A Toxic Legacy: Second World War Shipwrecks in the Pacific

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Research Director at the Major Projects Foundation.

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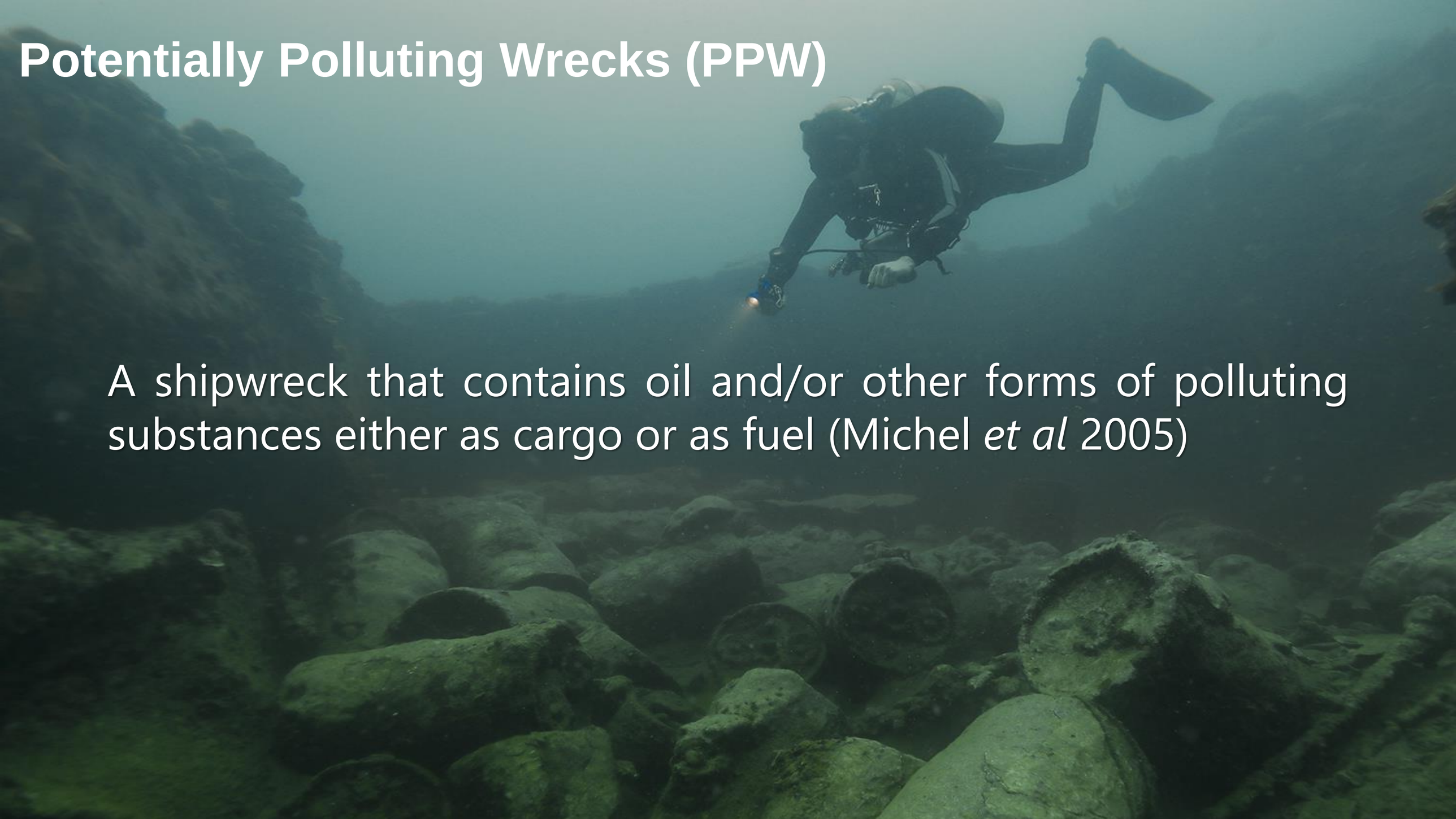
SPREP
Secretariat of the Pacific Regional Environment Programme

THE OCEAN FOUNDATION

Potentially Polluting Wrecks (PPW)



A shipwreck that contains oil and/or other forms of polluting substances either as cargo or as fuel (Michel *et al* 2005)

Who am I?

- Maritime archaeologist, commercial and technical diver.
- New Zealand Representative on the ICOMOS International Committee on Underwater Cultural Heritage (ICUCH), Vice-President of the Australasian Institute for Maritime Archaeology (AIMA).
- Honorary Associate at La Trobe University, Melbourne, Australia.
- Research Director at the Major Projects Foundation (MPF).

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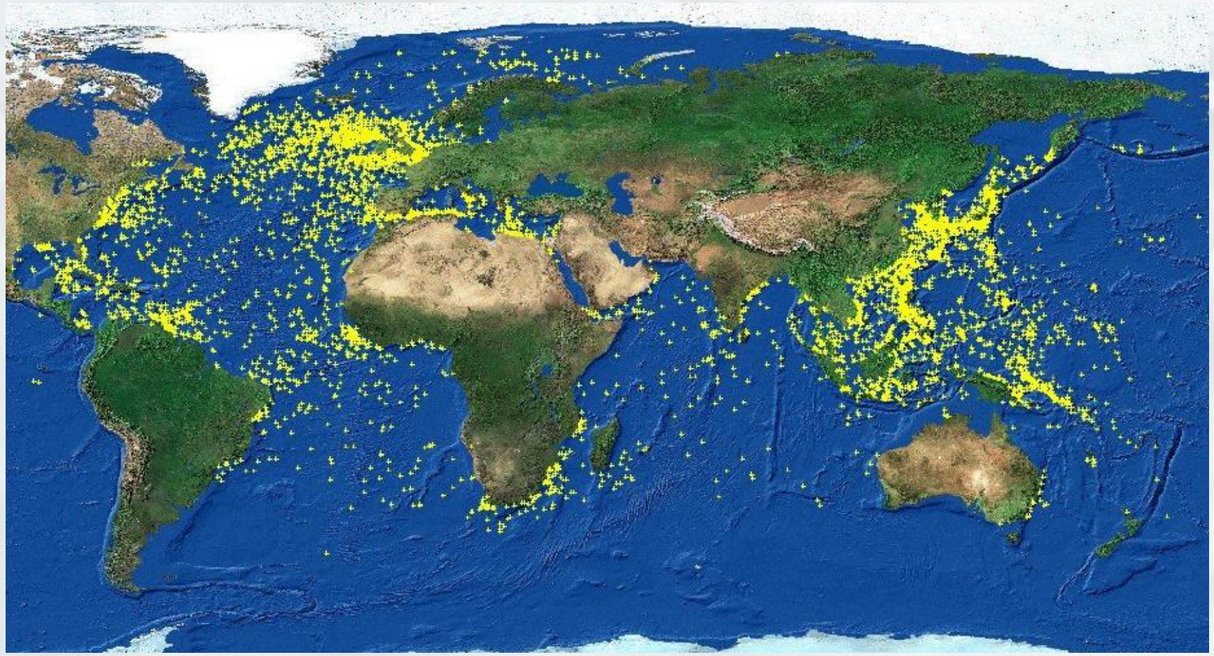
What is the scale of the problem?

- How many wrecks?
  - 8,569 potentially polluting wrecks (Michel *et al* 2005)



Map from Monfils 2005 showing the global distribution of potentially polluting wrecks

What is the scale of the problem?

- The Pacific War

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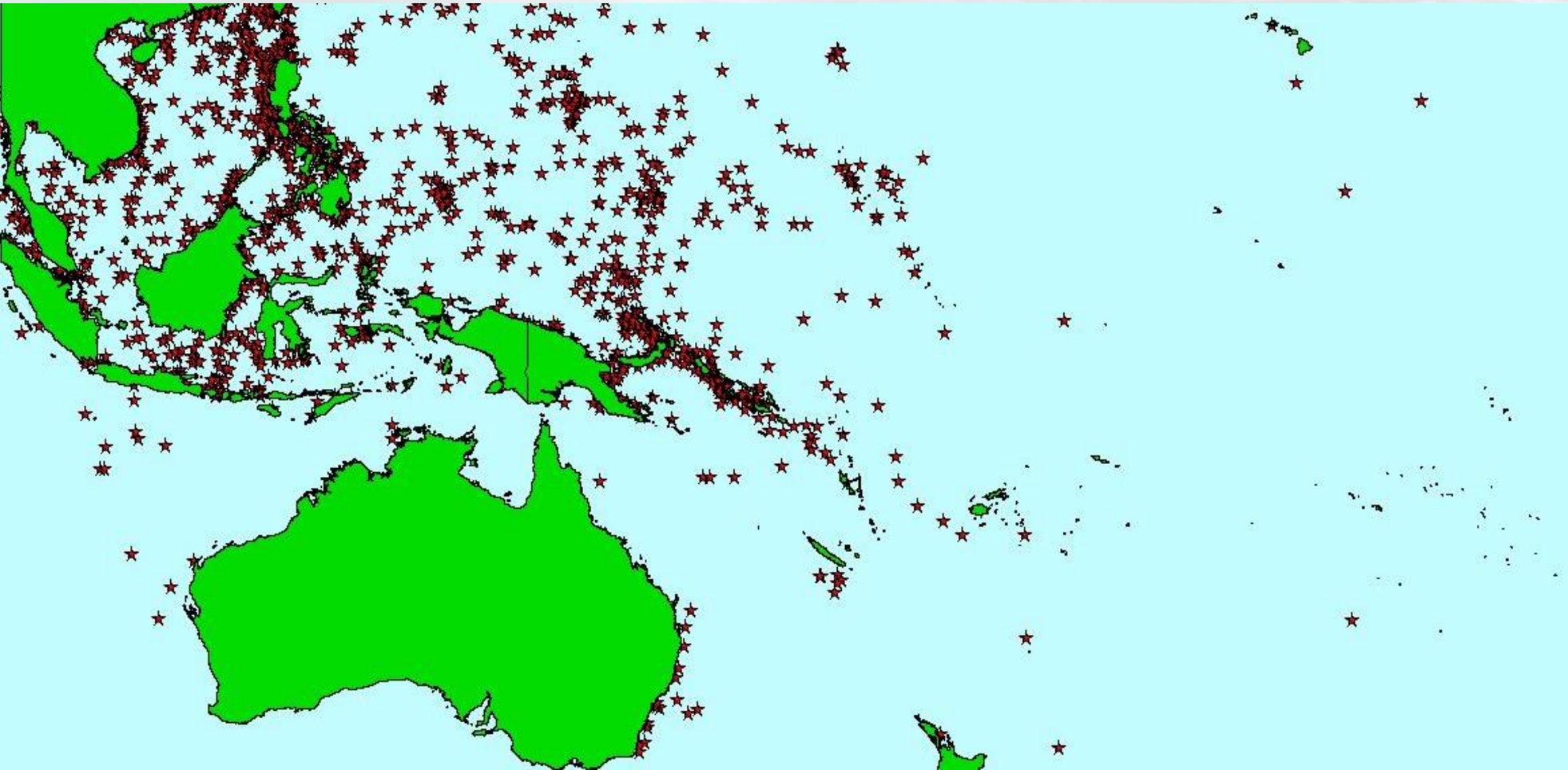
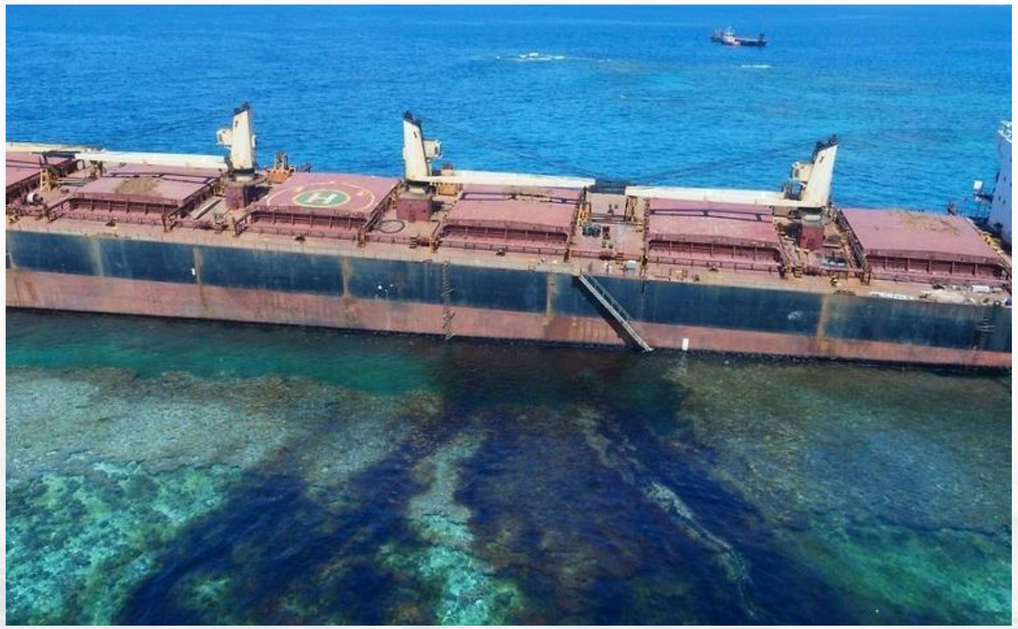
- The Pacific War
  - Approximately 3854 potentially polluting shipwrecks

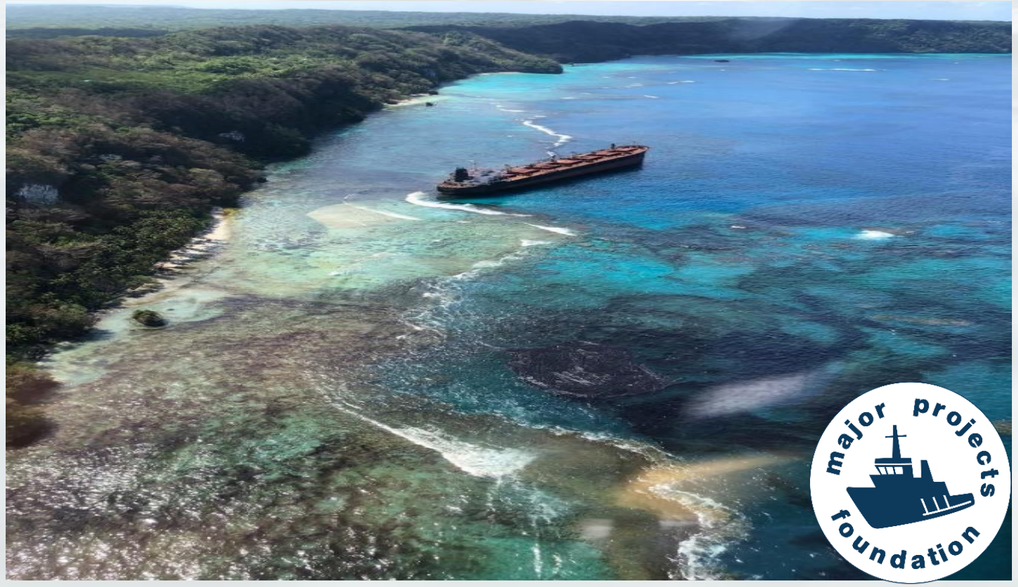


SPREP
WWII Shipwrecks GIS Database
Location of ALL Wrecks

What is the scale of the problem?

- The Pacific Ocean – how much oil?
  - Low estimate = 510,000 tonnes
  - High estimate = 4.1 million tonnes
  - *Solomon Trader* = 80-300 tonnes?





What is the scale of the problem?

- The Pacific Ocean
  - Approx 3854 potentially polluting shipwrecks
  - Approx 510,000 – 4,100,000 tonnes of remaining oil
  - Cost of cleaning up an oil spill in the millions

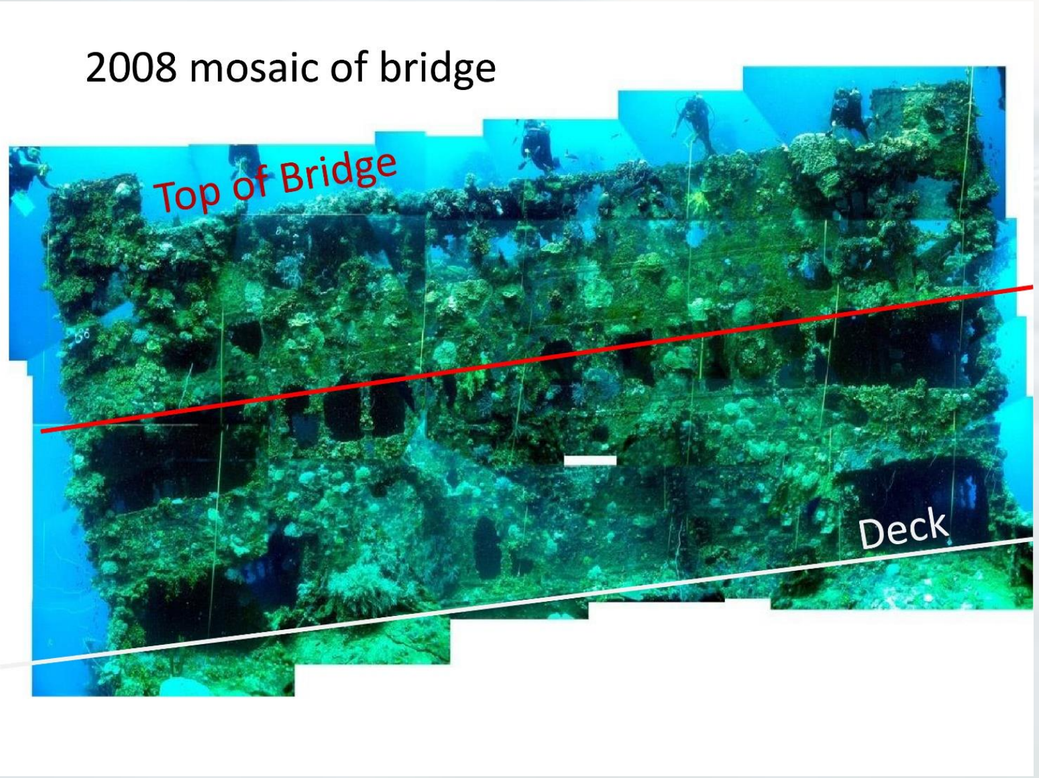
A clear and present danger?

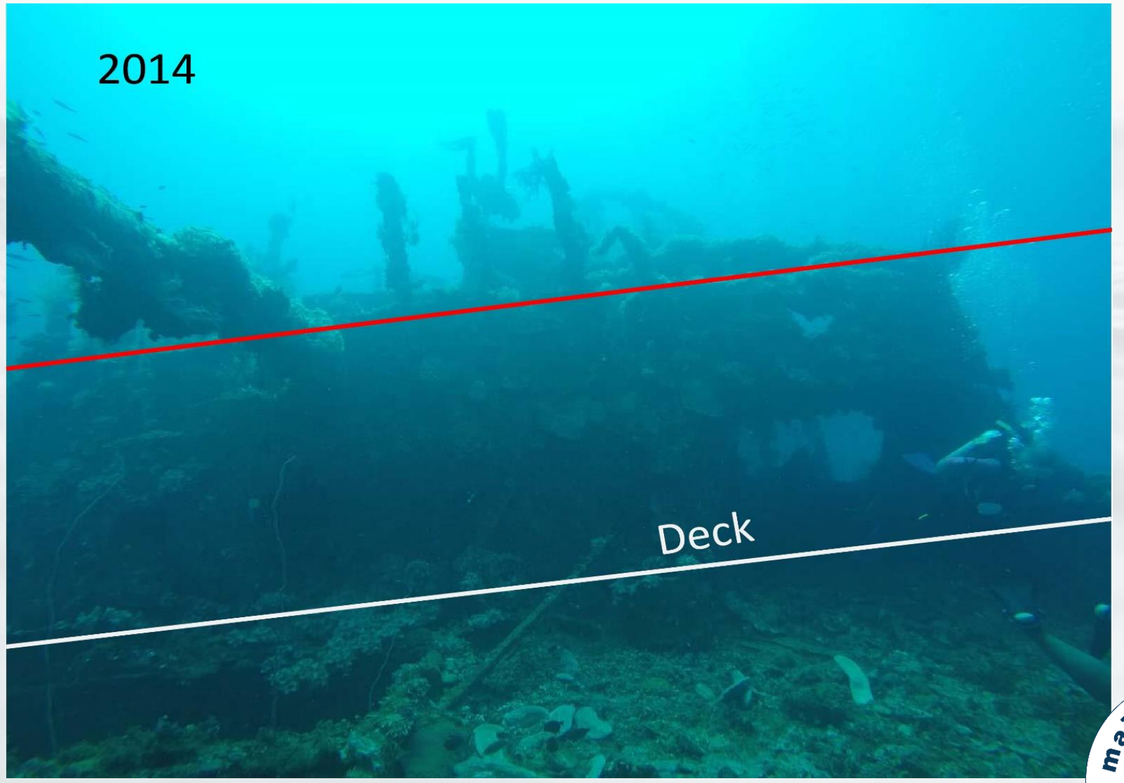
- The Pacific Ocean
  - WWII wrecks

Photo of a Japanese light tank on the *San Francisco Maru* courtesy of Pete Mesley

A clear and present danger?

- The Pacific Ocean
  - ‘Peak leak’

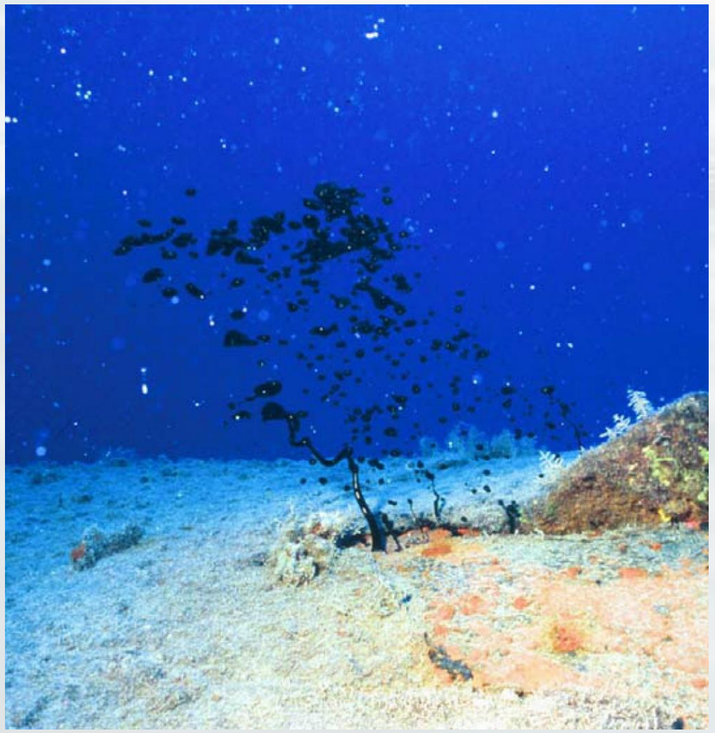




Images showing the bridge of the *Fujikawa Maru* in 2008 vs 2014 courtesy of Bill Jeffery

A clear and present danger?

- USS *Mississinewa* (1943-1944)
  - In 2001 leaked between 65 and 90 tonnes
  - US Navy removed a further 5600 tonnes



Photos from US Navy 2004, showing 1) sinking of the USS *Mississinewa,* 2) oil leaking from the wreck, 3) removal of the oil

What are the potential impacts?

Environmental

- Significant effects in the short & long term
- Biodiversity hotspots threatened

Social

- Significant and immediate
- Government response required

Cultural

- Significant and immediate
- Shock and anger for Island societies
- Fishing and swimming bans

Economic

- Reputational damage
- Loss of food resources

Habitat	Recovery Time
Planktonic communities	Days-weeks
Rocky Shores	2-5 years
Tidal Flats	5-10 years
Coral Reefs	10-50 years
Mangroves	25-80 years
Deep sea corals	10-100 years

Table from Hook 2019, Beyond Thresholds

Photo courtesy of TMC Marine

Cost of prevention is less than the cost of the combined impacts!

What is being done?

- A collaborative approach
- Secretariat of the Pacific Regional Environment Programme (SPREP)
- PPWs a ‘significant potential environmental threat ’ (SPREP 1999-2019)
- Tripartite Memorandum of Understanding (MOU) - Major Projects Foundation, SPREP and the University of Newcastle

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THE UNIVERSITY OF NEWCASTLE AUSTRALIA

How can we reduce the risk of PPWs?

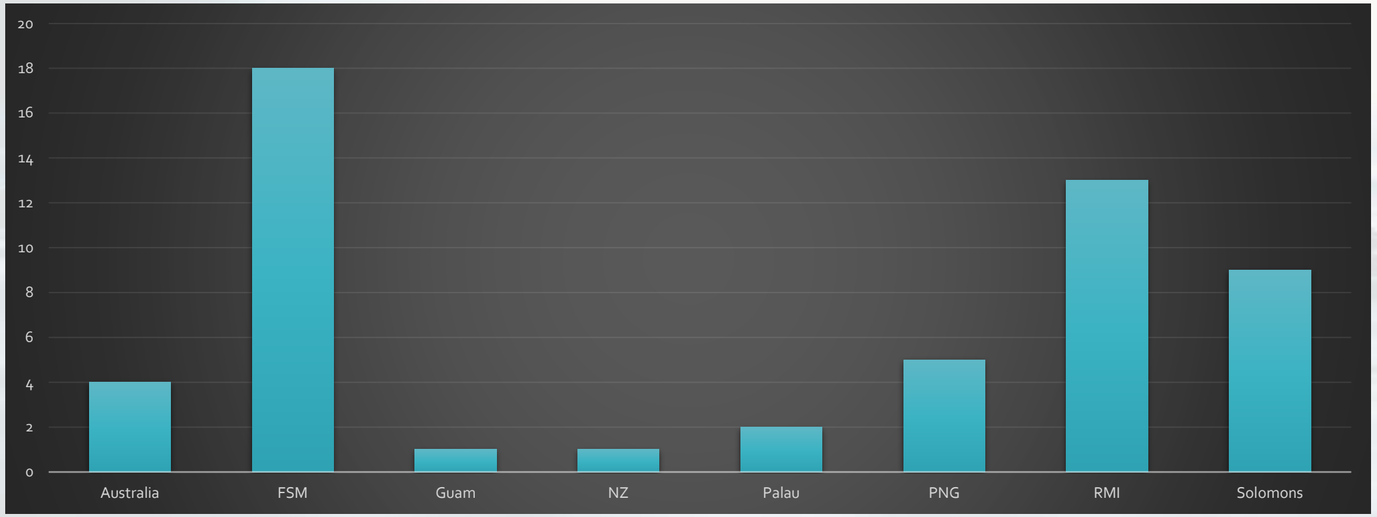
- **Prioritise:** Identification of high risk wrecks: Category 1 PPW
  - Historical archival material, dive reports

- **Evaluate:** Likelihood of exposure and severity of impact
  - Environmental Desk Based Assessments
  - Baseline condition assessment
  - On-site environmental survey

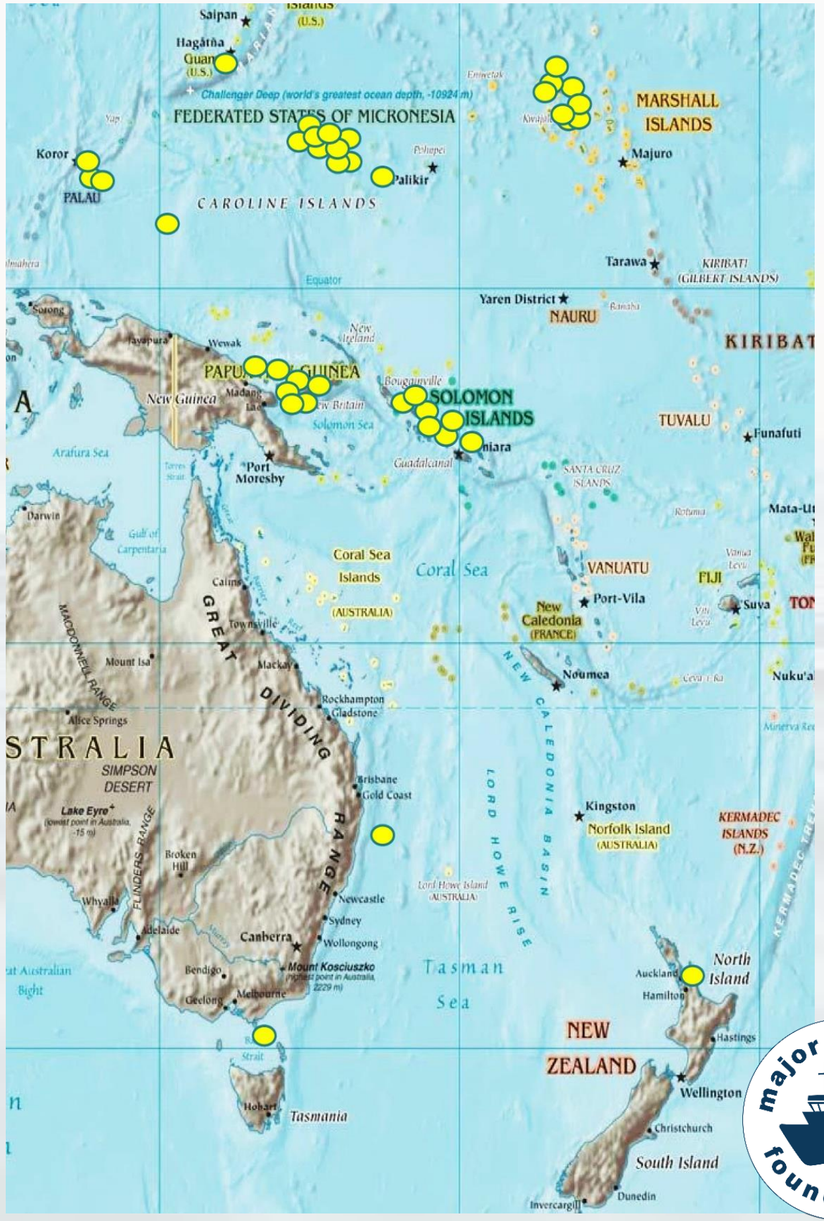
- **Manage:** do nothing, monitoring, removal of oil

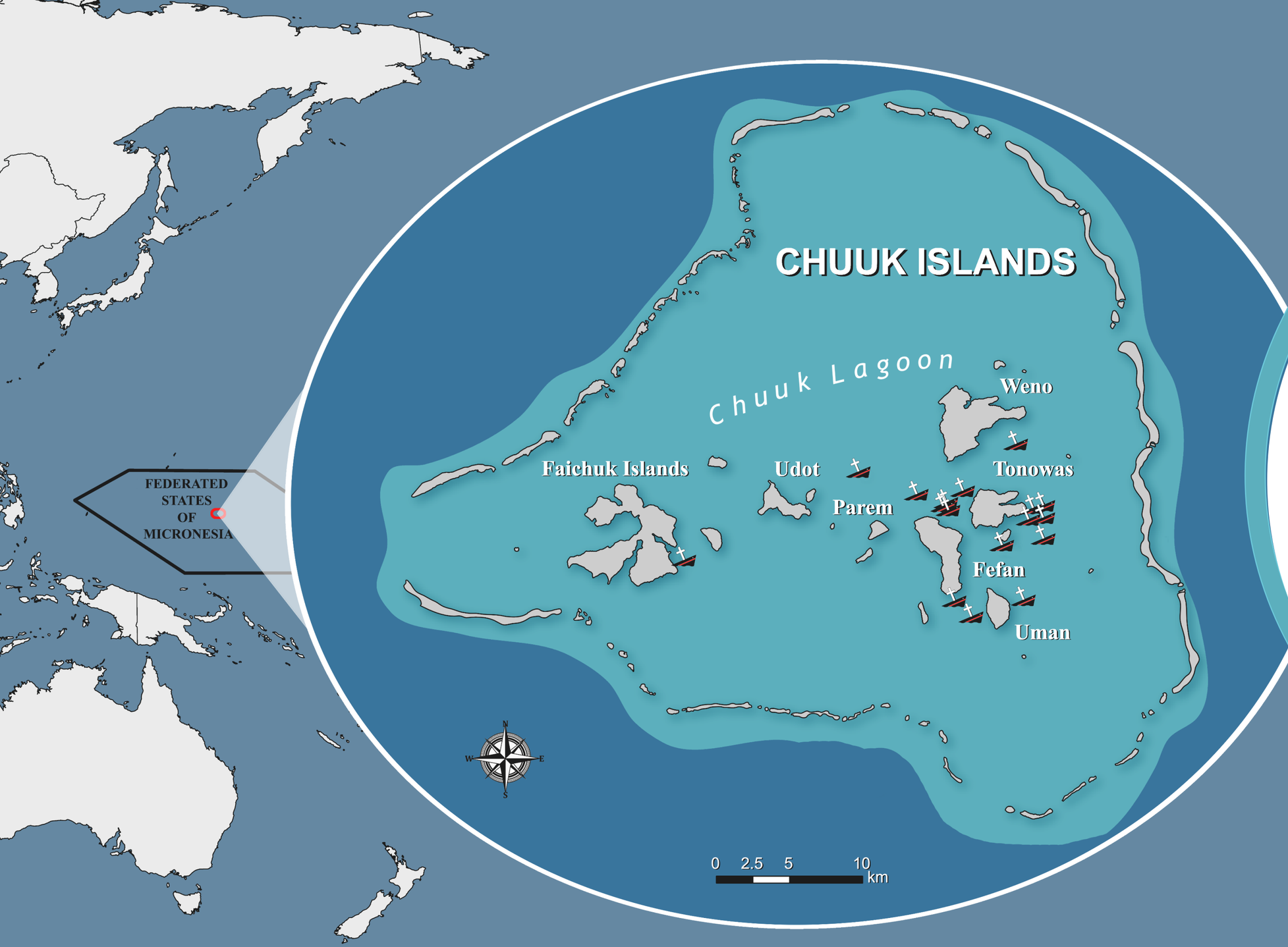
How can we reduce the risk of PPWs?

- Phase 1: desk based research….
  - Refining the database
    - 55 ‘priority 1’ shipwrecks



  - Environmental risk assessments (Goodsir 2019)
    - Standardised approach ‘best practice’
  - Disaster Risk Reduction (DRR) Strategy
    - Real-world applications





‘Truk’ Lagoon

Operation Hailstone February 1944 ‘Japan’s Pearl Harbor’

Over 65 ships and 250 planes destroyed

17 of the 65 ships are considered ‘Category 1’ potentially polluting wrecks

Chuuk Lagoon, FSM

- 17-18 February 1944 ‘Operation Hailstone’

Chuuk Lagoon, FSM

Chuuk Lagoon, FSM

Chuuk Lagoon, FSM

Chuuk Lagoon, FSM

- Tourism largest source of foreign income
- Heavy reliance on locally caught fish for diet

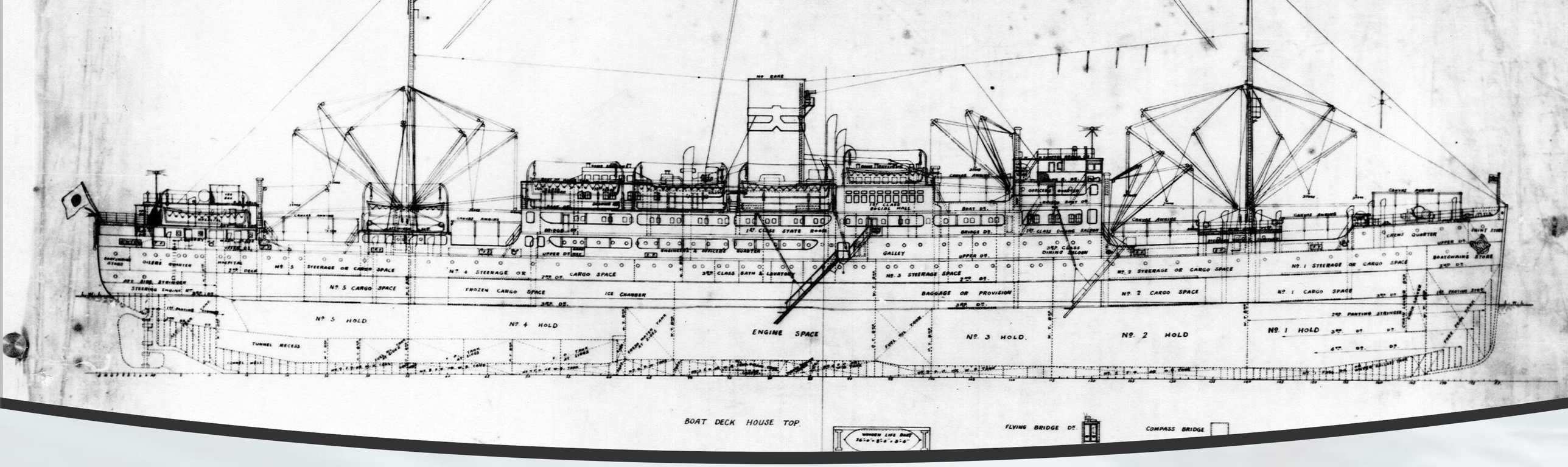
The oil, chemicals and unexploded ordnance still on board many of these wrecks pose a grave and imminent danger to the people, marine and coastal environments, tourism and fisheries of the region.

Anthony Talouli

Marine Pollution Manager, The Secretariat of the Pacific Regional Environment Programme (SPREP)

How can we reduce the risk of PPWs?

- Phase 2: site inspections *Rio de Janeiro* Maru



Rio de Janeiro Maru

Dimensions 461/162/26 feet. **Gross tonnage 9,626 tons**

Launched 19 November 1929. Built by Mitsubishi Zosensho in Nagasaki for Osaka Shosen Kaisha (O.S.K. Line). Constructed as an eight-deck passenger liner. Requisitioned by the Japanese Navy in 1940 and converted into a submarine depot ship (sub-tender). Sunk 17th February 1944 by U.S. aircraft scoring 1 – 2 hits with 1,000-lb bombs.

Likelihood of Oil Release Assessment

Assessment criteria from Goodsir et al. 2019, 'A standardised approach to the environmental risk assessment of potentially polluting wrecks', *Marine Pollution Bulletin*, vol. 142,

Risk assessment criteria	Specifics of wrecks	Low (Score of 1)	Medium (Score of 2)	High (Score of 3)	Weighting of criteria	Score
Vessel depth (metres)	12 - 35 m			3	2	6
History of leaks	Yes			3	3	9
Integrity of wreck	Intact			3	2	6
Age of vessel at time of sinking	15		**2**		1	2
Length of time vessel has been submerged	76		**2**		2	4
Method of storage	Tanks	**1**			2	2
Type of incident causing sinking	AB		**2**		1	2
Seabed type	Stable	**1**			2	2
Total Score						**33**

Total Score
<22 Low risk of oil release
22-32 Medium risk of oil release
>32 High risk of oil release.

Project Partners in FSM

NACH

FSM Office of National Archives, Culture and Historic Preservation

DECCEM

Department of Environment, Climate Change and Emergency Management.

Chuuk HPO

Chuuk Historic Preservation Office

1. Baseline Survey

The project team will actively work alongside and train representatives from the FSM agencies to undertake a baseline survey of the 17 potentiallyy polluting wrecks

2. Management Plans

Each wreck will have a report compiled assessing both the challenges to its preservation and the threat that it poses to the surrounding ecosystem.

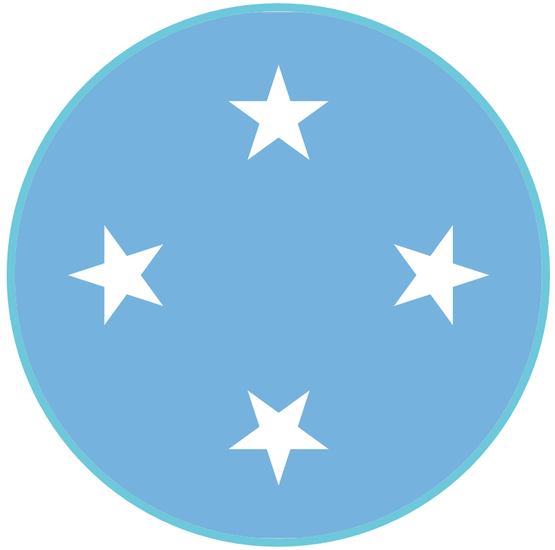
3. Risk Strategy

The project team and FSM agencies will review existing oil spill response plans and create action plans tailored specifically to the various wrecks

4. Remediation Plan

This plan will assess possible options for removing the oil from the wrecks, including estimated costs and timelines, and make recommendations for the best option.

A collaborative approach



Micronesia

Japanese Fleet in Chuuk Lagoon

17 potentially polluting wrecks. Collaborative project between the Major Projects Foundation, The Secretariat of the Pacific Regional Environment Programme (SPREP), The Ocean Foundation, FSM Office of National Archives, Culture and Historic Preservation (NACH), the Department of Environment, Climate Change and Emergency Management, and the Chuuk Historic Preservation Office

Marshall Islands

Atomic Fleet in Bikini Atoll

12 potentially polluting wrecks identified.. Collaborative project between the Major Projects Foundation, The Secretariat of the Pacific Regional Environment Programme (SPREP), The Ocean Foundation, RMI Historic Preservation Office and the Kili Bikini Ejit (KBE) Local Council.

Solomon Islands

WWII Wrecks ‘Iron Bottom Sound’

10 potentially polluting wrecks identified.. Collaborative project between the Major Projects Foundation, The Secretariat of the Pacific Regional Environment Programme (SPREP), The Ocean Foundation, Solomon Islands Ministry of Fisheries and Marine Resources and Ministry of Environment

The time is now!

- **Small Island Developing States (SID)**
- **UN Sustainable Development Goals SDG 14.1** “By 2025, prevent and significantly reduce marine pollution of all kinds”
- **2020 International Union for the Conservation of Nature (IUCN) Motion 30** “International cooperation on marine pollution from sunken vessels”
- **UN Decade of Ocean Science for Sustainable Development (2021-2030)** “Challenge 1 – Understand and map land and sea-based sources of pollutants and contaminants and their potential impacts on human health and ocean ecosystems, and develop solution to remove of mitigate them.

Photo Courtesy Pete Mesley (Lust4Rust)

Potentially polluting wrecks in the Pacific

- Polluting wrecks will have a negative impact on the environments, people and economy of the Pacific.
- This problem is solvable using available technology and methods.
- We need your support!

Thank you

All of the amazing Major Projects Foundation Volunteers!

Our generous and hugely appreciated sponsors!!

Steve Trewavas (photographs and dive support)

Kosi Latu, Tony Talouli and Vicki Hall (SPREP)

Professor Alan Broadfoot, Justine Ulph, Dr Sascha Fuller (UON)

Forthcoming paper:
Carter, M. et al. (in press) 'Ticking Ecological Time Bombs: Risk Characterisation and Management of Oil Polluting World War II Shipwrecks in the Pacific Ocean'. *Marine Pollution Bulletin*

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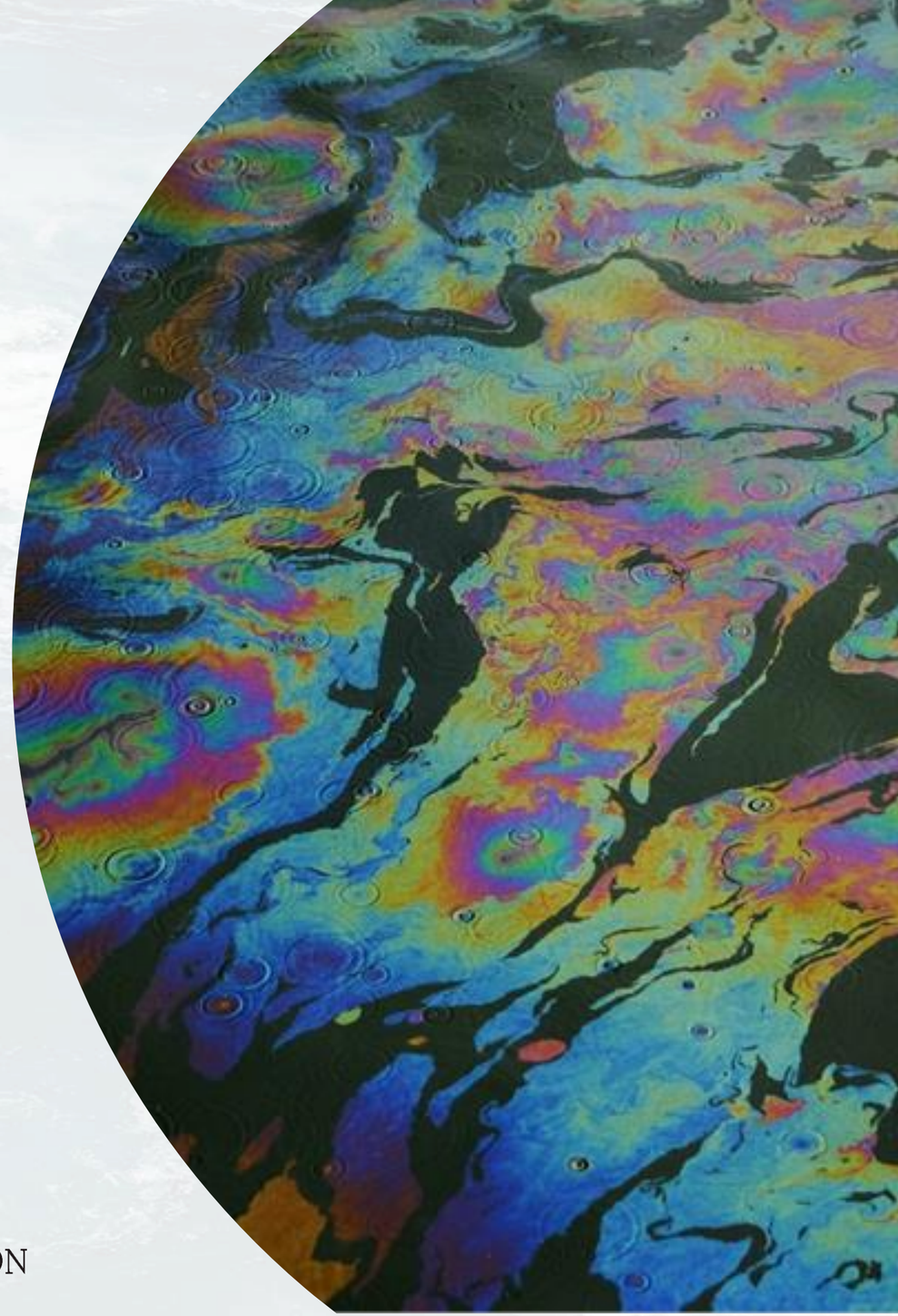

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