



**Tiki to Mickey Tu Meke**

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**Greg to Sol - The New Greg**

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# PLANT BREAKDOWN & RUST



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# BREAKDOWN OF THE STEP-UP GEAR BOX (SUG)



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## SUG FUNCTION

The main engine drives the propeller shaft through a primary gear box. This gear box has a power take off shaft that is utilised to drive a “shaft” generator for ships electrical power generation.

The SUG is between the power take off from the primary gearbox and the generator and increases or “steps up” the speed to allow correct frequency electricity to be generated.

Without the SUG there is no option to generate power through the shaft generator and so another diesel driven generator must be operated to supply the ship with electrical power.

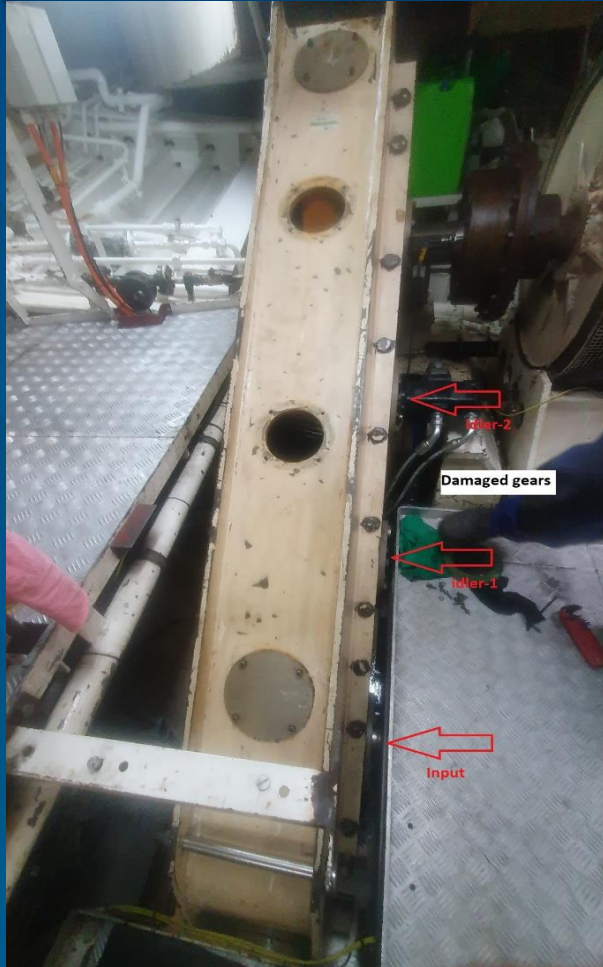
This alternative option requires additional fuel consumption.

## WHAT HAPPENED

**Collapse of bearing cage  
damaged the gear teeth**

**Identified during a planned  
oil change**





## IMPLICATION OF NO SUG

**Fuel consumption – additional 2000  
litres / per standard operational day**

**Increase of emissions**

**Reliance and additional load or back-up  
generators**





# REPAIR PLAN

Removal and install scheduling

Availability of the engineering firm

Ordering of raw materials from overseas

Machining time for a set of gears

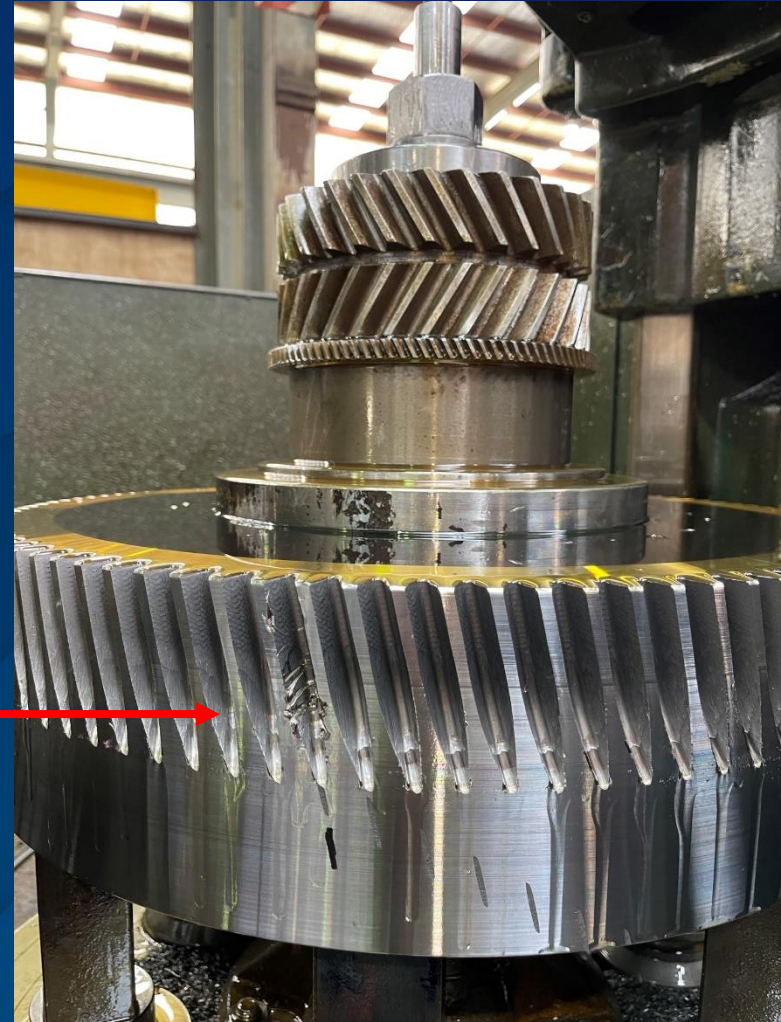
## CHALLENGES

**Delays with raw materials**

**Damage to idler shafts during disassembly**

**Re-work of gears due to incorrect machining process**

**Contractor holding all parts with no initial inspection of complete assembly**



## CHALLENGES cont'd

Agreement and adjustment to schedule

<5 days for disassembly

<7 days for install (x2)



Crack in Logan clutch hub

## **COST OF NO SUG**

**Three unplanned downtime periods total 19 days**

**150 – 180 days without normal generating capability**

**Additional litres 300,000 – 350,000 consumed**

**Additional fuel cost \$500 – \$600k**



# WASTAGE IN THE MARGINS

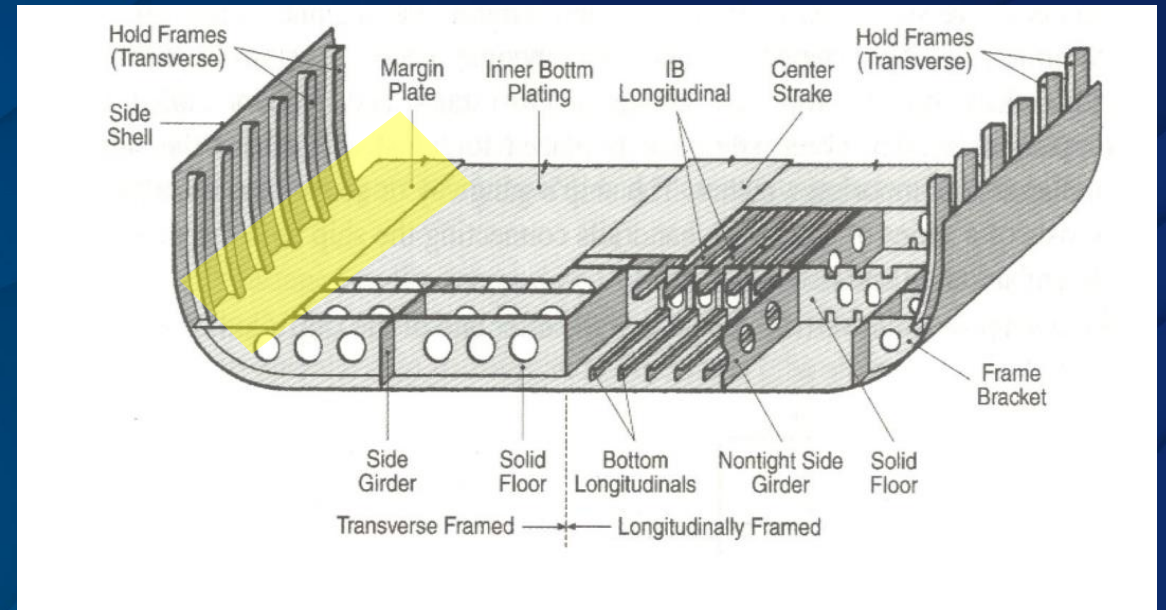


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## RV TANGAROA MARGINS

The guttering system in the internal margins captures condensation and any run-off from the inside of the portholes.

It is a cascading system with water captured at the highest deck and channelled via downpipes until reaching the factory deck bilges.



## **DISCOVERY**

**Water drips into the generator room were traced back to the fan room space**

**Invasive investigation plan was executed  
removal of linings, insulation, plate  
thickness readings and pipe work**

**Underwater UT Readings of hull plating**



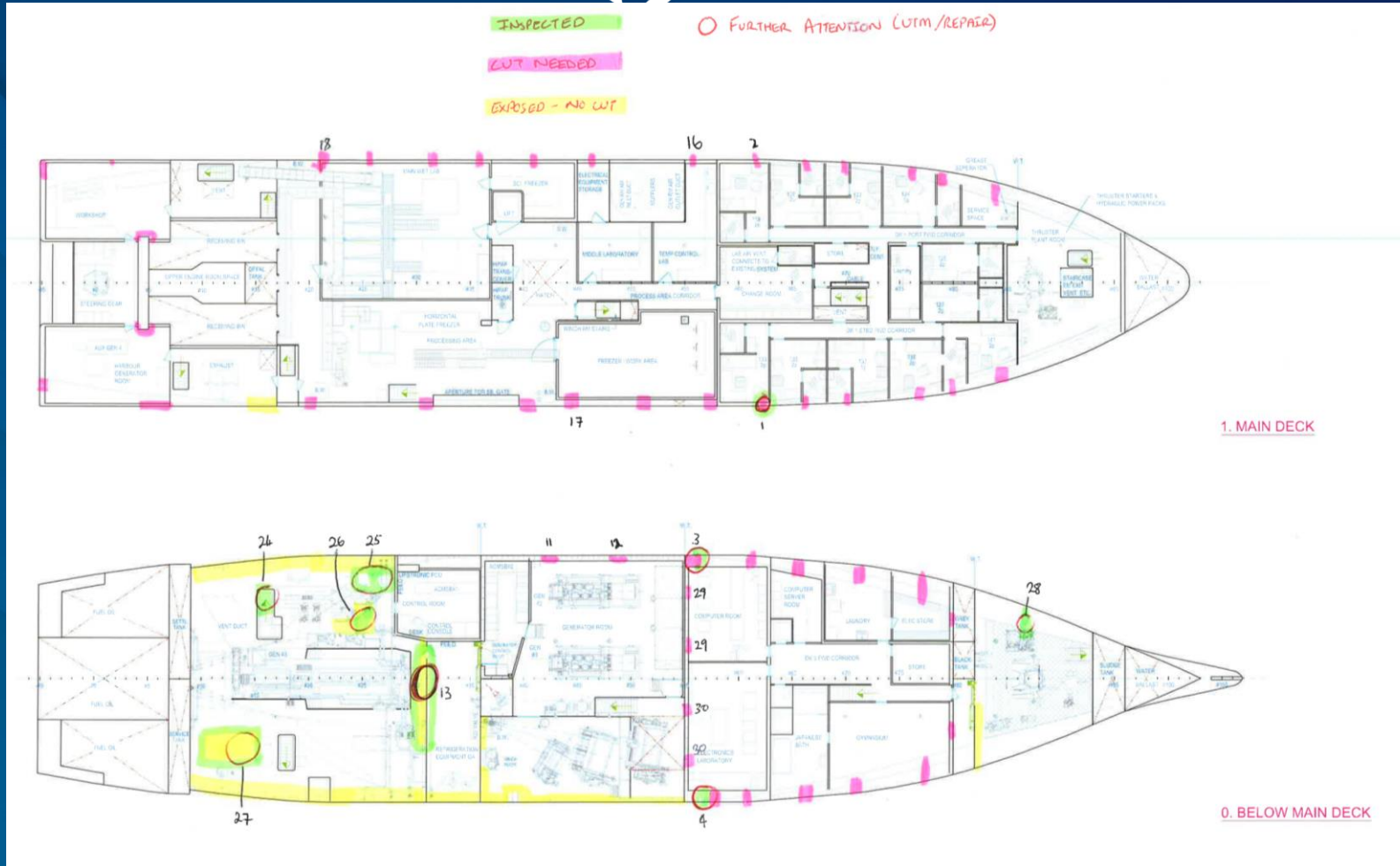




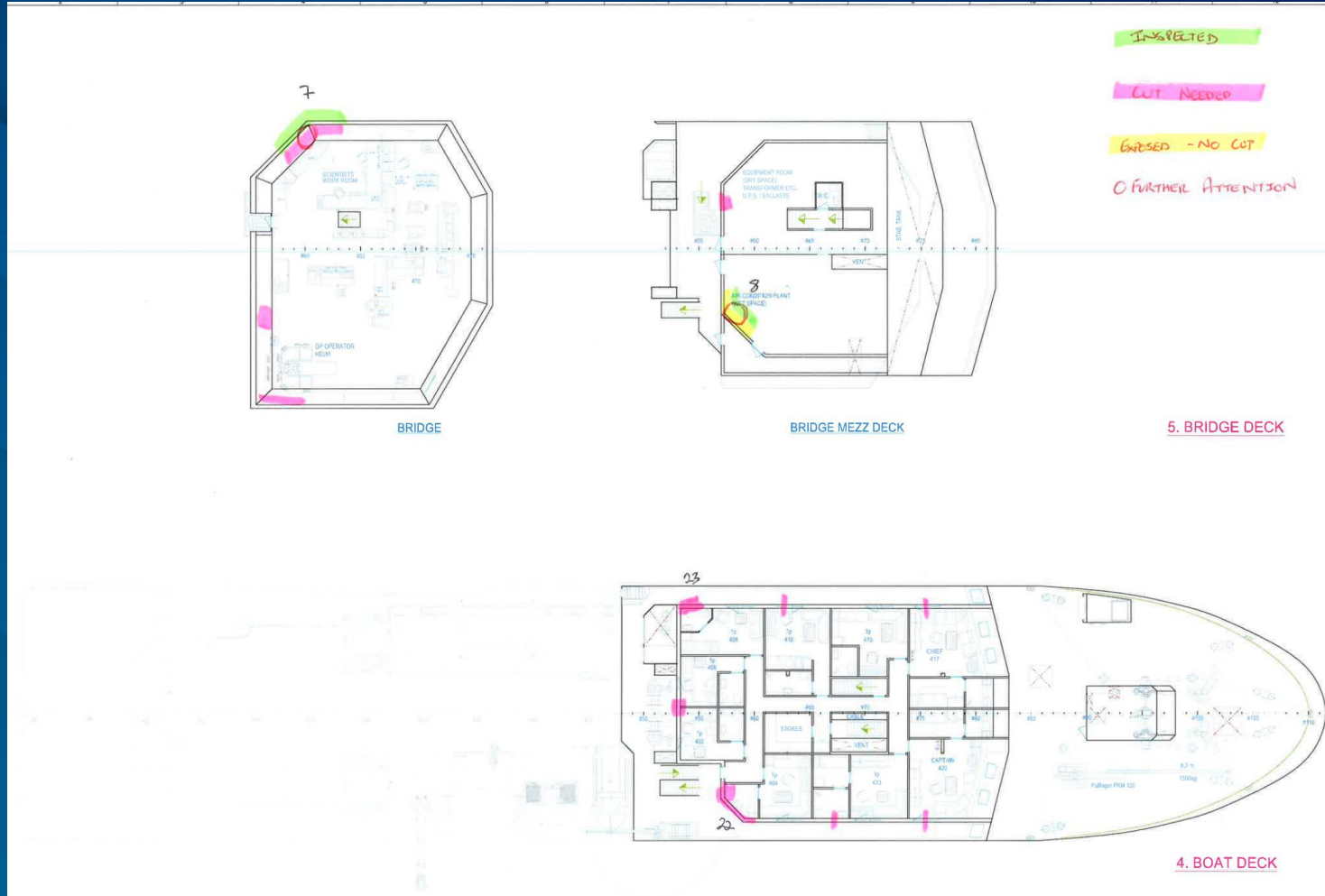
# INVESTIGATION PLAN



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**Thickness measurements of affected areas and surrounding shell plating, allowed us to identify the pattern of deterioration and establish a scope of repairs.**

**The pattern highlighted wastage in the 1/3 aft sections and corners of the accommodation where the downpipes were located and aft lateral margins. Which is consistent with the vessel trim and expected flow of any moisture.**

## PLAN & REPAIRS

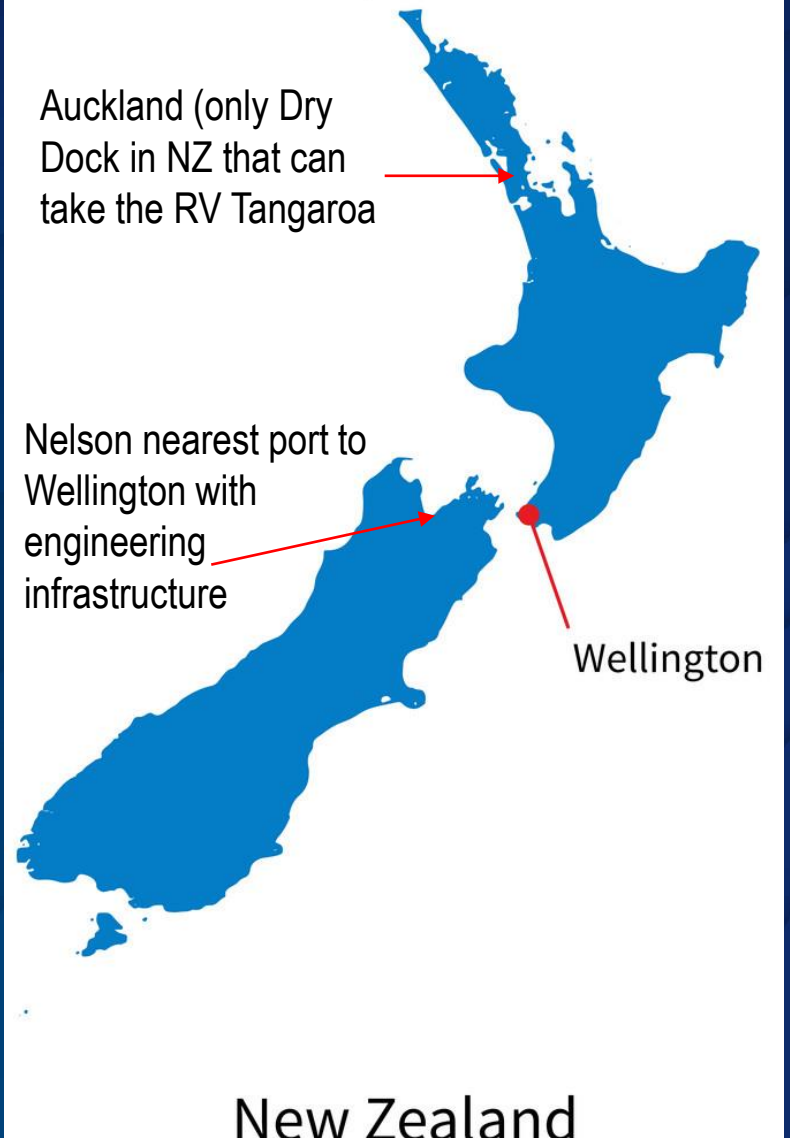
Agreed plan with DNV

Identification of contractors and availability

Execution of identified temporary and permanent repairs

Confirmation of port facility to support repair processes

Scheduling



# REPAIR



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## CHALLENGES

**Available skillsets 3 of 4 contractors declined**

**Access difficulties for investigation and repair locations**

**Voyage scheduling once you start you can't stop**

**Lack of berths / port infrastructure in Wellington (8 movements)**

**Decommissioning of multiple spaces**

**Crew wellbeing disrupted**

**Urgency to identify the extent of the wastage**

**Costs to date approx. \$20k per m.**

## CONTRIBUTING CAUSES

**Age of the vessel 32 years**

**Leakage from window drains**

**High salt condensate and sweating behind the insulation**

**Rotted pipe work**

**Lack of invasive inspection**







## **SIMPLE LEARNINGS**

**Distraction of the obvious**

**Looking where we don't look plan**

**Enable easier access to covered areas**

**Providing context to the science team**

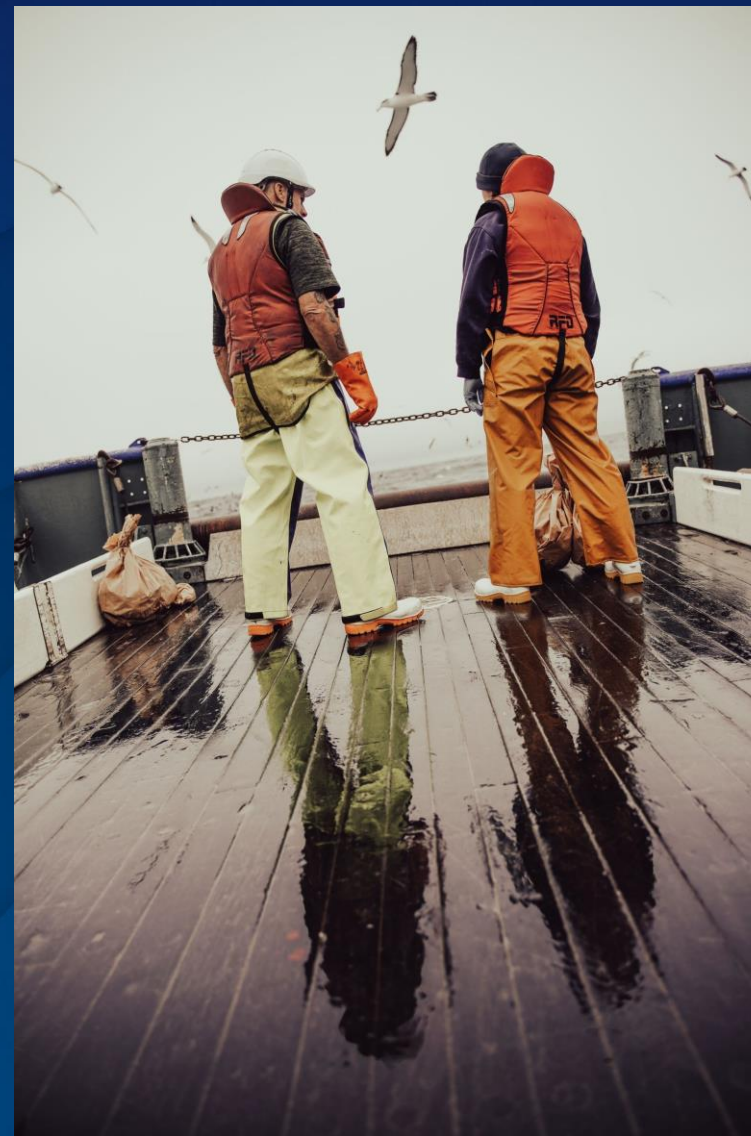
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**THANK YOU**

**“TWO SIDES OF EXPERTISE”  
NIWA 2023 people's choice award winner**

**Tran Lawrence – RV Kaharoa**



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