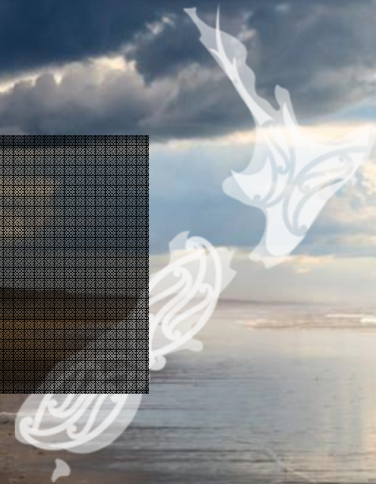





# Pacific Regional Navigation Initiative (PRNI)

Adam Greenland | National Hydrographer



# Maritime Safety in the Pacific





**NEW ZEALAND**  
MINISTRY OF FOREIGN AFFAIRS & TRADE  
**Aid Programme**

New Zealand Aid Programme  
Ministry of Foreign Affairs and Trade  
p 64 4 439 8000 f 64 4 439 7156  
Nga Hōa: Tūpūtupu-māi-tawhiti  
www.aid.govt.nz

Level 19, 163-175 Featherston Street  
Private Bag 189001  
Wellington 6140  
New Zealand

## MEMORANDUM OF UNDERSTANDING (MOU)

### South-west Pacific Regional Hydrography Programme


between

**Ministry of Foreign Affairs and Trade**  
195 Lambton Quay  
Wellington 6140  
New Zealand

**Land Information New Zealand**  
NZ Hydrographic Authority  
160 Lambton Quay  
Private Box 5501  
Wellington 6145  
New Zealand  
**(Partner Agency or LINZ)**

SWP Regional Hydrography Programme (SWPRHP)

CT file: MOU/63/2/SSDPF



LinZ Address | Place Name | Search | E/N or Lat/Lng

Current layers: SOLAS Risk Analysis, Vanuatu Shipping Tracks, Vanuatu Cruise Ships, Coastal Trader Shipping Tracks, Vanuatu Risk Analysis

**Hydro**

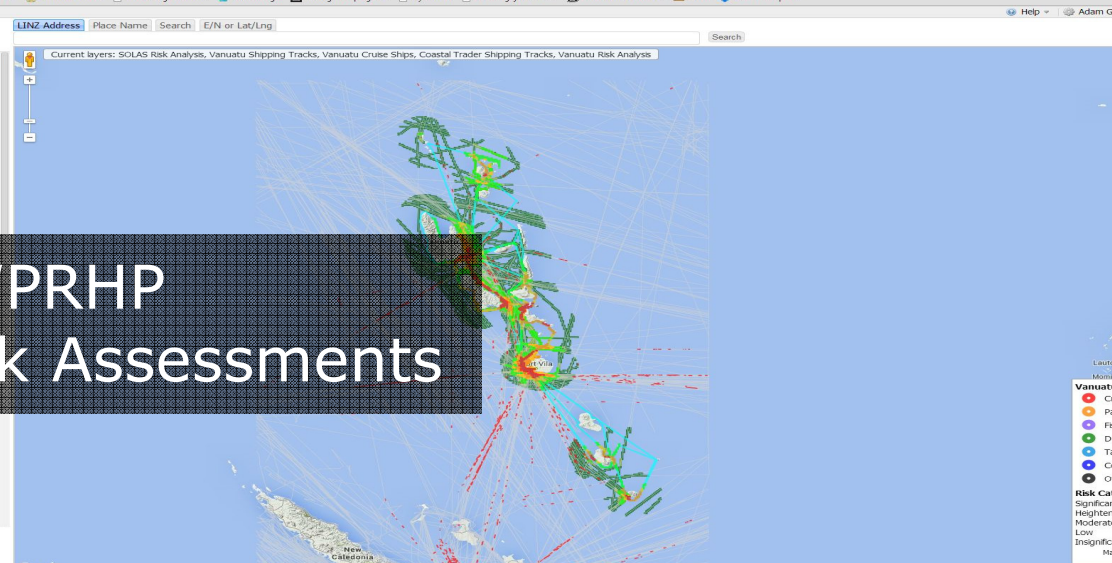
Shipping Lanes\*

Marine Dec: '11'

- No Classification
- Cargo Ship
- Commercial
- HSC
- Non-Commercial
- LPMAX
- Other

Marine Dec: '12'

- All Tracks
- Cruise Ships



**Vanuatu Shipping**

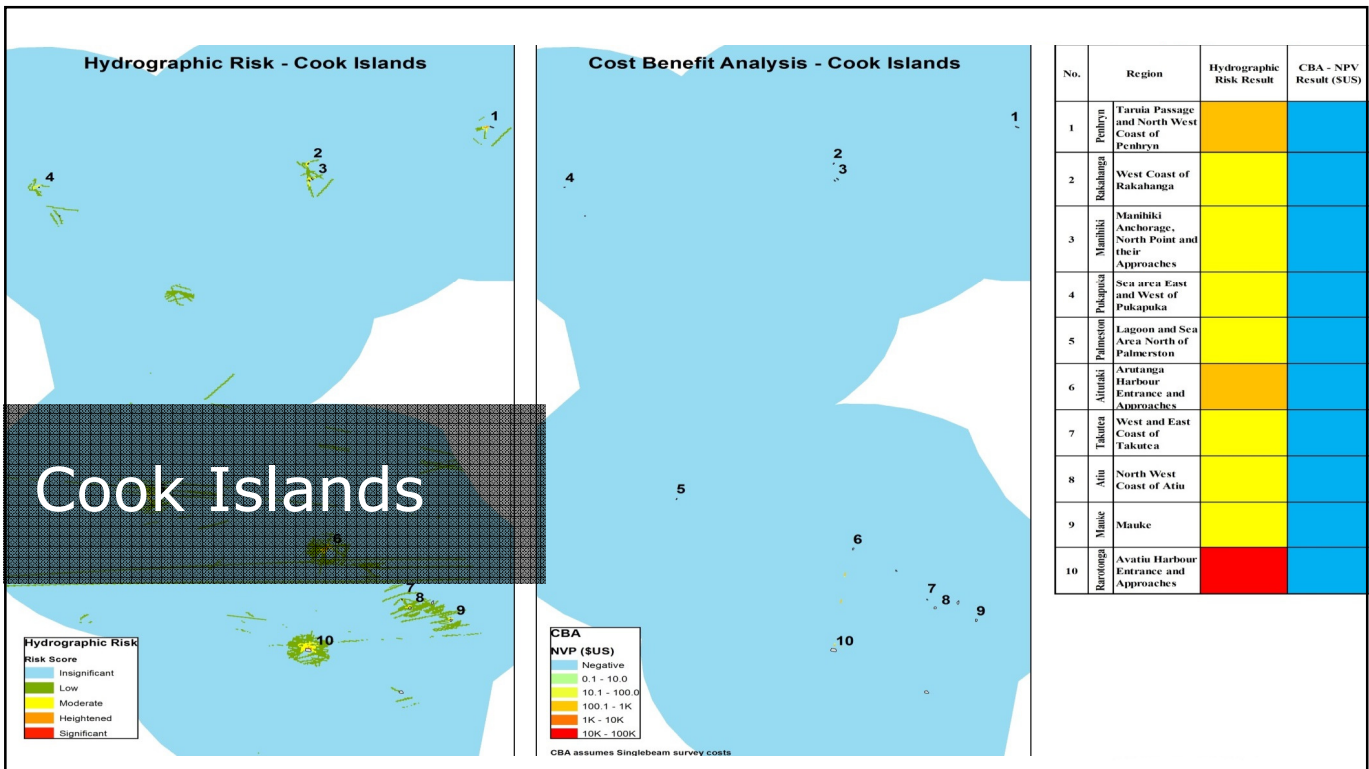
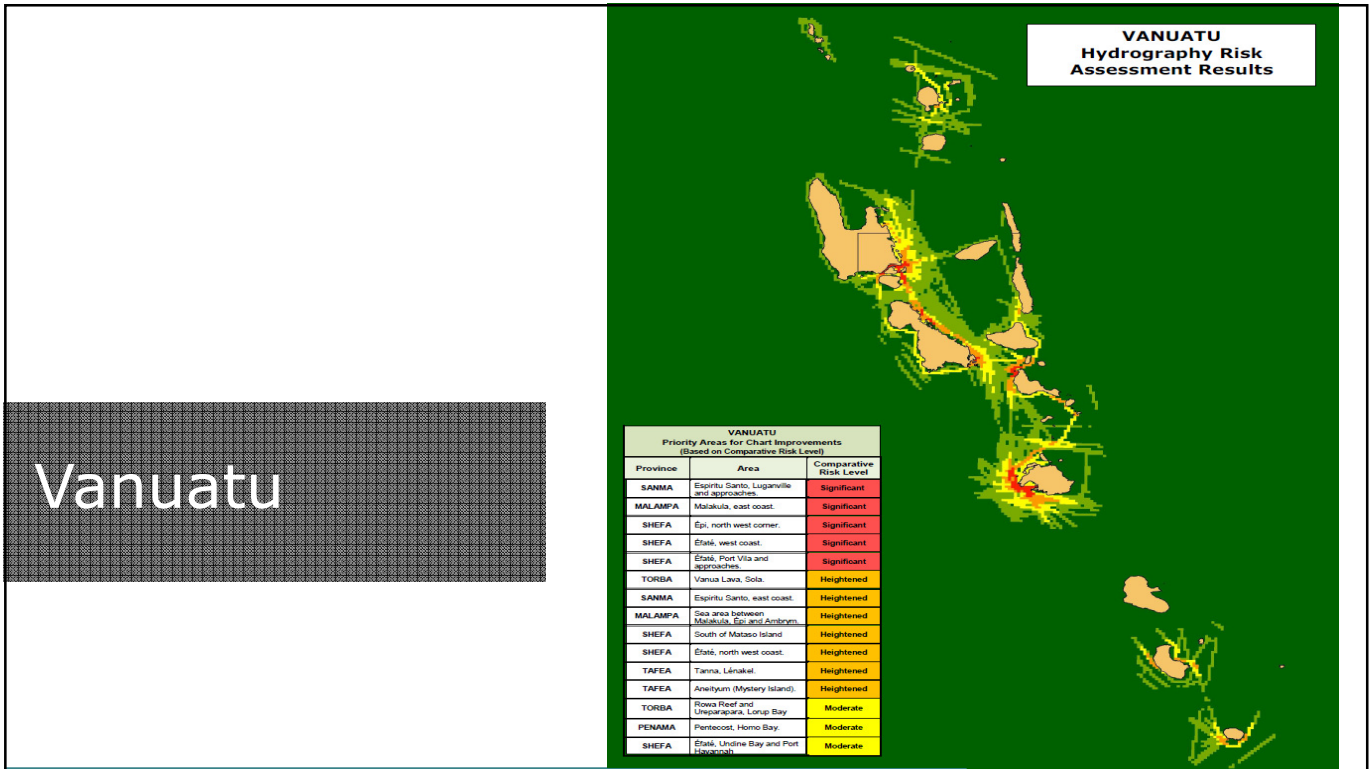
- Cruise Ship
- Passenger Ship
- Fishing
- Dry Cargo
- Tanker
- Container
- Other

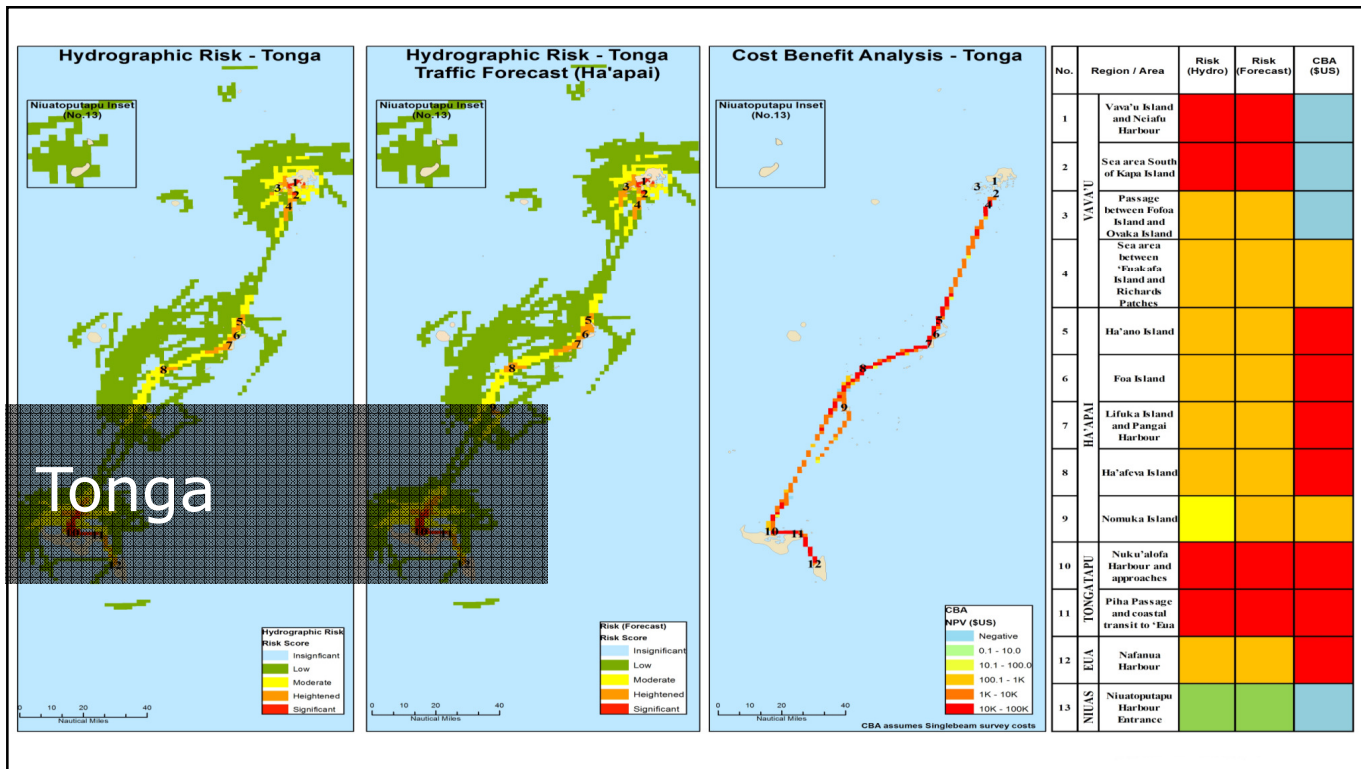
**Risk Categories**

- Significant
- Heightened
- Moderate
- Low
- Insignificant

Map Data ©2014 LINZ

SWPRHP Risk Assessments





New Zealand Ministry of Foreign Affairs and Trade  
Manatū Aorere

195 Lambton Quay  
Private Bag 18-901  
Wellington 5045  
New Zealand

T +64 4 439 8000

MEMORANDUM OF UNDERSTANDING  
(MOU)

Pacific Regional Navigation  
Initiative (PRNI)

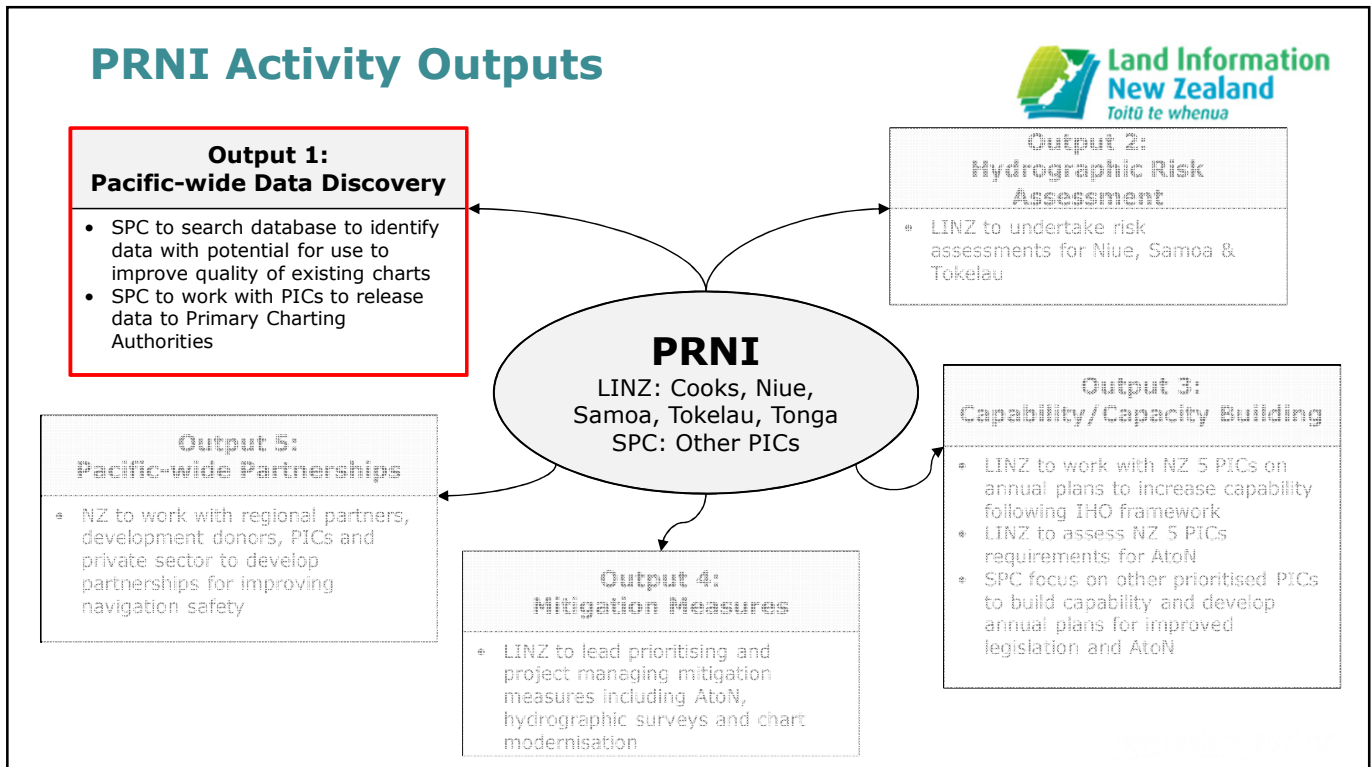
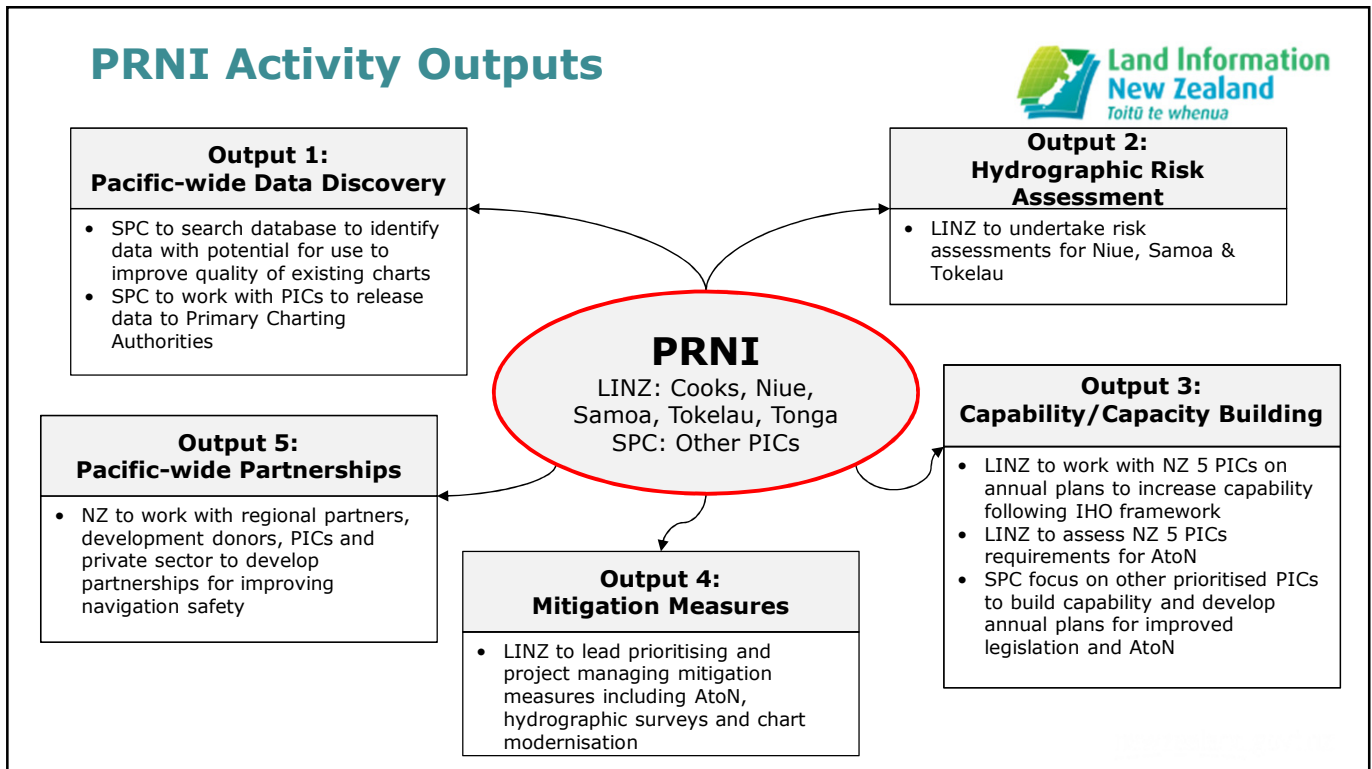
*Pacific Regional Navigation Initiative*

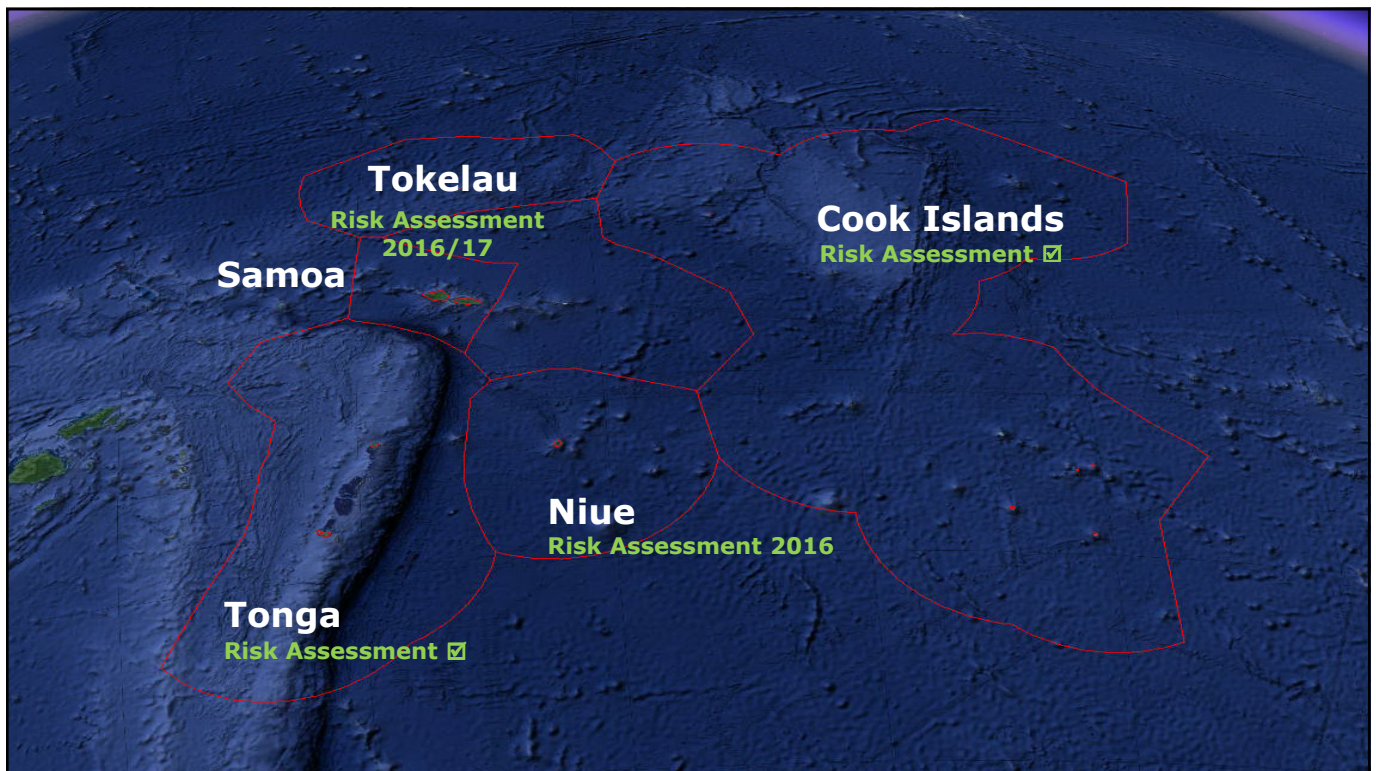
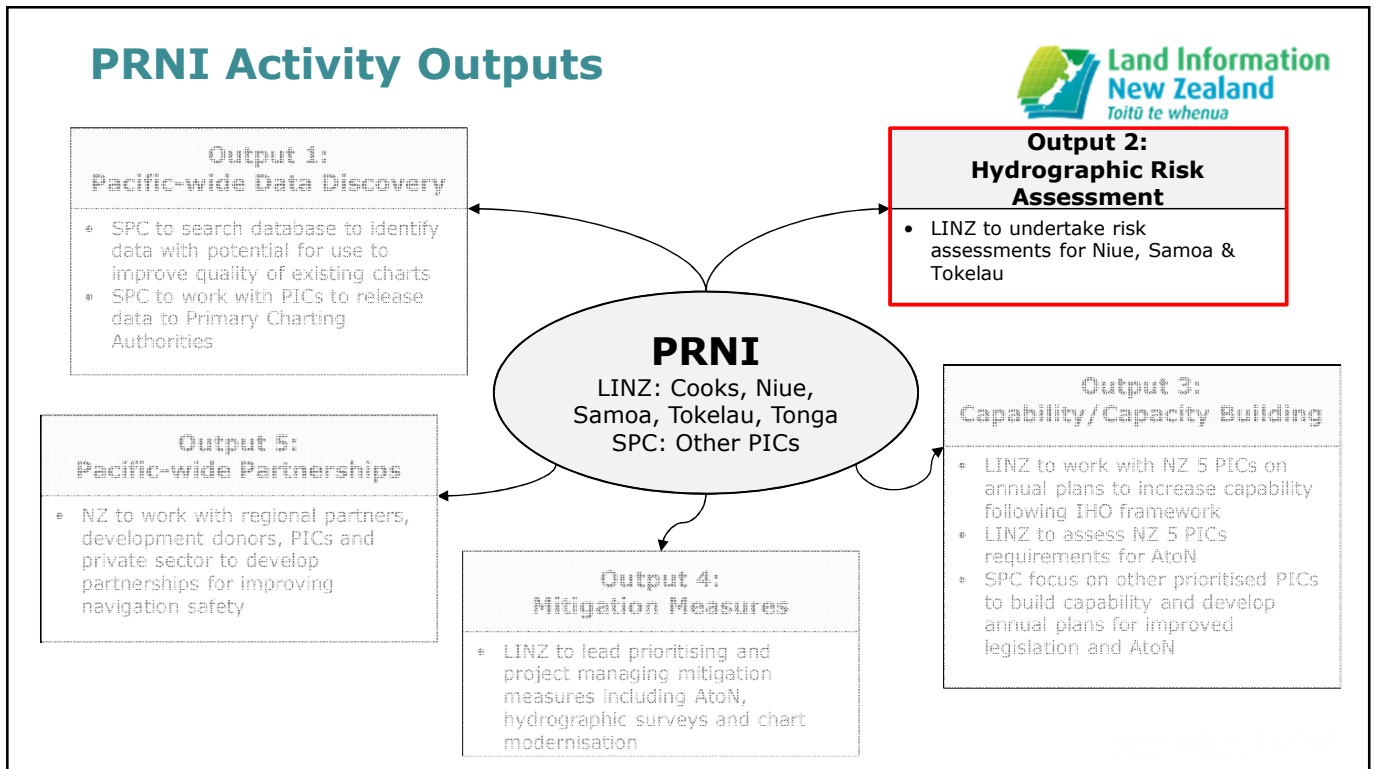
between

Ministry of Foreign Affairs and Trade  
195 Lambton Quay  
Wellington 6011  
New Zealand  
(MFAT)

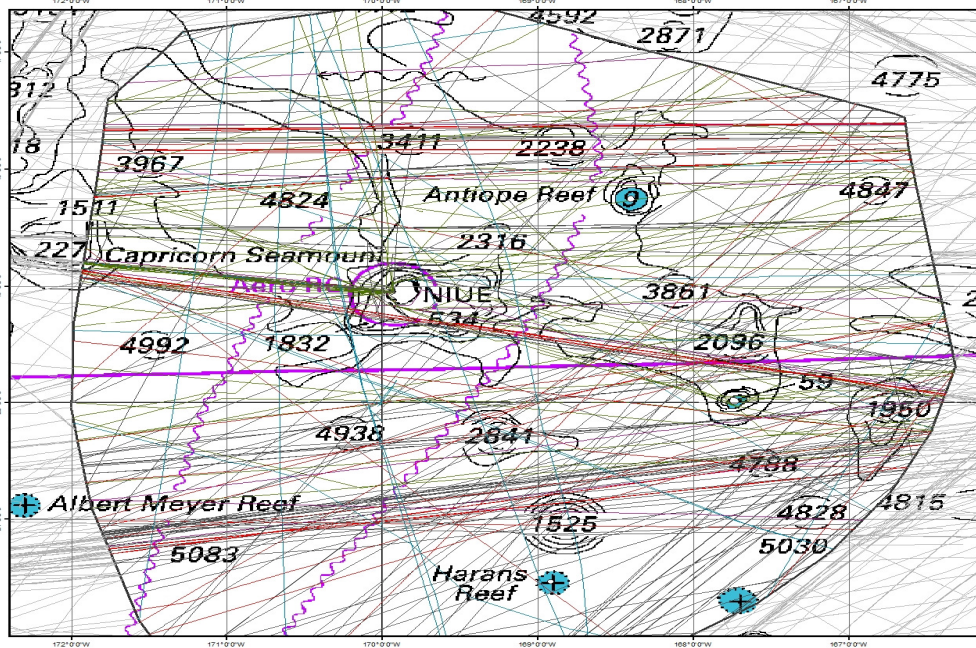
and

Land Information New Zealand  
NZ Hydrographic Authority  
Level 7, Radio New Zealand House





# Niue Risk Assessment



**All Vessel Tracks by Type**

**Legend**

- Cargo
- Fishing
- Passenger
- Recreational/Superyacht
- Tanker

**Scale at A3:**  
1:2,115,000  
0 5 10 20 30 40 50  
Nautical Miles

**Data Source:**  
Satellite AIS (S-AIS) vessel track dataset recorded January - March 2012  
July - October 2013  
December 2013 - January 2014  
Charts NZ 845 and NZ 14081 supplied by LINZ  
S-AIS supplied by MarineWeb

**Coordinate System:**  
WGS 1984 UTM Zone 2S

**Produced by:**  
Land Information New Zealand  
Wellington Office, Level 7,  
Radio New Zealand House  
155 The Terrace PO Box 5501,  
Wellington 6145, New Zealand  
T: 0800 665 463 | W: www.linz.govt.nz  
E: customer.support@linz.govt.nz

**SW Pacific Hydrography Risk Assessment**

**NEW ZEALAND**  
Sovereign Services & TRADE  
Aid Programme

**Land Information New Zealand**  
Te Taiao o Aotearoa

# Risk model – low traffic areas (SWP)



		Risk Scores					Weightings		Total Model			
		0	1	2	3	4	5	Factor		Category		
<b>Traffic</b>	Vessel Traffic		Insignificant	Low	Moderate	High	Catastrophic			0.5000		
	Pollution Potential		Insignificant	Low	Moderate	High	Catastrophic			0.5000		
<b>Likelihood Risk Criteria</b>	Met/Ocean Conditions		Sheltered at most sites	Mainly sheltered	Moderate Exposure	Mainly Exposed	Exposed on most sites	3		0.1500		
	Prevailing Conditions Exposure		Open Sea (insignificant)	1-2 knots	2-3 knots	3-4 knots	>5 knots	2	0.3	0.1000		
	Spring Mean Current Speed		Poor Visibility	Poor Visibility	Poor Visibility	Occasional Poor Visibility	Poor Visibility	1		0.6500		
	Visibility		Unknown	Very Limited	Very Limited	Very Limited	Very Limited	2		0.6500		
	Navigational Complexity		Open Sea (>10nm)	Offshore Navigation (5-10nm)	Coastal Navigation (1-5nm)	Port Approaches	Constrained Navigation (Within 5nm)	3	0.15	0.1500		
	Aids to Navigation		Chart/Doc	A	B	C	D	U	3		0.1800	
	Proximity to Non Working Atofts		No Lights	100% effective range	80% effective range	70% effective range	60% effective range	Within 50m effective range	2	0.3	0.1200	
	Bathymetry		Depth of Water 15m Contour	>10nm	5-10nm	2.5-5nm	1.5 to 2.5nm	1 to 1.5nm	Within 5nm	3	0.1	0.0600
	Bottom Type			Soft	Soft	Soft	Soft	Hard/rocky	2		0.6400	
	Navigational Hazards		Proximity to Known Reefs	>10nm	5-10nm	2.5-5nm	1.5 to 2.5nm	1 to 1.5nm	Within 5nm	2		0.0333
		Proximity to Volcanoes	>10nm	5-10nm	2.5-5nm	1.5 to 2.5nm	1 to 1.5nm	Within 5nm	2		0.0333	
		Proximity to Known SeaMounts	>10nm	5-10nm	2.5-5nm	1.5 to 2.5nm	1 to 1.5nm	Within 5nm	1		0.0333	
		Proximity to WW2 Military Sites	>2.5nm	2-2.5nm	1.5-2nm	1-1.5nm	500m-1nm	Within 500m	1	0.15	0.0167	
		Proximity to Charred Tidal Hazard (Chert/Fish/Bone)	>2.5nm	2-2.5nm	1.5-2nm	1-1.5nm	500m-1nm	Within 500m	3		0.6500	
<b>Consequence Risk Criteria</b>	Environmental Impact		Proximity to Large Reef (High Quality / or Isolated Shallow)	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	3		0.0789
			Proximity to Key Offshore Reef	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	2		0.0526
			Proximity to Large Wetlands Resource (Mangroves) (Large Volume or Small Volume)	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	3		0.0789
			Proximity Small Wetlands Resource (Mangroves) (Large Volume or Small Volume)	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	2	0.15	0.0526
			Proximity to Important Breeding Grounds	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	3		0.0789
			Proximity to World Biological Protected Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	3		0.0789
			Proximity to Regional Biological Protected Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	2		0.0526
			Proximity to Local Cultural Protected/Important Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	1		0.0263
	Culturally Sensitive Areas		Proximity to World Cultural Protected/Important Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	3		0.0789
			Proximity to Regional Cultural Protected/Important Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	2	0.15	0.0500
		Proximity to Local Cultural Protected/Important Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	1		0.0250	
Economically Sensitive Areas		Proximity to Sites of High Economic Contribution	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	3		0.1000	
		Proximity to Sites of Moderate Economic Contribution	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	1	0.35	0.0333	
		Proximity to Key Infrastructure (Ports)	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	3		0.1000	
		Proximity to Tourist Diving Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	1.5		0.0500	
		Crude Oil Spills	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	Within 5nm	2		0.6667	

# Risk model – high traffic areas (NZ)



		0	1	2	3	4	5	Rating	Category Weighting	Model Weighting	Overall Weighting	
		<b>CONTINUOUS SCALES</b>										
Traffic	Potential Loss of Life		Insignificant	Low	Moderate	High	Catastrophic		42.0%		25%	
	Potential Oil Outflow		Insignificant	Low	Moderate	High	Catastrophic		38.0%			
	Vessel Damage - Salvage Costs		Insignificant	Low	Moderate	High	Catastrophic		5.0%			
	Economic Costs		Insignificant	Low	Moderate	High	Catastrophic		15.0%			
		<b>LIKELIHOOD SCALES</b>										
Causation Risk Criteria	Charting	Chart Quality	A	B	C	D	U	3				
		Survey Age	<5 years	5-10 years	10-20 years	20-30 years	>30 years	1	30.0%	15.00%	5.00%	
		Chart Adequacy	Excellent	Good	Moderate	Poor	Unacceptable	2		10.00%		
	Route Characteristics	Navigational Complexity	Open Sea >10nm	Offshore Navigation (5-10nm)	Coastal Navigation (1-5nm)	Port Approaches	Constrained Navigation (<1nm)	3				
		Depth of Water 15m Contour	>10nm	5-10nm	2.5-5nm	1.5-2.5nm	1-1.5nm	2	17.5%	8.75%	5.83%	
	MetOcean	Traffic Density		Insignificant	Low	Moderate	High	Catastrophic	1			2.92%
		Prevailing Wave/Wind	Sheltered at Most Times	Mainly Sheltered	Moderate Exposure	Mainly Exposed	Exposed on Most Days	3				5.83%
		Tides/Current	Open Sea	1-2kts	2-3kts	3-4kts	>5kts	3	17.5%	5.83%	5.83%	
	Navigational Hazards	Longwave/Surge	Very Unlikely	Unlikely	Occasional	Often Poor	Frequent	2				3.89%
		Sea Mounts	>10nm	5-10nm	2.5-5nm	1.5-2.5nm	1-1.5nm	1				2.19%
Isolated Dangers - Rocks/Wrecks/etc.		>2.5nm	2.5-2nm	1.5-2	1-1.5nm	500m-1nm	<500m	2	17.5%	4.38%	4.38%	
Mitigation	Charred Tidal Hazards	>2.5nm	2.5-2nm	1.5-2	1-1.5nm	500m-1nm	<500m	2			1.94%	
	Breaking Reefs	>10nm	5-10nm	2.5-5nm	1.5-2.5nm	1-1.5nm	3				6.56%	
Bathymetry	Harbour Risk Mitigation Resources	Available	Partial	Limited	None	Absent	3	10.0%	4.00%	4.00%		
	Dynamic Seabed - Estuarial Seismic/Volcanic Factors	>10nm	5-10nm	2.5-5nm	1.5-2.5nm	1-1.5nm	2	7.5%	3.00%	3.00%		
		<b>CONSEQUENCE SCALES</b>										
Consequence Risk Criteria	Loss of Life	Response Complexity	100.0%	102.5%	105.0%	107.5%	110%	N/A	N/A			
	Property	Salvage Complexity	100.0%	102.5%	105.0%	107.5%	110%	3				17.65%
		Formal Reserves - World Heritage	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	3			N/A
		Marine Reserves	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2.5			14.71%
	Environmental Impact	Coastal Reserves	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2			11.76%
		Wetland Resources	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	1.5			8.82%
		Aquaculture/Fishing Grounds/Shellfish Harvest Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2	N/A		11.76%
		Tourism	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2			11.76%
		Cultural (Iwi)/Treaty History Sites	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2			11.76%
	Economic Impact	Recreational/Social Amenity	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2			11.76%
		Port Access Channels	>2.5nm	2.5-2nm	1.5-2nm	1 to 1.5nm	500m to 1nm	<500m	3			25.00%
		Critical Infrastructure (Berths)	Absent	Very Low	Low	Moderate	High	Critical	1			8.33%
		Proximity to Sites of High Economic Contribution	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2	N/A		16.67%
		Proximity to Sites of Moderate Economic Contribution	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	1			8.33%
		Cruise Ship Stops	>20nm	10-20nm	5-10nm	2.5-5nm	1-2.5nm	<1nm	2			16.67%
Pipelines/Cables		>10nm	5-10nm	2.5-5nm	1.5-2.5nm	1-1.5nm	Within 1nm	3			25.00%	

# PRNI Activity Outputs



**Output 1: Pacific-wide Data Discovery**

- SPC to search database to identify data with potential for use to improve quality of existing charts
- SPC to work with PICs to release data to Primary Charting Authorities

**Output 2: Hydrographic Risk Assessment**

- LINZ to undertake risk assessments for Niue, Samoa & Tokelau

**PRNI**  
LINZ: Cooks, Niue, Samoa, Tokelau, Tonga  
SPC: Other PICs

**Output 3: Capability/Capacity Building**

- LINZ to work with NZ 5 PICs on annual plans to increase capability following IHO framework
- LINZ to assess NZ 5 PICs requirements for AtoN
- SPC focus on other prioritised PICs to build capability and develop annual plans for improved legislation and AtoN

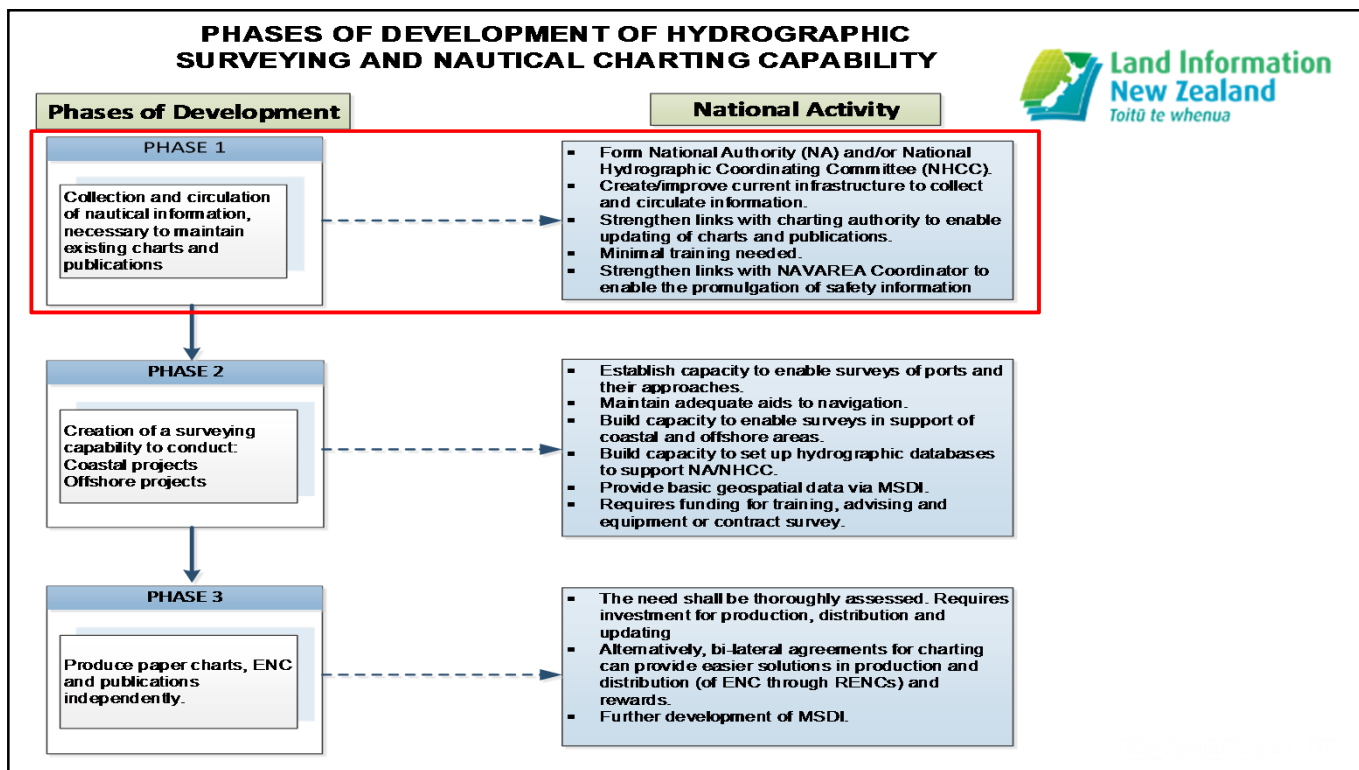
**Output 5: Pacific-wide Partnerships**

- NZ to work with regional partners, development donors, PICs and private sector to develop partnerships for improving navigation safety

**Output 4: Mitigation Measures**

- LINZ to lead prioritising and project managing mitigation measures including AtoN, hydrographic surveys and chart modernisation





## Hydrography Governance



Assist PICs to deliver on SOLAS V/9 international treaty obligations for hydrographic services (governance, policy, resources, oversight)

### IHO CB Phase 1

- Establish National Hydrographic Authority
- Establish National Hydrographic Coordinating Committee
- Establish National MSI Coordinator position

## Capability building & training



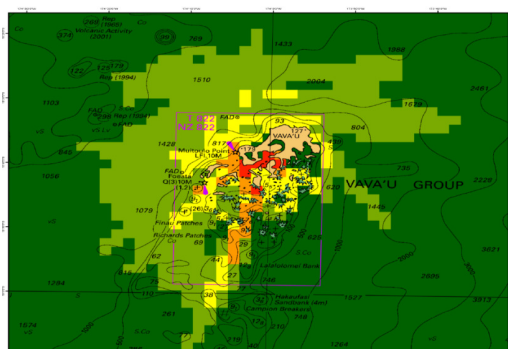
- Formal training
  - Cat A/B Hydrographic Surveyor
  - Cat B Nautical Cartographer
  - MSI Coordinator
  - AtoN
- Work placements
  - Cartography
  - Surveying
  - MSI/NtM
- Available through
  - PRNI
  - SWPHC
  - IHO/IMO/IALA
  - Donor programmes

## IHO Capacity Building Strategy

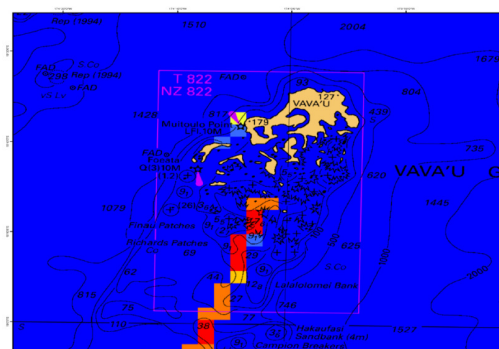


### 5.3.3 Risk Assessment

A risk assessment provides a robust basis for prioritising a national/regional charting programme. The risk analysis methodology is evidence-based and objective against set criteria. It includes AIS traffic analysis and an economic assessment. The main output is a risk heat map which allows governments, charting authorities and other interested parties to come to a conclusion about the nature and scope of charting improvements and related maritime safety initiatives. A GIS is used for the analysis and to display the results. This allows complex data to be easily accessed and understood by key stakeholders to aid decision making and presents a compelling case for action.



**Risk result**



**Cost Benefit Analysis**

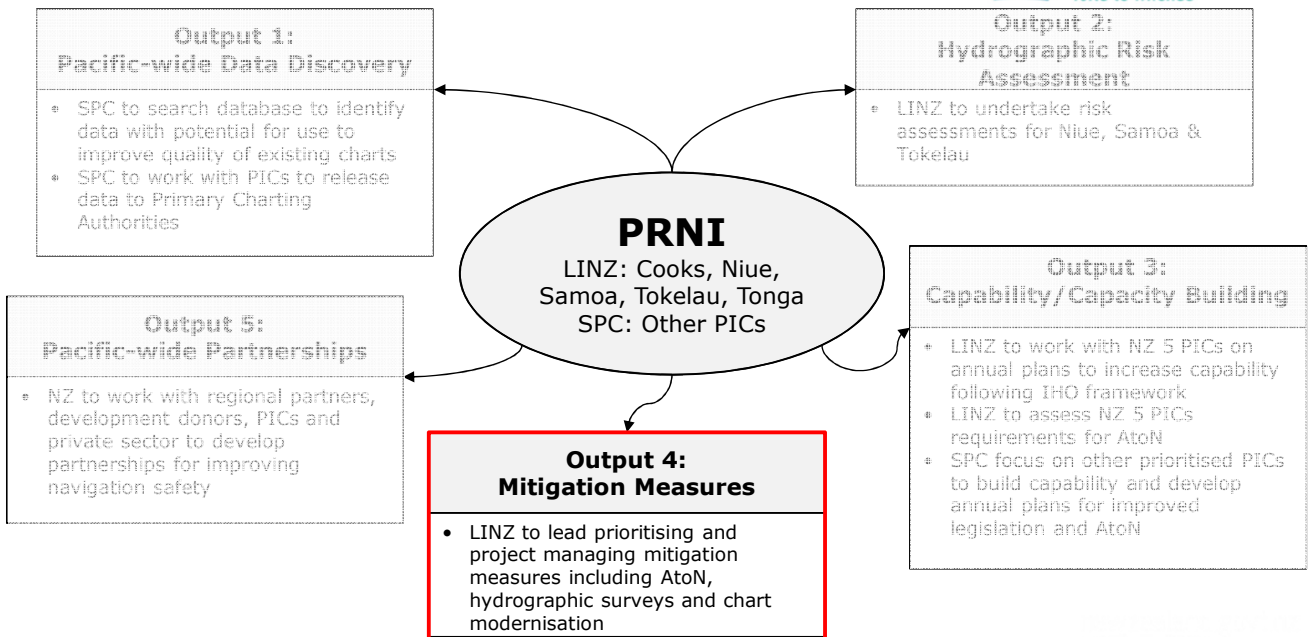
# Open source risk assessment



- how the concept of an evidence led hydrography risk assessment has been adopted as part of the International Hydrographic Organization Capacity Building Strategy and embraced by the international maritime community

The screenshot shows the IHO website's 'Risk Assessment' page. It features a navigation menu at the top with options like 'Home', 'Standards & Publications', and 'Capacity Building'. The main content area is split into two columns: English ('Risk assessment, methodology and tools') and French ('Méthodes et outils d'évaluation des risques'). Both columns list the 'South West Pacific Regional Hydrography Programme - Methodology and Risk Assessment Results' and provide a numbered list of documents for download. A search bar is visible on the right side.

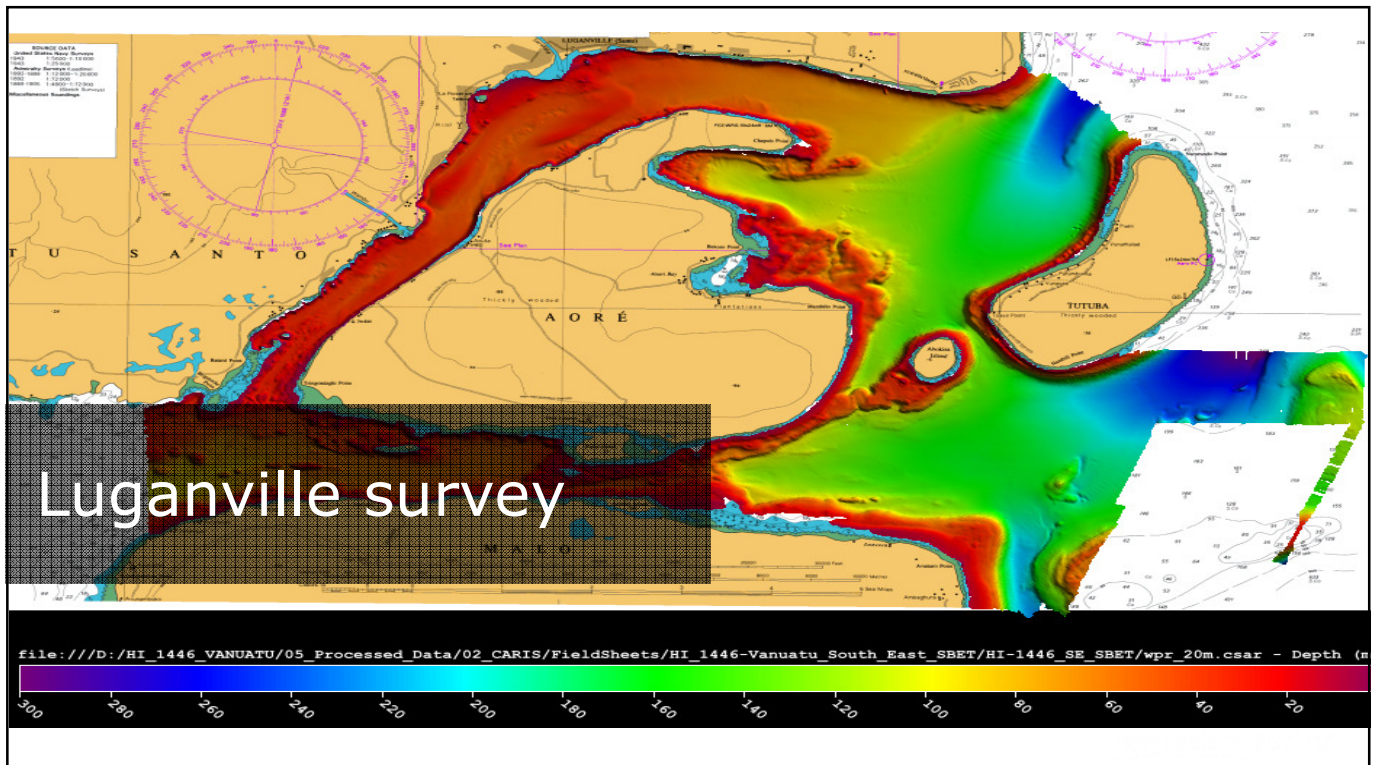
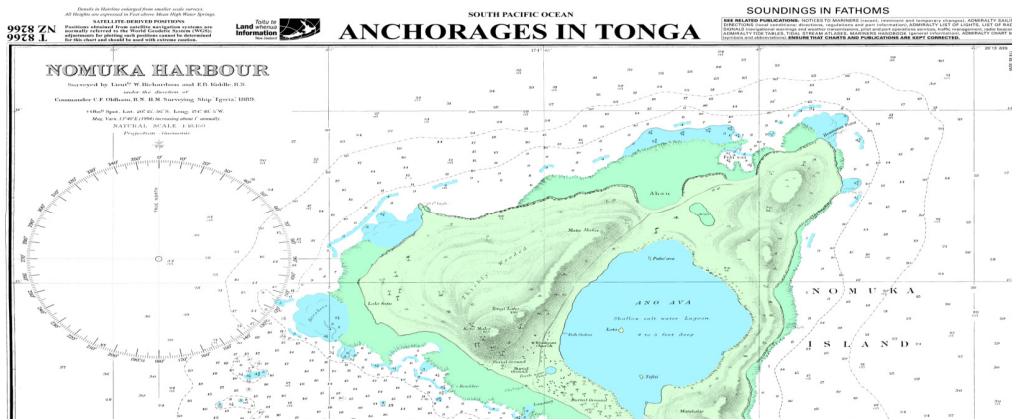
# PRNI Activity Outputs



## Mitigation measures



- Hydrographic surveys
- Chart modernisation programme
- Aids to Navigation (AtoN) assessment



Luganville survey

