Integrated Maritime Risk Management

Managing Vertical and Horizontal Clearance from Keel to Mast

Date: 2026-04-21

Classification: Public / Commercial in Confidence

Who is OMC International

Inventor (1993) and sole supplier of DUKC®.

Australian owned and operated company with a branch in Halifax, Canada

Focused on research, development, implementation and 24/7 support of DUKC® and other safety systems.

Supported by an experienced team of 70+ engineers, naval architects, oceanographers, software engineers, IT personnel and master mariners.

Chair of the IHO S-129 Project Team developing standards for UKC portrayal in S-100 format.

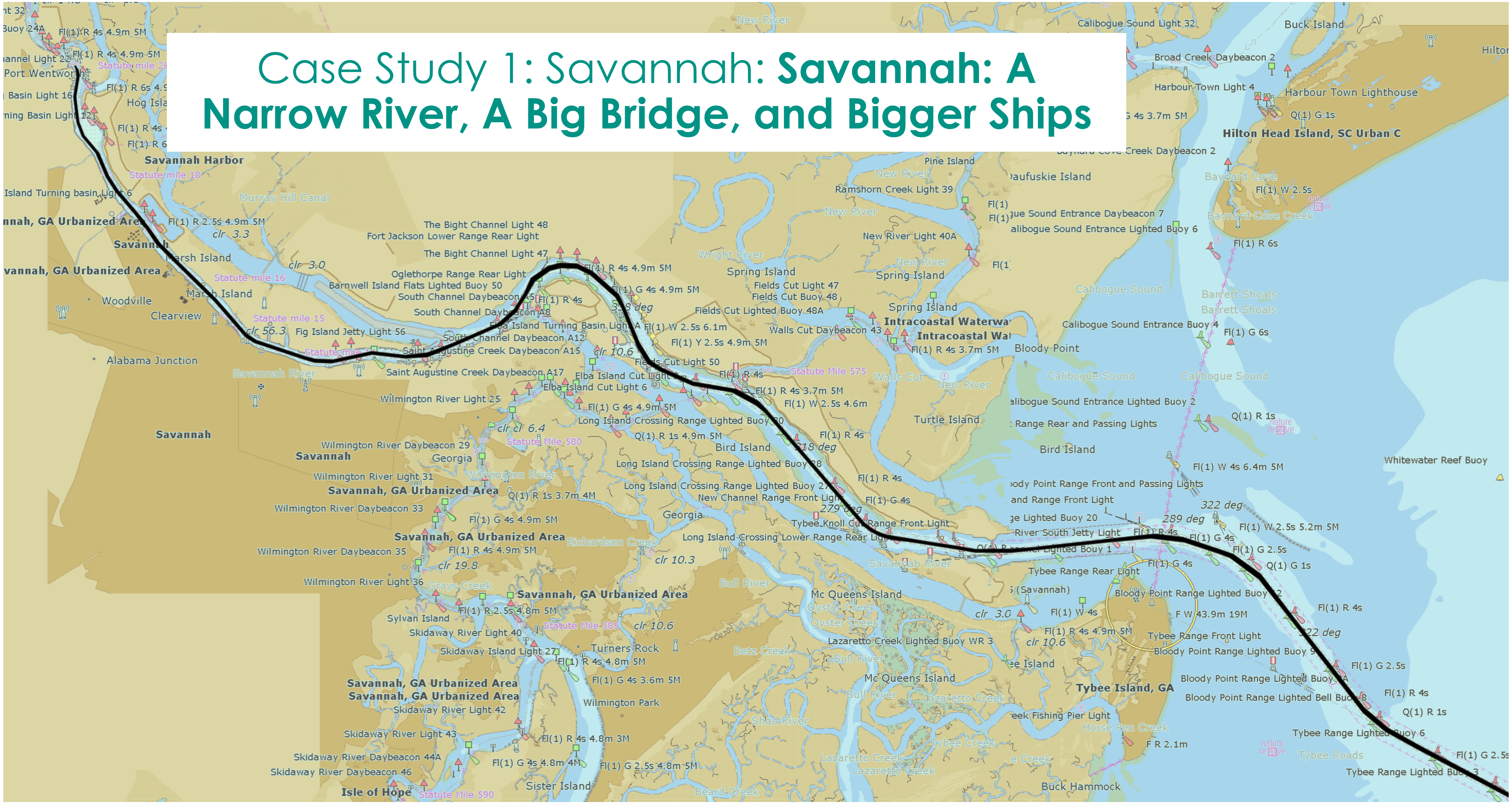
Agenda

Case Study 1: Savannah UKC and Bridge Clearance

Case Study 2: Dynamic Mooring

Case Study 3: Air Draft warning system

Case Study 1: Savannah: **Savannah: A Narrow River, A Big Bridge, and Bigger Ships**



The problem

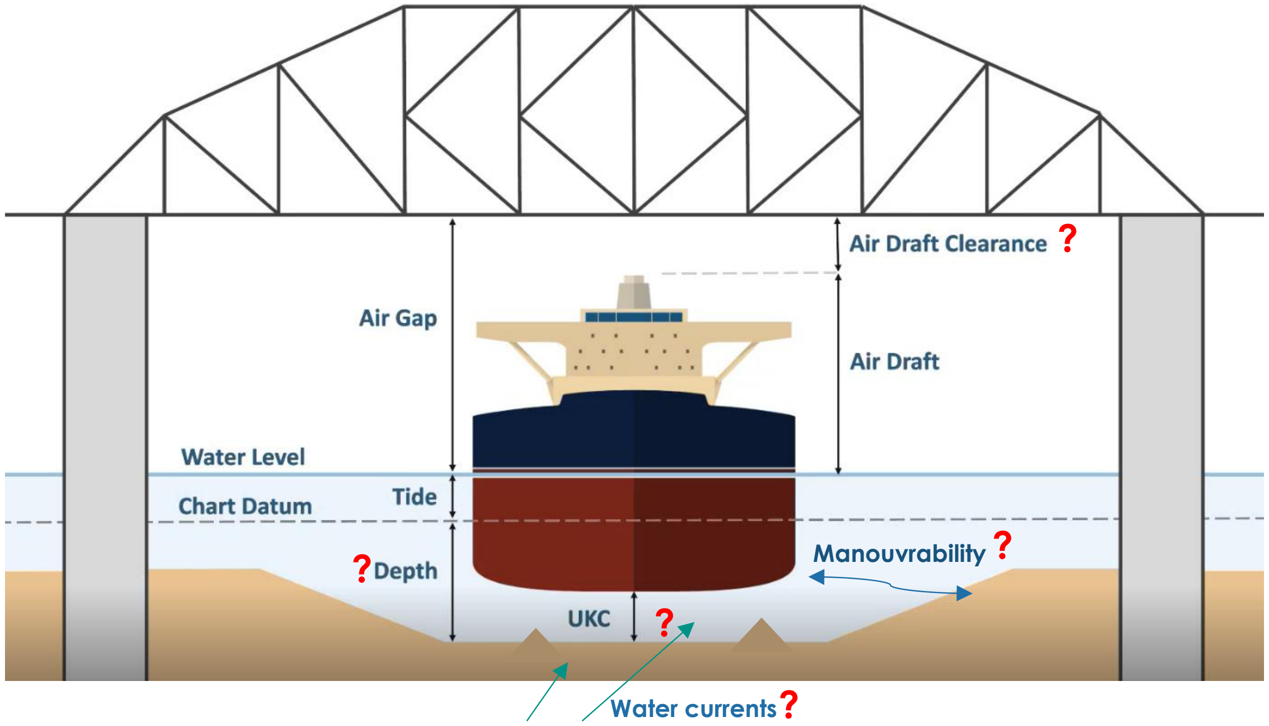
Bathymetry constantly changing -> UKC Risk – Maintained depth = 43 feet (~13.1 m) but constant sedimentation means keeping on top of shoals and maintaining safe UKC between dredges.

Air Draft – risk of bridge strike

Strong water currents – managing risk of losing steerage in strong currents in a narrow channel

Pilots in charge of managing safe operational windows and determining sailing times

Shippers pushing for deeper drafts – but safety first

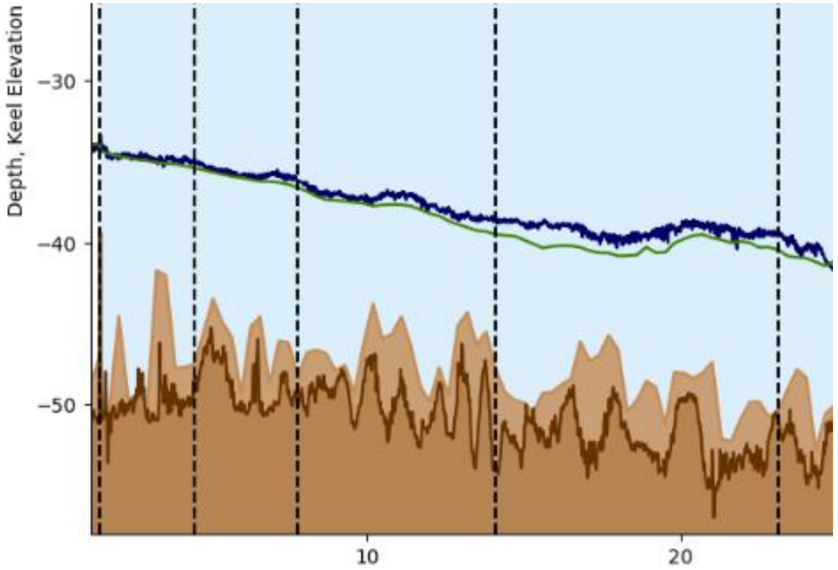


Savannah: The solution

So the real question becomes: when is it actually safe to move a vessel? Not based on one factor - but all of them together – UKC, steerage (bank), and bridge. We tackled this in stages…

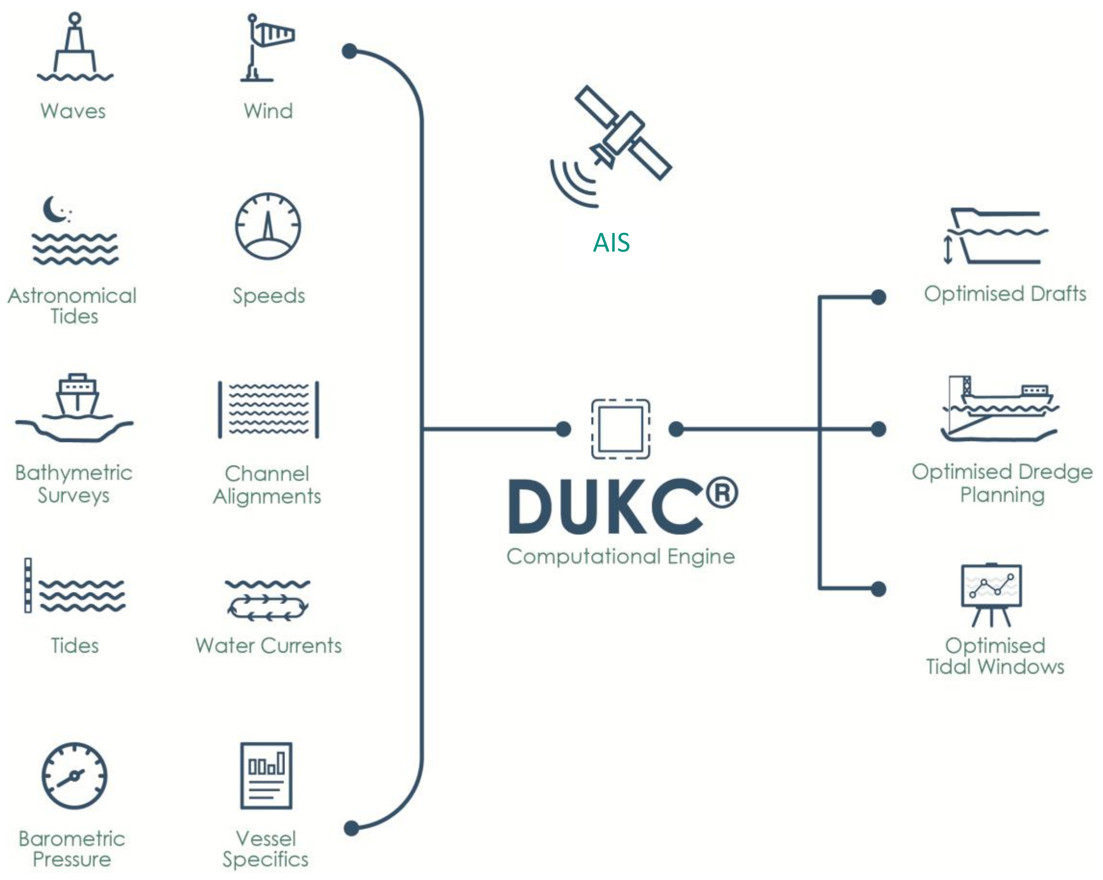
To start, we undertook vessel motion measurements to determine the real UKC between the seabed and the vessel keel

Measuring vessel motions near the berths



Measured keel elevation vs channel depth and depth under keel

Savannah: The solution



Using that information, we developed models for UKC and safe steerage that are specific to each vessel that transits the Savannah channel.

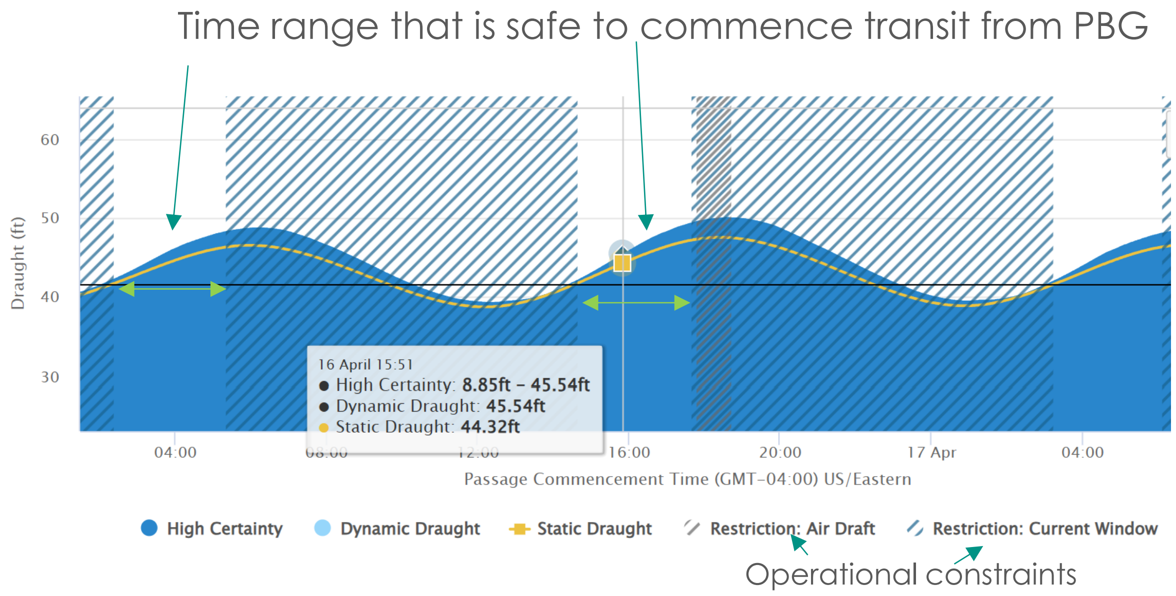
We built a custom DUKC® that incorporated the real-time and forecast water density, water currents, tides, air gap, vessel speeds, and bathymetry.

Combining the weather and vessel models, latest bathymetry, and air gap clearance gives optimised operational windows and reduces risk of incidents due to the reduction in unknowns and increased situational awareness.

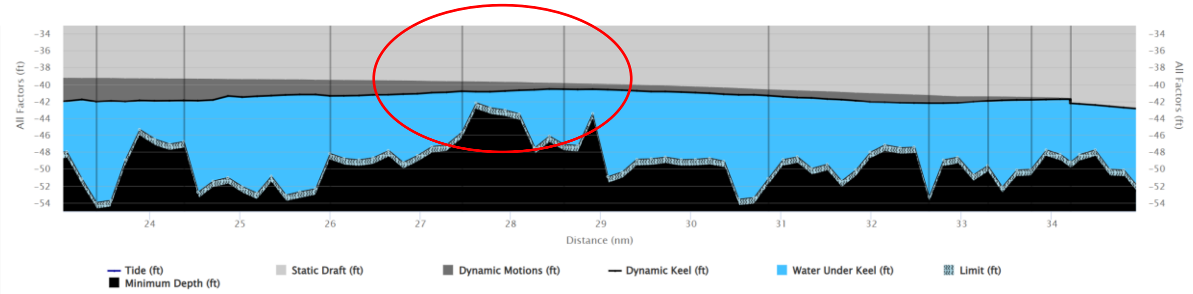
Savannah: The solution

The resulting DUKC® tool provides vessel and weather specific safe operational windows alongside their existing (static) operational rules to assist in decision making.

All Windows				
Open Time	Close Time	Duration	Maximum Draft	Static Window
19Apr2026 **1715**	19Apr2026 **2000**	**2 hrs 45 mins**	50.1 ft	2 hrs 15 mins
20Apr2026 **0600**	20Apr2026 **0830**	**2 hrs 30 mins**	48.39 ft	1 hr 45 mins



It allows the pilots to visualise trouble spots for targeted dredging, to open operational windows, while highlighting areas of greater UKC risk.



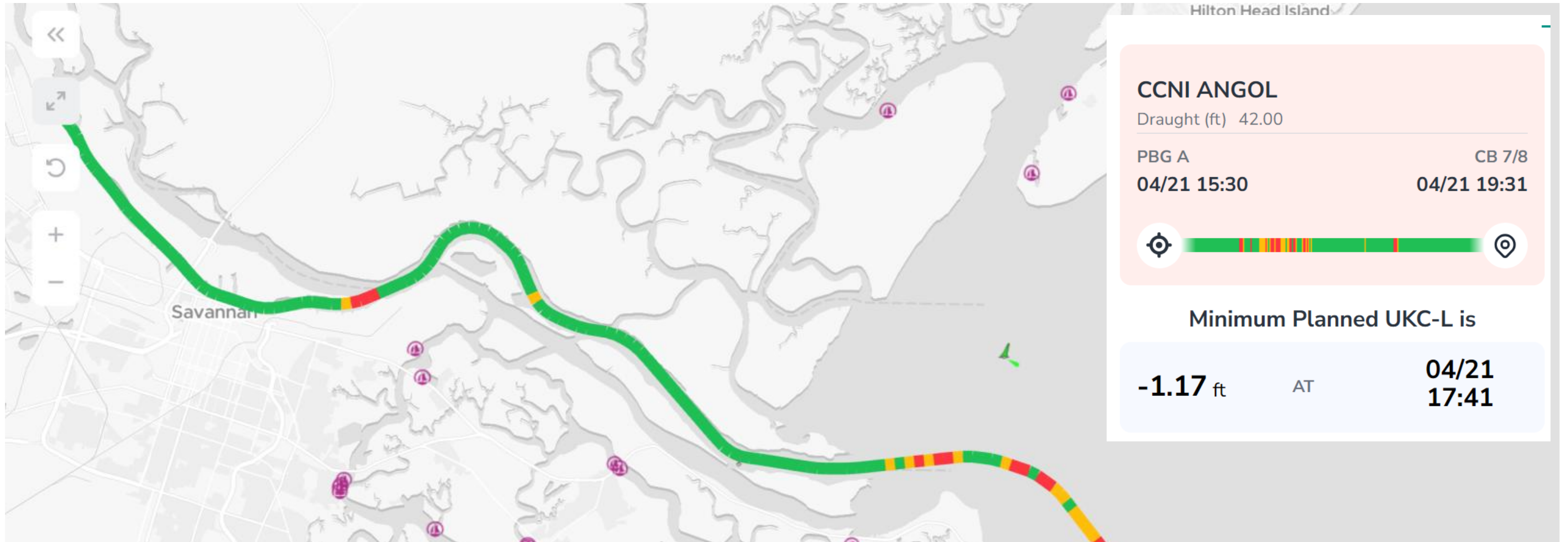
Depth vs UKC based on dynamic conditions along channel, with highlighted riskier location

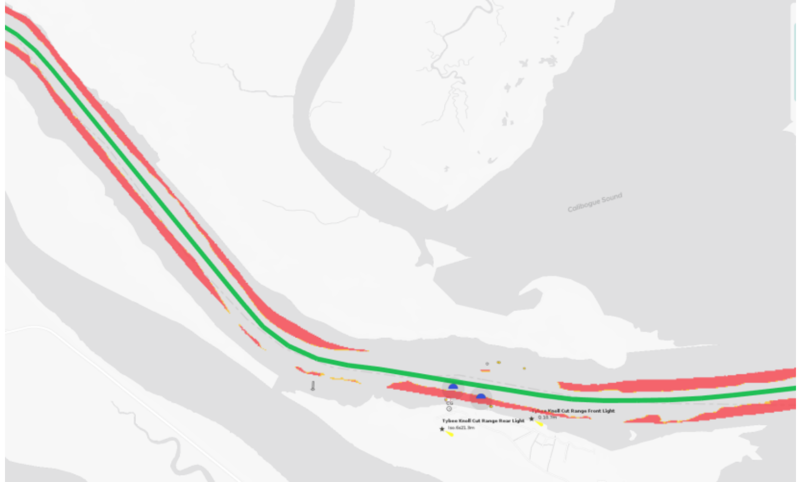
Savannah: The solution

Real-time monitoring that alerts if conditions become unsafe to allow pilots to take action.

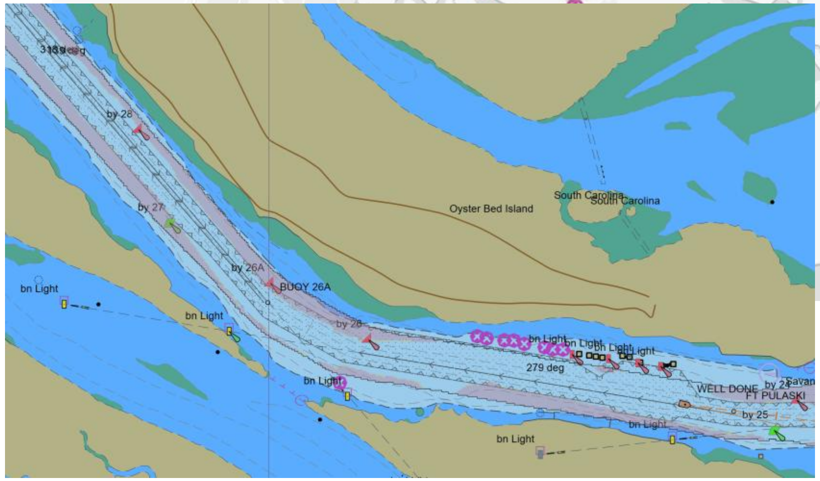
Coming next - S-129 real-time monitoring UKC layer for viewing in SealQ – coming next month

Example transit with areas that don't meet conditions for safe transit (UKC or steerage)





Example safe transit with areas of No-Go



Example SealQ transit with No-Go areas shown

Savannah: The outcome

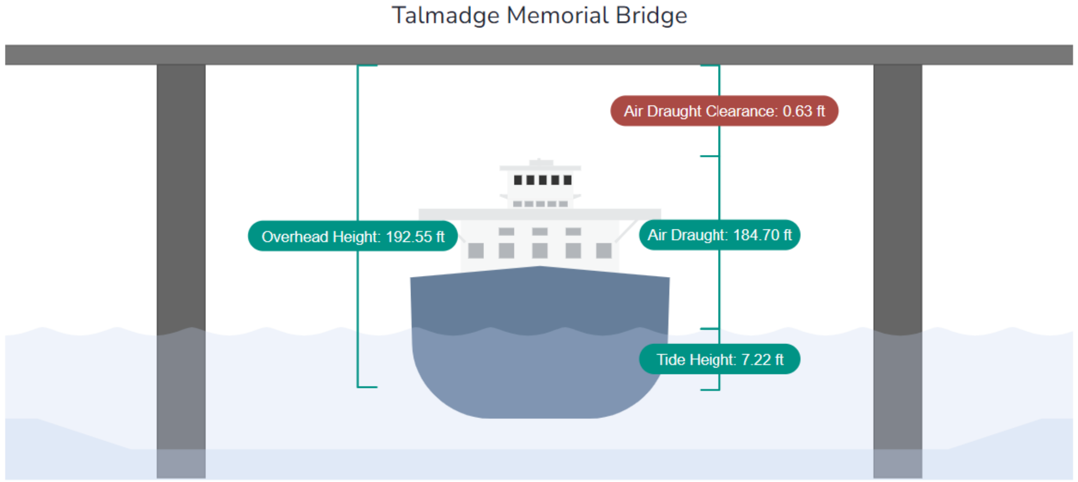
Greater situational awareness

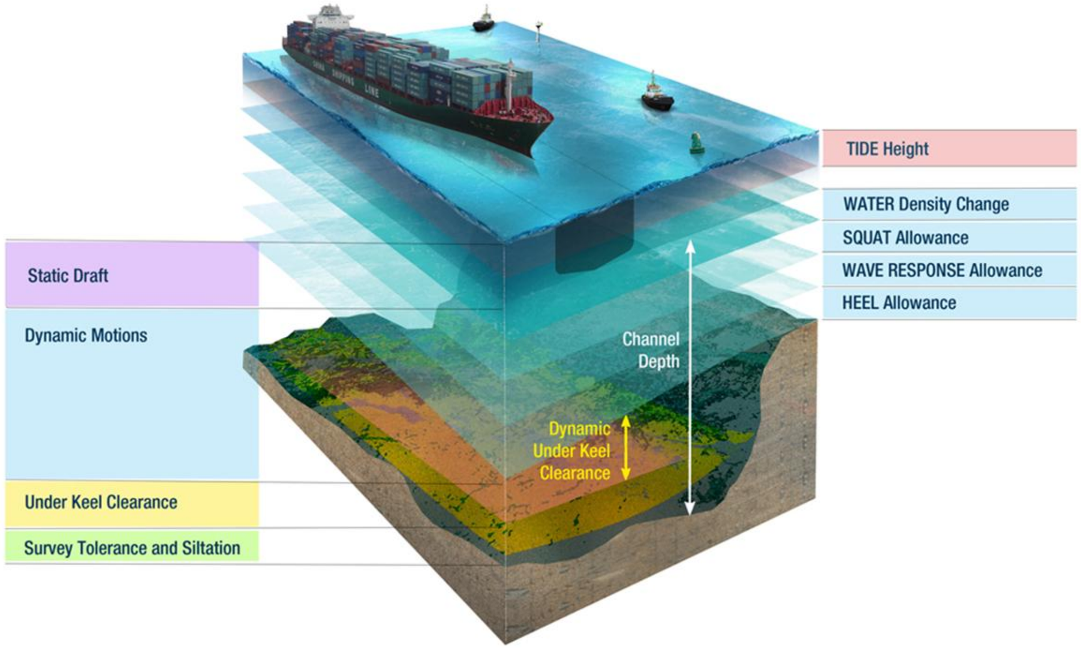
Reduced risk of grounding, losing steerage, or bridge strike by improving accuracy of operational windows

Easily identify trouble shoals for target dredging

Generally widened operational windows to allow greater flexibility of sailing schedules considering the horizontal and vertical constraints

Potential for greater vessel drafts in certain conditions





Case Study 2: A Swell-Exposed Berth

The Problem

The client is a bulk export port with berths exposed to open-ocean conditions, where significant vessel motions at berth were being experienced.

They needed a clearer way to understand berth-side risk - distinguishing situations where it was genuinely unsafe to remain alongside from those where conditions appeared uncomfortable but were still within safe limits.

Unnecessary de-berthings were costly, but so too was the risk of mooring line failure or injury to personnel.

A swell exposed berth: The solution

Dynamic Mooring Analysis - Custom models for their berths, vessels, load states and mooring scenarios. Identified **Infragravity Longwaves (IG)** as a driving factor in risk of vessel motions at berth.

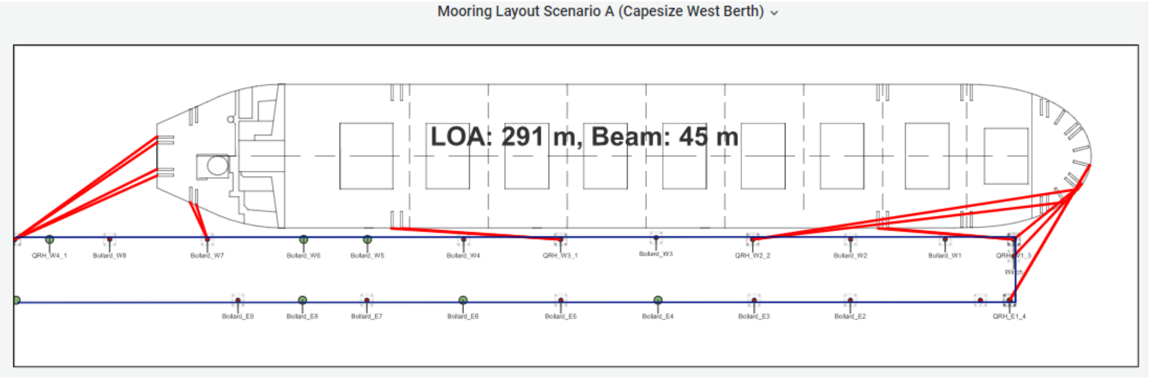
Implement stand-alone IG sensors at the port to better detect and forecast these long waves – hard to see, strong effect on vessel motions alongside

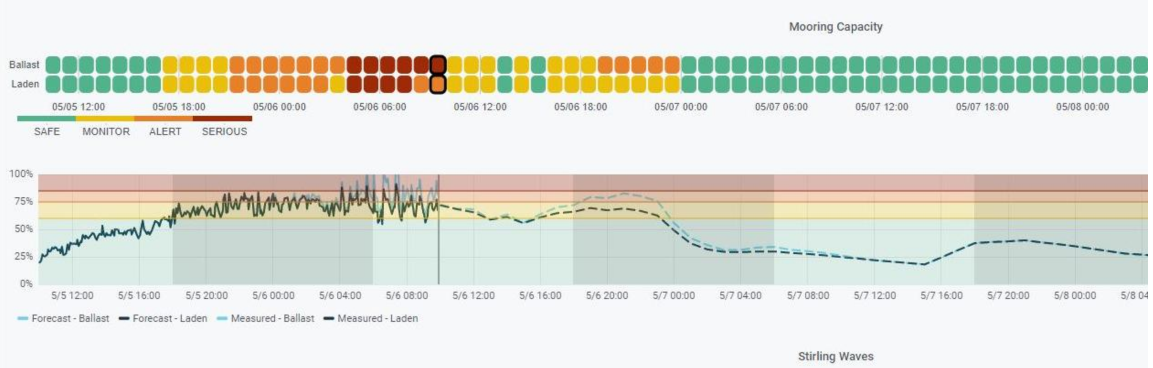
Live berth warning system incorporating the mooring models and real-time/forecast weather conditions

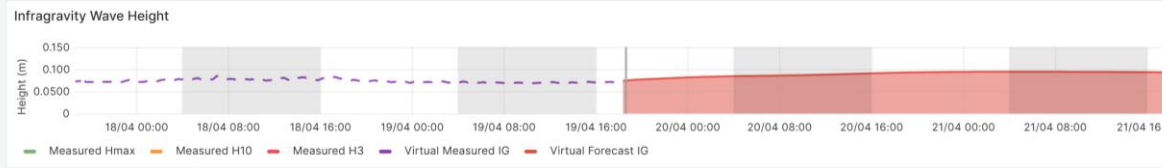
The outcome

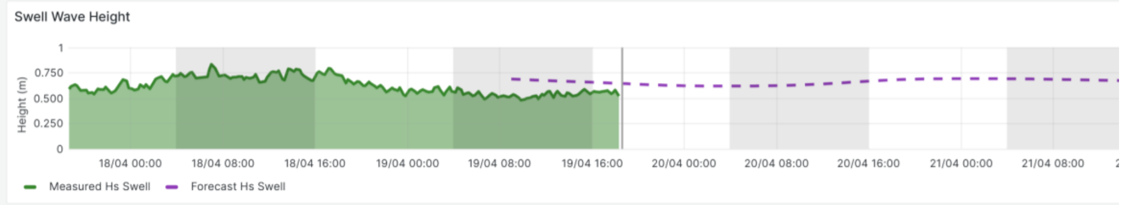
Reduced risk of injury and damage

Reduced likelihood of unnecessary de-berthings









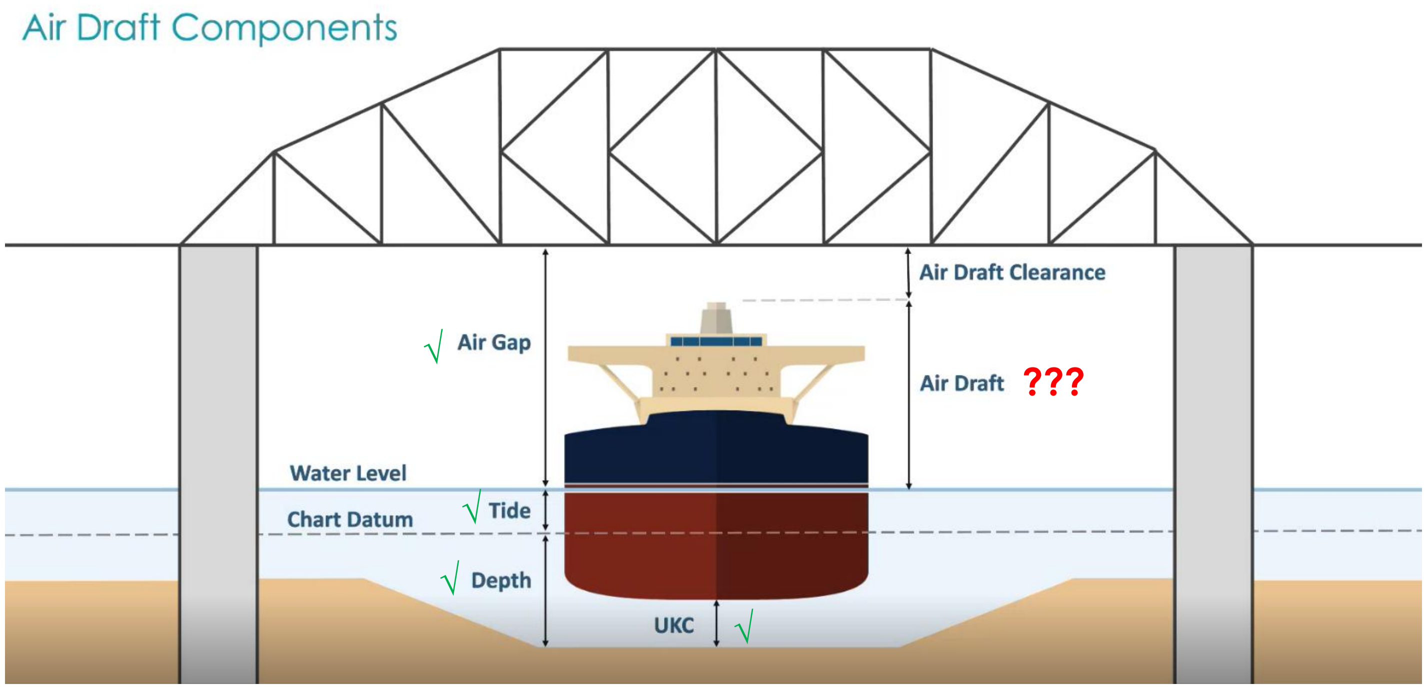
Case Study 3: Melbourne - Getting Air-Draught Right

The problem

Air Gap is known.

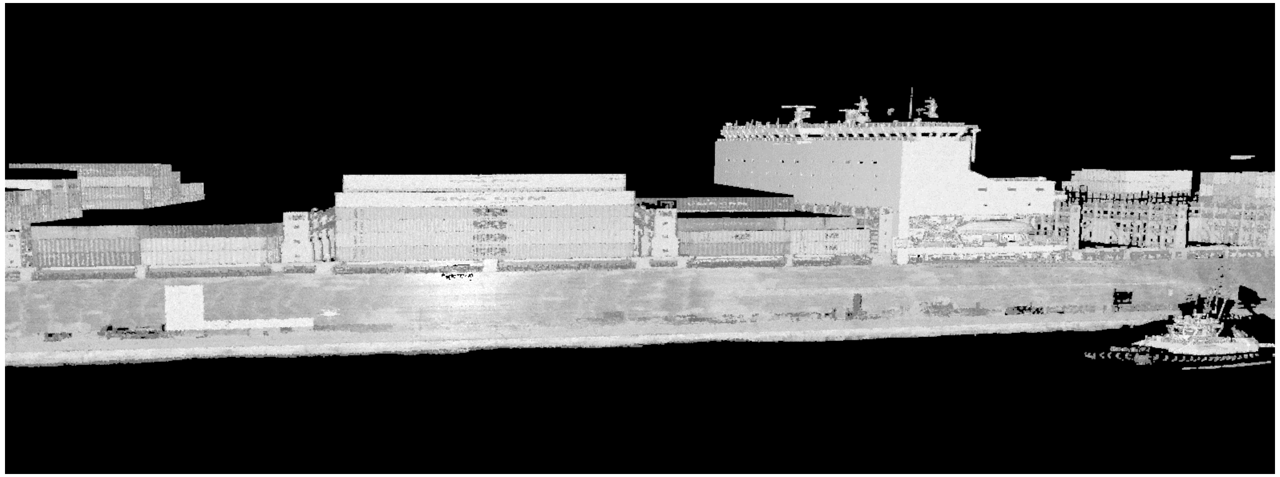
Air Draft is reported but unknown.

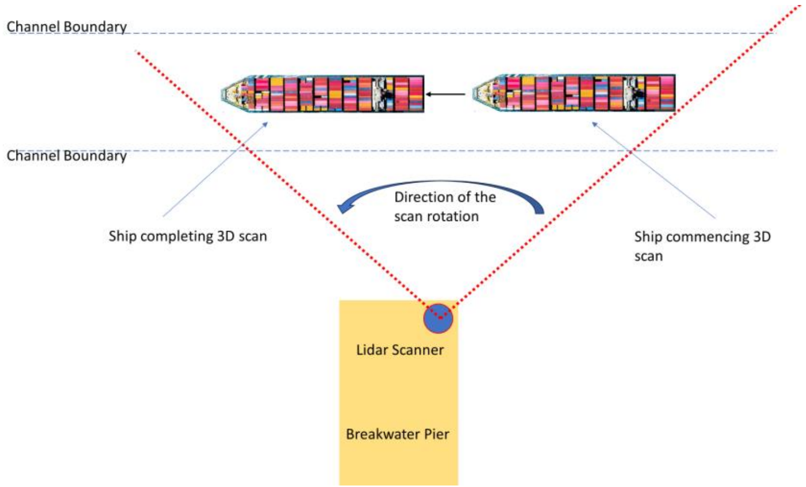
Wanted to reduce risk of bridge strike, given visual evidence of vessels scraping underside of bridge



Melbourne: The solution

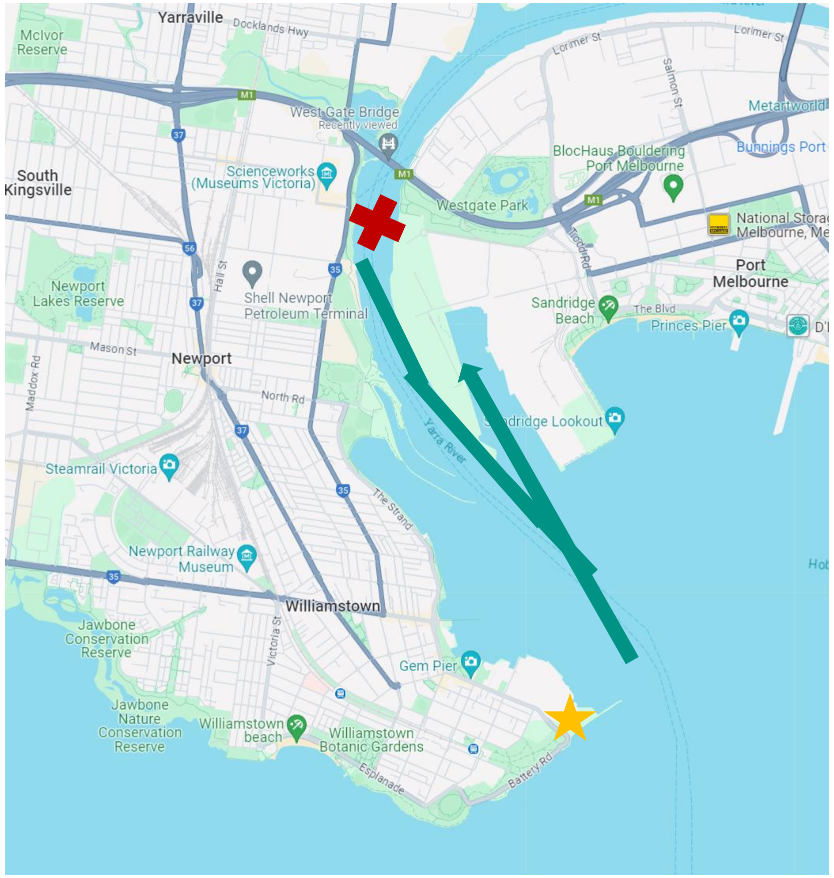
- Collaboration project between OMC and Ports Victoria
- Hardware solution using Lidar (Light Detection & Ranging) scanners to create a point-cloud representation of a vessel





Melbourne: The solution

- Measures vessel air draft 23 minutes before ETA at bridge, giving sufficient time to alert pilot to divert to safe berth.
- Alerting dashboard with details of each scan
- Procedure for pilots to abort if unsafe



Melbourne: The outcome

Several vessels were detected exceeding the port's 50.1 m air-draft limit, leading to aborted bridge transits.

Multiple vessels were found to have measured air drafts several metres higher than their declared values.

In many of these cases, on investigation, an antenna was missed in the official air-draft measurements submitted to PortsVic, resulting in under-reported vessel heights.

Recap

Case Study 1: Savannah UKC and Bridge Clearance

Case Study 2: Dynamic Mooring

Case Study 3: Air Draft warning system

Thank you