viewpoint of the Gaul's ability to meet the IMCO stability standards (*see example in Annex I*) and, in fact, on the day of her loss it is probable that, unbeknownst to her skipper, she was sailing in a marginal or deficient stability condition³.



In 2004, the officials charged with conducting the Re-opened Formal Investigation into the loss of the Gaul managed to convince themselves, but not many others, that factory deck flooding, resulting from **crew error** was the reason why the Gaul had capsized and foundered.

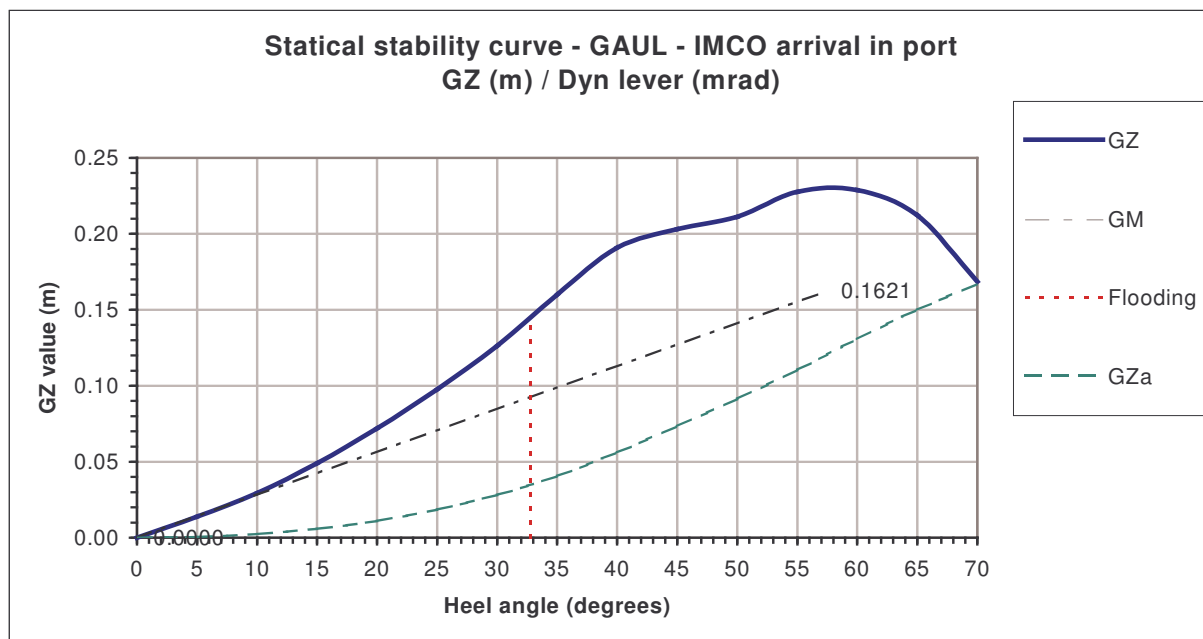
Design faults, which could lead to such flooding, and the fact that the Gaul had inadequate stability for her proposed service were two critical issues that were kept strictly off the agenda.

³ From the viewpoint of stability assessment, the exact condition of the Gaul at the time of her loss cannot be accurately gauged and minor differences in assumptions made as to the amount of fish and gear onboard, fuel consumption, tank usage etc could take the vessel from a marginal 'pass' to a significant 'fail' (vis-à-vis the IMCO minimum standard).

Annex 1

Intact stability standards for fishing vessels:

- IMCO arrival in Port (10% fuel, stores etc and 20% of fish catch onboard)



Gaul arrival in port – 34.3 tonnes Fuel Oil (total) in no.2 DB tank P&S and daily service tanks

Free trim stability:		Dyn. lever	Incr. stab	Draught	Trim
Heel a (°)	Right. lever GZ (m)	GZa(0-a) (mrad)	dGZ/da (m/rad)	mld at L/2 (m)	at CL (m)
0	0.000	0.000	0.162	3.813	1.174
5	0.014	0.001	0.161	3.806	1.149
10	0.029	0.002	0.201	3.783	1.069
15	0.049	0.006	0.248	3.743	0.949
20	0.072	0.011	0.280	3.683	0.797
25	0.098	0.018	0.309	3.598	0.623
30	0.126	0.028	0.358	3.480	0.435
35	0.160	0.041	0.415	3.319	0.245
40	0.191	0.056	0.223	3.106	0.051
45	0.203	0.073	0.084	2.838	-0.098
50	0.211	0.091	0.147	2.497	-0.158
55	0.228	0.110	0.125	2.050	-0.088
60	0.229	0.131	-0.096	1.476	0.090
65	0.212	0.150	-0.315	0.707	0.395
70	0.169	0.167	-0.708	-0.430	0.985
GZ max at 57.8°	0.231				
Minimum stability criteria:		Actual value / Compliance	Max KG' (m)	Critical Points :	Subm.angle(°)
GZa(0.0°-30.0°)>0.055mrad		0.028 / NO	5.687	Duff chute Factory entrance	32.8 55.6
GZa(0.0°-40.0°)>0.090mrad		0.056 / NO	5.753		
GZa(30.0°-40.0°)>0.030mrad		0.028 / NO	5.891		
GZ(>30.0°)>0.200m		0.231 / OK	5.950		
a(GZmax)>30.0°		57.8 / OK	6.108		
GMo>0.350m		0.162 / NO	5.722		
Sum. Compliance, max KG' :		NO	5.687	Min.angle :	32.8

The table above shows that the vessel fails to meet four of the IMCO's six minimum stability criteria (i.e. the GZ areas and the initial GM value) in the given sailing condition and that the failure is neither marginal nor borderline, but a failure by a substantial margin (see differences between minimum stability criteria and the actual values).