CARGO OPTIMISATION: WATERSIDE

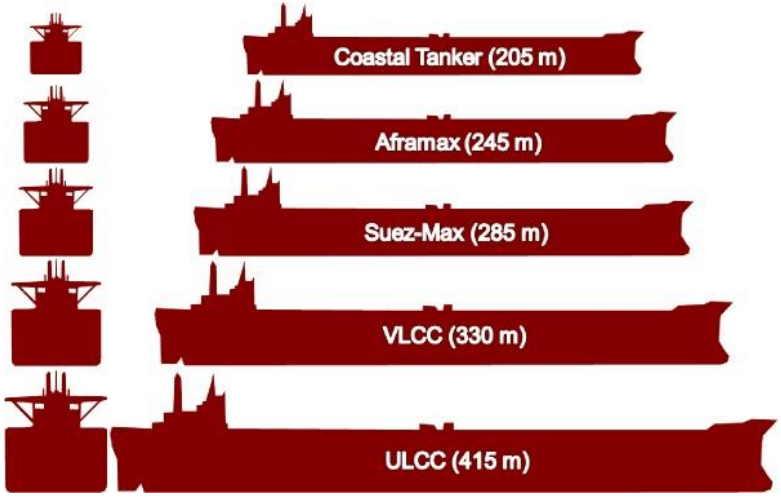
Maximising the efficiency and productivity of the water column and ensuring channel integrity and vessel safety

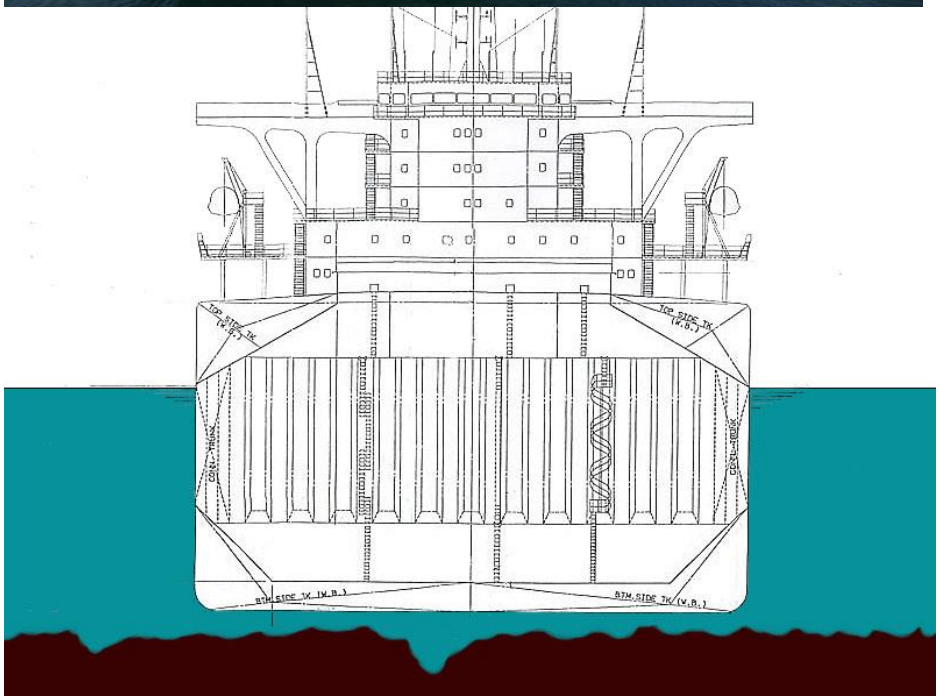
AAPA Seminar
8 June 2016

Captain Jonathon Pearce
Business Development Manager

Setting the scene

Ports having to adapt to ever larger ships

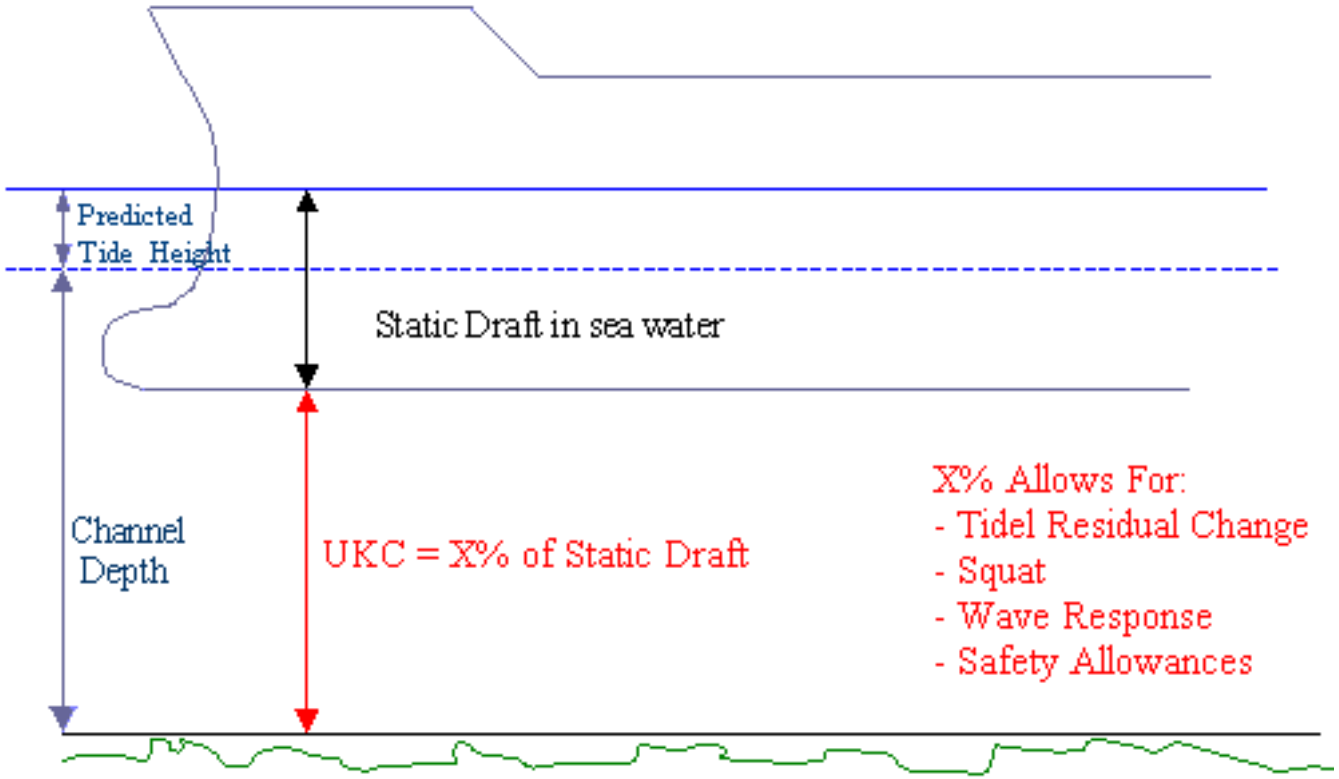




Risk controls

STATIC

Traditional rules based on **static** data, referred to as **SUKC**.

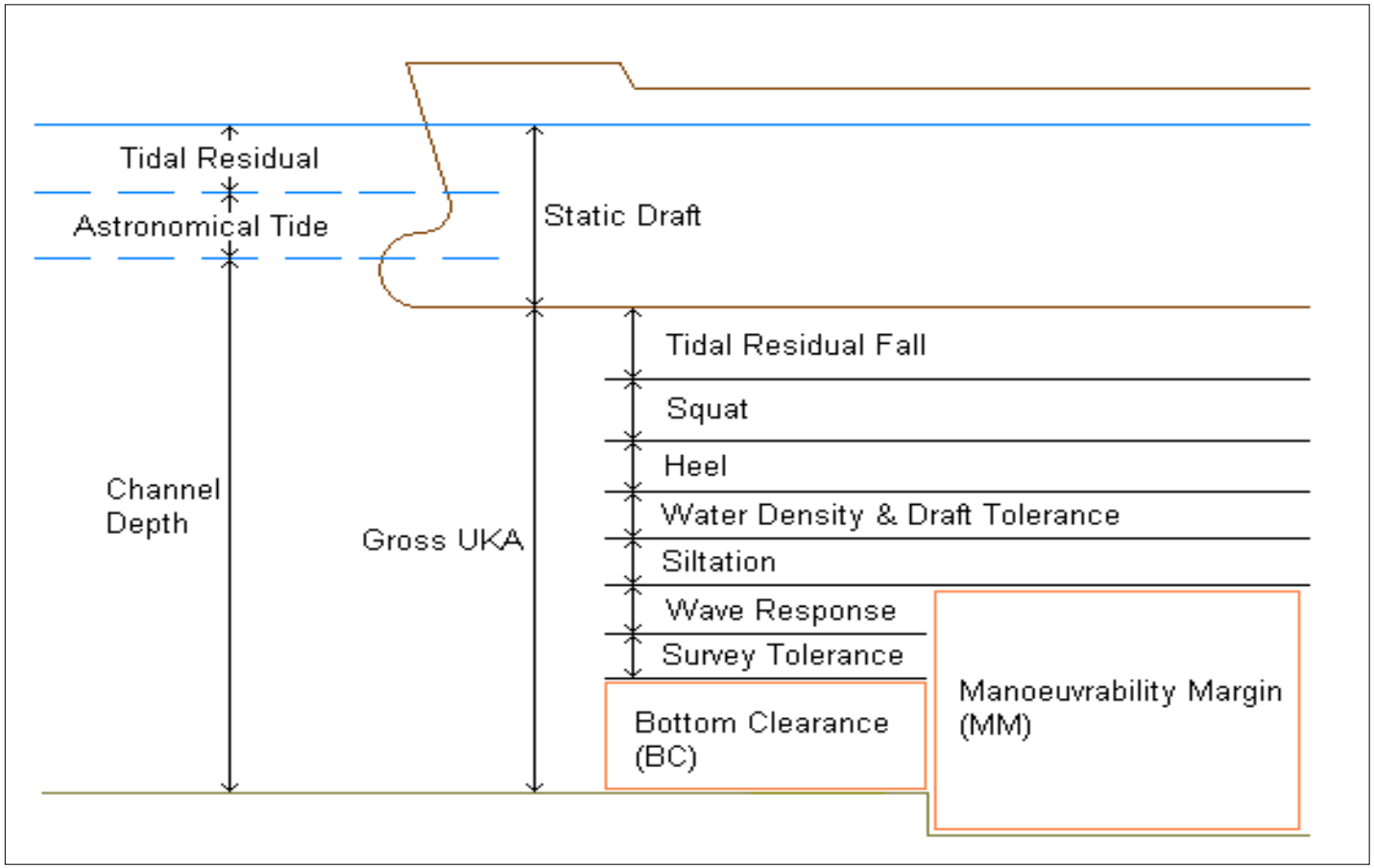


VARIABLE RISK

Improved risk controls

DYNAMIC

DUKC® measurement based on **real time** data for each element.

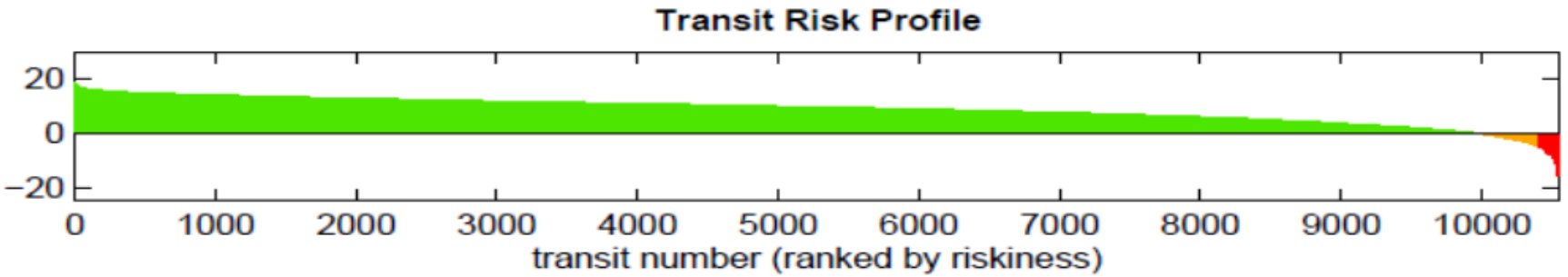


FIXED (CONSTANT) RISK

DUCK® - Overview

Economic and Safety Drivers

Win/Win - Productivity & Safety

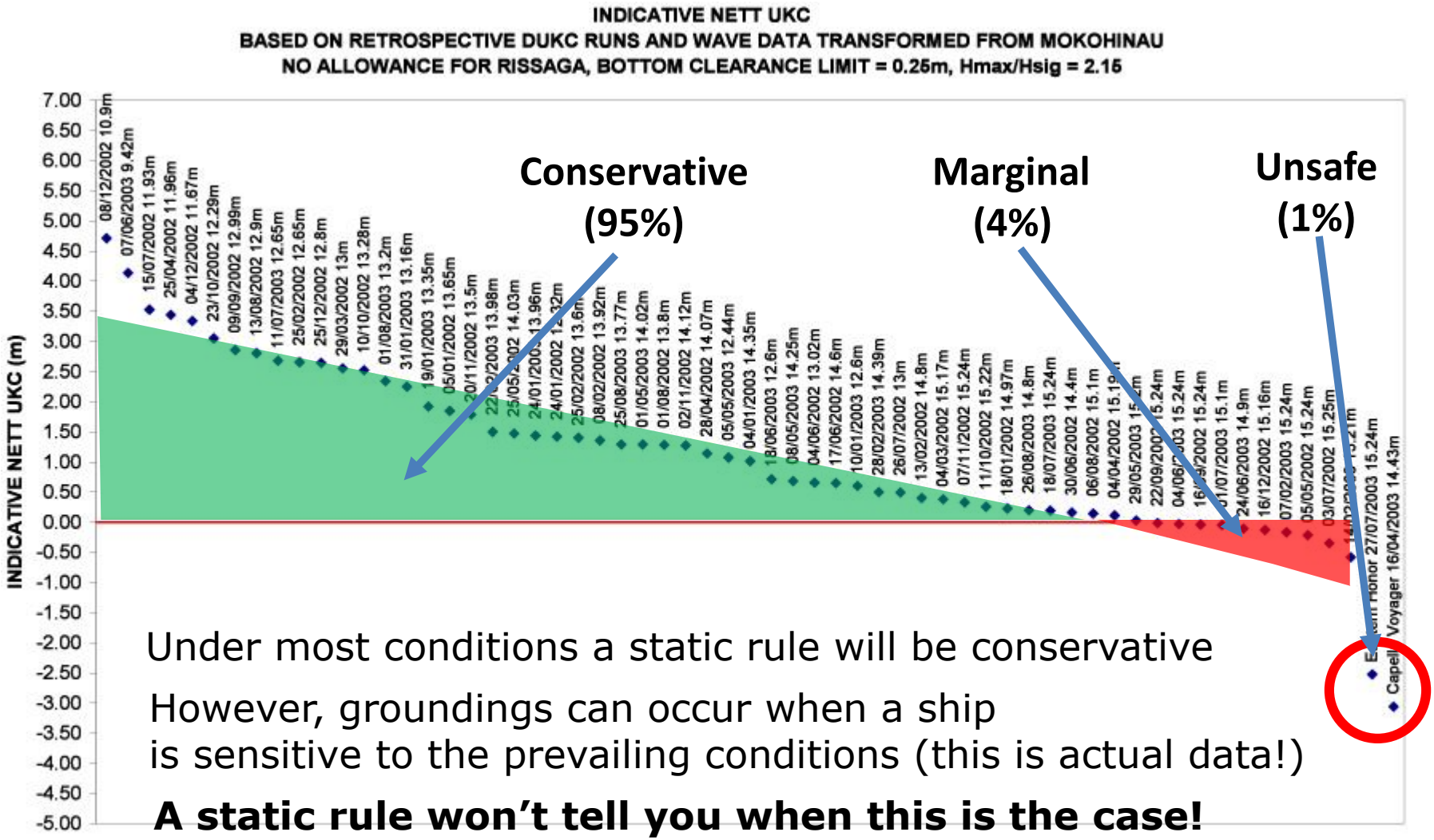


- OMC's evidence from existing studies show:
- 95% existing static rule conservative
- *Potential for draught increases and/or productivity gains through increased tidal windows*
- 4% existing static rule marginal
- *Potential for a touch bottom incident. High risk but actual risk never quantified*
- 1% existing static rule unsafe
- *Very high potential for a touch bottom incident*

Case Study - Failure of Static Rule

OMC International

Marsden Point NZ, Groundings: Eastern Honor & Capella Voyager 2003



Under most conditions a static rule will be conservative

However, groundings can occur when a ship is sensitive to the prevailing conditions (this is actual data!)

A static rule won't tell you when this is the case!

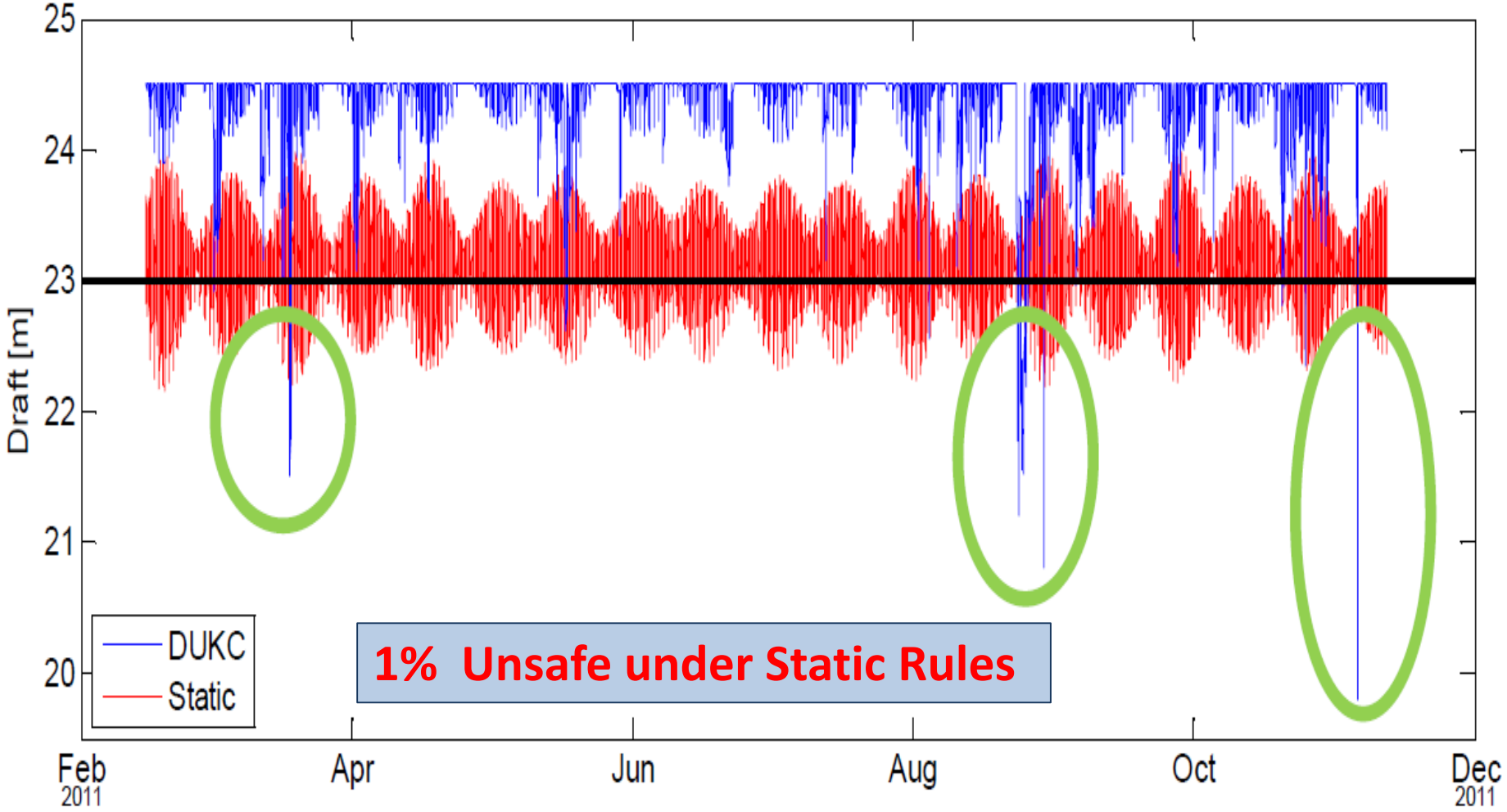
Case Study - Port Taranaki

Increased DUKC® Tidal Windows

Original Static Tidal Window

Static Rules not Sufficient in High Swell Conditions

South American Port – Similar Results



Why push for an extra cm?

- Every cm of draft is ~120 tonnes of cargo
- Iron Ore say ~$50 per tonne
- 120 x $50 = $6,000 per cm/vessel
- ~1300 cape vessels p.a.
- $ 6,000 x 1300 = $7,800,000 extra income p.a. per cm
- Any additional draft increases income streams

DUKC® Economic Benefits

"The DUKC program continues to be a major asset for BHP and the Port. As the port grows so does the value of the DUKC program, the value is in the order of ***7% of throughput*** (circ. 15 million tonnes).

The benefits are many:

1) *Direct tonnage gain from the* ***additional 50cm*** *in available draft over a static system, which adds an extra* ***7,000 tonnes*** *to a vessels loading*
2) *The* ***increased sailing window*** *(of about an hour) available enables us to sail* ***multiple vessels on a tide****.*
3) *Increased safety because all calculations are measurable and are accurate*."

BHP (Port Hedland)

Benefit Examples from using DUKC®

OMC International

Port Hedland Port Authority

- 2014/2015:
- Export tonnage 444,786,569 tonnes (approx 2400 vessels)
- Direct value of DUKC: approx an additional 40M tonnes per annum
- Or US$2 billon in addition revenue (US$50.15 (6/6/16))
- Tonnage record on a single tide: 1,511,977 tonnes (8 capesize vessels)

Arium

- In the 11 months since implementation:
- Directly reduced freight costs by over US$660,000
- Additional throughput of approximately 47,000t
- Increased revenue of more than US$2,000,000

Offshore Representative ROI's

	Benefits based on profit of additional tonnages								Benefits based on reduced freight due to fewer ships. Ignores berth, port, & pilotage fees, demurrage, deadfreight etc.			
Western Australian Ports	Average Benefit (m)	Number of Ships p.a.	TPCI	Additional Tonnage p.a. (lakh)	Profit / tonne	Total Benefit p.a. (INR crore)	Total Cost p.a. (INR crore)	ROI	Avge Tonnage (lakh)	Ships saved	Voyage Cost (INR crore)	ROI
Port 1	0.50	800	150	60	20	720.0	4.2	17043%	2	30.0	6.0	4186%
Port 2	0.10	360	150	5.4	20	64.8	1.8	3500%	2	2.7	6.0	800%
Port 3	0.40	2000	150	120	20	1440.0	21	6757%	2	60.0	6.0	1614%
Port 4	0.20	90	120	2.16	10	13.0	1.5	764%	0.8	2.7	2.4	764%
Port 5	0.20	40	150	1.2	10	7.2	1.8	300%	1.7	0.7	5.1	100%

- Australia Iron Ore Exports - 600 Million tonnes per annum (60 crore per annum)
  - **95% of Australia's iron ore exports sails on ships with maximum drafts and sailing times determined by DUKC® systems**
- Australian Coal Exports - 230 Million tonnes per annum (23 crore per annum)
  - **70% of Australia's coal exports sail on ships with maximum drafts and sailing times determined by DUKC® systems**

Representative Client Benefits

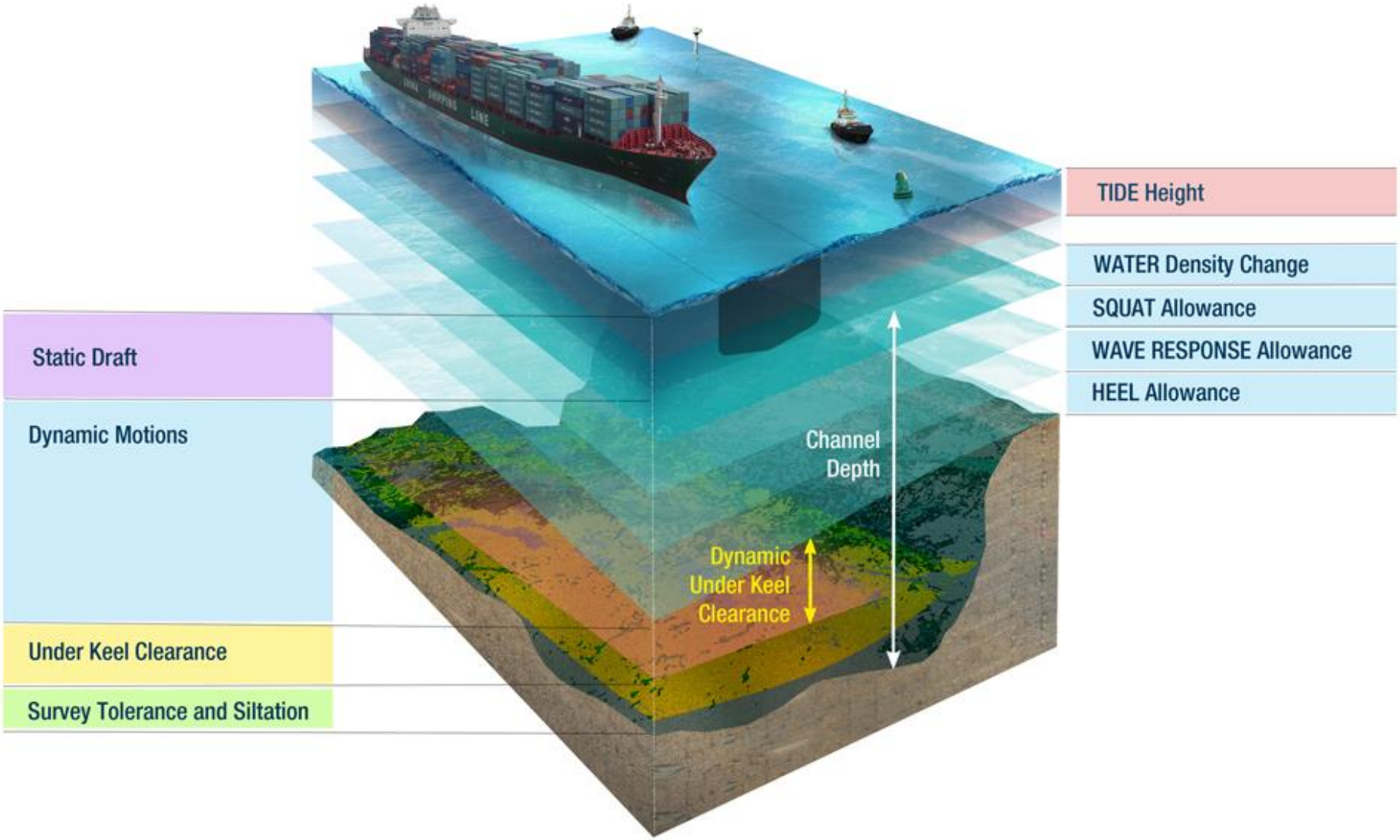
	Average #ships/ annum	Av GRT	TPC	Av benefit, cm	Profit/ tonnes	Total Benefit (US$)
Port 1	60	28000	40	20	20	$ 948,706
Port 2	80	60000	85	40	20	$ 5,421,176
Port 3	80	28000	40	40	20	$ 2,529,882
Port 4	60	28000	40	20	20	$ 948,706
Port 5	160	35000	49	20	20	$ 3,162,353
Port 6	200	35000	49	25	20	$ 4,941,176
Port 7	2600	85000	120	50	20	$ 312,000,000
Port 8	800	85000	120	50	20	$ 96,000,000
Port 9	365	85000	120	10	20	$ 8,760,000
Port 10	270	40000	56	20	20	$ 6,098,824
Port 11	400	80000	113	20	20	$ 18,070,588
Port 12	150	80000	113	20	20	$ 6,776,471
Port 13	250	40000	56	20	20	$ 5,647,059
Port 14	750	80000	113	40	20	$ 67,764,706
Port 15	400	45000	64	35	20	$ 17,788,235
Port 16	100	40000	56	30	20	$ 3,388,235
Torres Straits*	2000	40000				

Ships/annum 8725

With Torres still restricted with static 12.2, but analyses indicates average benefit possible of approx 30-40cm

Dynamic Underkeel Clearance

OMC International



Recap: Dynamic UKC (DUKC®)

- Provides a consistent scientific approach to UKC management. It is deterministic not probabilistic.
- Utilises near real time and forecast environmental data (tides, waves, currents) and uses sophisticated ship modelling to calculate ship motions and UKC
- Rigorous application of PIANC guidelines and limits
- Effective mitigation of grounding hazards
- Extensive full-scale DGPS validation (>450 vessels)

DUKC® Primary Outcomes

- **Ensures Safety** and
- **Maximises Productivity and Efficiency** and
- **Increased Economic Benefits**

(By exploiting the inefficiencies of the static rule)

- Enhanced decision making with transit plan accuracy
- Detailed reports Improved Master/Pilot Information Exchange
- Enhanced vessel scheduling/reduced channel conflicts
- Enhanced contingency planning
- Removes commercial pressures
- Implements a shared picture between ship and shore

PPA Corporate Video - Maintaining channel integrity in the Port Hedland harbour

https://youtu.be/Fquk0KLb_cU

OMC International

- Inventor and sole supplier of DUKC®
  - Dr Terry O'Brien involved in 2 PIANC committees
  - Technical advisors to UKHO TSMAD committees
  - Industrial member of IALA, and VTS committees
- Safety Record: 140,000+ bulk, container and tanker movements since 1993 without incident (about 1 movement per hour)
- Productivity and economic gains for DUKC users
- Installed at 25 Worldwide ports
- Over 450 vessels surveyed

TT CLUB
Mutual Insurance Limited

JAS-ANZ

LLOYD'S REGISTER QUALITY ASSURANCE · ISO9001

UKAS QUALITY MANAGEMENT 001

OMC DUKC®

Products & Services

- Channel Design
- Dredge Optimisation
- Mooring Design
- Risk Assessments

- Departure Drafts
- Sailing Windows
- Forecasting
- Long Range Planning Optimiser

- Port Capacity Modelling
- Discrete Event Simulation
- Vessel Fleet Optimisation
- Vessel Motion Analysis

- Vessel Monitoring
- Chart Overlay
- Real-time Alerts

Embrace Technology

Thank You

SOMS UKC Concept Study