

Annex A

Ports and Waterways Safety Assessment Workshop Report Torres Strait, Australia

Introduction

Risk identification and mitigation are and have been ongoing activities within the Torres Strait area. As a step toward standardizing methodology, a formal Ports and Waterways Safety Assessment (PAWSA) for Torres Strait was conducted in Cairns, Australia, on 22 – 23 March 2004. The results of that workshop are provided in this report and include the following information:

- Brief description of the process used for the assessment
- Numerical results from the following activities:
 - Expertise Evaluation
 - Risk Factor Rating Scales
 - Absolute Risk Levels
 - Present Risk Levels
 - Intervention Effectiveness
- Summary of risks and mitigations discussion

Assessment Process

The PAWSA process is a structured approach for obtaining expert judgments on the level of waterway risk. The process also addresses the effectiveness of possible intervention actions for reducing risk in the waterway. A select group of waterway users / stakeholders evaluate risk factors and the effectiveness of various intervention actions. Thus the process is a joint effort involving waterway experts and the agencies / entities responsible for implementing selected risk mitigation measures.

The PAWSA methodology employs a generic model of waterway risk that was conceptually developed by a United States National Dialog Group on National Needs for Vessel Traffic Services and then translated into computer algorithms by Potomac Management Group, Inc. In that model, risk is defined as the product of the probability of a casualty and its consequences. Consequently, the model includes variables associated with both the causes and the effects of waterway casualties.

The first step in the process is for the participants to assess their expertise with respect to the six risk categories in the model. Those self assessments are used to weight inputs during all subsequent steps. The second step is for the participants to provide input for the rating scales used to assess risk. The third step is to discuss and then numerically evaluate the absolute risk

levels in the waterway using pre-defined qualitative risk descriptors. In the fourth step, the participants discuss and then evaluate the effectiveness of existing mitigation strategies in reducing risk. Next, the participants are asked to offer new ideas for further reducing risk, for those factors where risk is not already well balanced with existing mitigations. Finally, the effectiveness of various intervention actions in reducing unmitigated risk is evaluated.

The process produces the group's consensus of risks in the waterway and is an excellent tool for focusing risk mitigation efforts. However, risk factors evaluated as being adequately balanced may still be worthy of additional risk mitigation actions. Any reasonable steps for minimizing or preventing the impacts of marine accidents should be encouraged for the benefit of the waterway community.

Geographic Area:

The participants defined the geographic bounds of the waterway area to be discussed.

- All of the waters of Torres Strait from Booby Island to Bramble Cay and north of 10° 41' S latitude, including Varzin and Gannet Passages, the Prince of Wales Channel, the Great North East Channel, Endeavour Strait, and the Adolphus Channel to abeam Cape York.

Changes to the Waterway Risk Model:

Recreational boating in Torres Strait is virtually nonexistent. On the other hand, the people living on the many islands scattered throughout Torres Strait use watercraft for their daily transportation and subsistence fishing. Consequently, the Waterways Risk Model was adjusted for this workshop by replacing the Recreational Boater Proficiency risk factor with the Traditional Fisher Proficiency risk factor and by replacing the Volume of Recreational Traffic risk factor with the Volume of Traditional Fishery Traffic risk factor.

Numerical Results

Book 1 –Expertise Evaluation

In *Book 1*, the participants were asked to assess their level of expertise compared to the other participants in the workshop for each of the six categories in the Waterway Risk Model. Overall, 29% of the participants placed themselves in the upper third, 33% in the middle third, and 38% in the lower third of all participants. This distribution is very close to the nominal ideal.

Book 2 – Risk Factor Rating Scales

Risk Factor	A Value	B Value	C Value	D Value
Vessel Quality	1.0	3.0	5.7	9.0
Deep Draft Mariner Proficiency	1.0	3.1	5.7	9.0
Shallow Draft Mariner Proficiency	1.0	3.1	5.7	9.0
Traditional Fisher Proficiency	1.0	3.1	5.7	9.0
Volume of Commercial Traffic	1.0	3.0	5.4	9.0
Vol. of Traditional Fishery Traffic	1.0	2.9	5.9	9.0
Traffic Mix	1.0	2.3	4.8	9.0
Congestion	1.0	2.8	5.1	9.0
Winds	1.0	2.5	5.2	9.0
Currents	1.0	2.8	5.0	9.0
Visibility Restrictions	1.0	2.9	5.7	9.0
Obstructions	1.0	2.1	4.6	9.0
Visibility Impediments	1.0	3.1	5.5	9.0
Dimensions	1.0	3.1	5.5	9.0
Bottom Type	1.0	2.5	5.2	9.0
Configuration	1.0	2.8	5.4	9.0
Personal Injuries	1.0	3.2	5.7	9.0
Petroleum Discharge	1.0	3.8	6.2	9.0
Hazardous Materials Release	1.0	3.6	6.1	9.0
Mobility	1.0	3.1	5.4	9.0
Health and Safety	1.0	3.0	5.6	9.0
Environmental	1.0	3.2	5.9	9.0
Aquatic Resources	1.0	2.9	5.6	9.0
Economic	1.0	3.0	5.7	9.0

Analysis:

The purpose of *Book 2* is to produce the risk scale numbers that are used in *Book3: Absolute Risk Levels*. The facilitated risk assessment session is structured to address six risk categories, with four related risk factors under each. The 24 risk factors in the Waterway Risk Model included those identified by the United States National Dialogue Group as those that should be addressed when considering improvements to vessel traffic management. In *Book 3* the participants evaluate the absolute risk level in the waterway for each risk factor by selecting a qualitative

descriptor that best describes conditions in Torres Strait. Those qualitative descriptors are written in absolute risk terms, i.e., they describe the risk that exists due to the nature of operations on the waterway, the configuration of the waterway, or environmental conditions in the area without considering any existing mitigations that also might exist. However, before the absolute risk levels can be measured, the qualitative descriptors have to be converted to numerical values. This is done by having the participants calibrate a risk measurement scale for each risk factor. On that scale, 1.0 represents low risk (best case scenario) and 9.0 represents high risk (worst case scenario). Low risk represents a description of the lowest possible absolute risk expected to be found on a waterway. The first qualitative descriptor, written to describe that best case scenario, is referred to as the A value, and is always given a value of 1.0. High risk represents a description of the highest possible absolute risk that might be encountered. The fourth qualitative descriptor, written to describe that worst case scenario, is referred to as the D value, and is always given a value of 9.0. Using Book 2, the participants determined numerical values for two intermediate qualitative descriptions (the B and C values) between those two extreme limits. On average, participants from this workshop calculated the intermediate risk points as 3.0 (B value) and 5.5 (C value), which are very close to the average values (3.0 and 5.6) established during prior PAWSA workshops held throughout the United States.

Book 3 – Absolute Risk Levels

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
4.5	1.9	4.5	1.0	5.7	3.0
Deep Draft Mariner Proficiency	Volume of Traditional Fishery Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
5.5	3.4	7.9	5.3 *	9.0	9.0
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Material Release	Aquatic Resources
7.0	3.3	3.2	8.5	6.5	7.2
Traditional Fisher Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic
5.6	2.6	2.6	5.1	4.3	7.6

* The concept measured in the Dimensions risk factor does not include underkeel clearance, a major issue in this waterway. The risk measurement for the Dimensions factor only considers the risk associated with horizontal dimensions. Consequently, the absolute risk value shown for the Dimensions factor probably understates the actual risk by a considerable margin.

Analysis:

The participants evaluated the absolute risk level in the waterway by selecting a qualitative descriptor for each risk factor that best described conditions in the Torres Strait area. Those qualitative descriptors were converted to numerical values using the scales from the *Book 2* results. On those scales, 1.0 represents low risk (best case) and 9.0 represents high risk (worst case), with 5.0 being the mid-risk value. In the Torres Strait area, 13 of the 24 risk factors were scored at or above the mid-risk value. They were (in descending order):

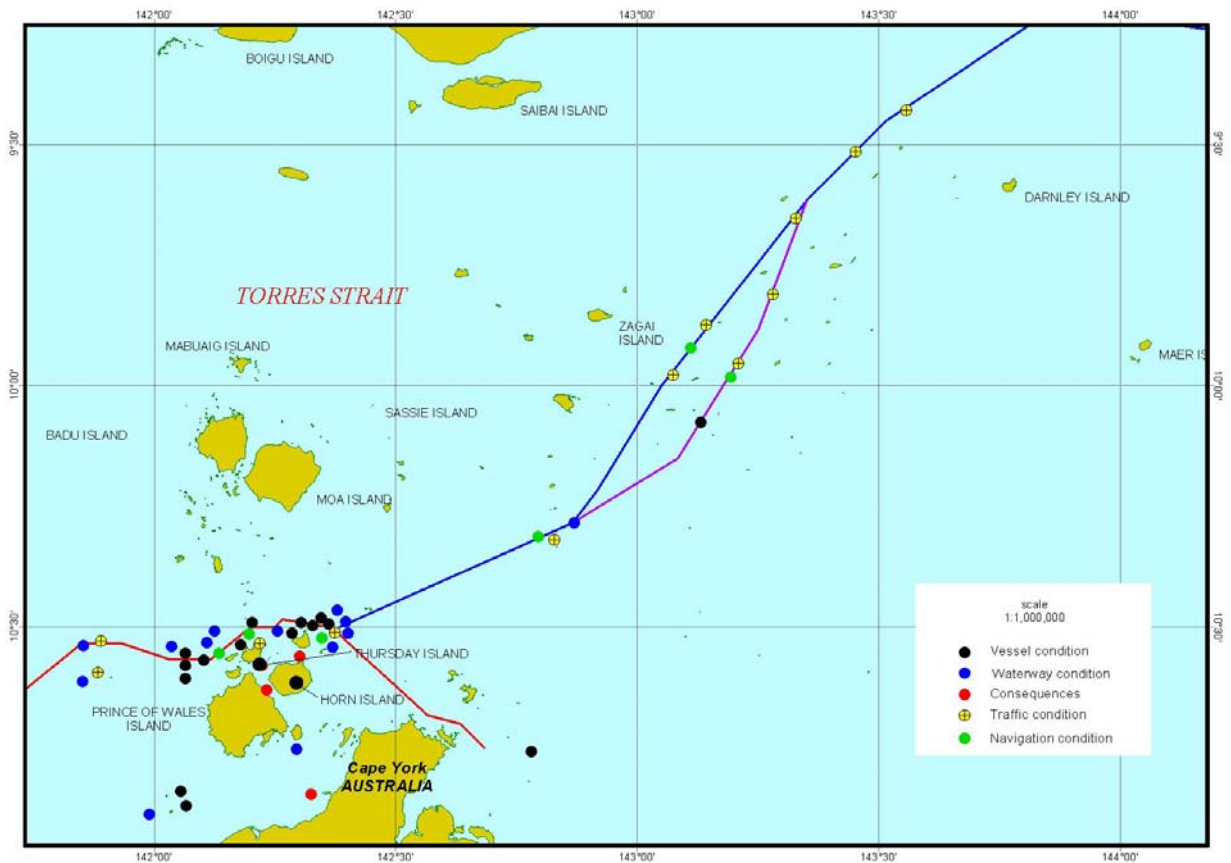
- Petroleum Discharge (9.0)
- Environmental (9.0)
- Bottom Type (8.5)
- Currents (7.9)
- Economic (7.6)
- Aquatic Resources (7.2)
- Shallow Draft Mariner Proficiency (7.0)
- Hazardous Materials Release (6.5)
- Personal Injuries (5.7)
- Deep Draft Mariner Proficiency (5.5)

- Traditional Fisher Proficiency (5.6)
- Dimensions (5.3 *)
- Configuration (5.1)

Risk values highlighted in red (values at or above 7.7) denote very high absolute risk levels. Conversely, risk values highlight in green (values at or below 2.2) denote very low absolute risk.

Chart of the Waterway:

As participants identified specific locations associated with particular risks, a nautical chart of the area was annotated with colored dots corresponding to the risk category being discussed. The completed chart is shown below. Note the dot concentration in the Prince of Wales Channel.



Book 4 – Present Risk Levels

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
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Vessel Quality	Volume of Commercial Traffic		Winds		Visibility Impediments		Personal Injuries		Health and Safety		
4.5	3.9	1.9	2.2	4.5	3.6	1.0	1.0	5.7	5.3	3.0	3.1
NO		RISING		Balanced		Balanced		Maybe		RISING	
Deep Draft Mariner Proficiency		Volume of Traditional Fishery Traffic		Currents		Dimensions		Petroleum Discharge		Environmental	
5.5	4.5	3.4	3.4	7.9	6.2	5.3	5.5	9.0	7.3	9.0	7.9
NO		Balanced		Maybe		RISING		Maybe		Maybe	
Shallow Draft Mariner Proficiency		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
7.0	5.3	3.3	3.2	3.2	2.7	8.5	7.1	6.5	6.3	7.2	6.9
Maybe		Maybe		Balanced		Maybe		NO		Maybe	
Traditional Fisher Proficiency		Congestion		Obstructions		Configuration		Mobility		Economic	
5.6	3.6	2.6	2.8	2.6	2.1	5.1	3.6	4.3	5.1	7.6	6.5
Balanced		RISING		Balanced		Balanced		RISING		Balanced	

KEY		Book 3	Absolute level of risk
Risk Factor		Book 4	Level of risk taking into account existing mitigations
		Balanced	Consensus that risks are well balanced by existing mitigations
Book 3	Book 4	Maybe	No consensus that risks are adequately balanced by existing mitigations
Consensus		NO	Consensus that existing mitigations do NOT adequately balance risk
		RISING	Existing mitigations or future projections are causing /will cause risk to rise

Analysis:

The participants examined all risk factors and the effects of existing mitigations on those risks in the Torres Strait area. For eight risk factors, the participants were in consensus that the risk was well balanced by existing mitigations. Consensus is defined as more than 2/3 of the participants being in agreement. For three risk factors, the participants were in consensus that risks were NOT adequately balanced by existing mitigations. For the other eight risk factors, there was not good consensus on whether existing mitigations adequately reduced risk. For five risk factors the participants felt that future trends would cause risk to increase further in spite of existing mitigations.

Book 5 – Intervention Effectiveness

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
Enforcement 1.9 Caution	Rules & Procedures 1.0	Balanced	Balanced	Coordination / Planning 3.3	Coordination / Planning 0.9 Caution
Deep Draft Mariner Proficiency	Volume of Traditional Fishery Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
Rules & Procedures 2.7	Balanced	Nav / Hydro Info 2.5	Rules & Procedures 2.9	Coordination / Planning 3.3	Coordination / Planning 2.8
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Rules & Procedures 2.7	Active Traffic Mgmt 2.2	Balanced	Nav / Hydro Info 3.7	Coordination / Planning 3.0	Coordination / Planning 3.9
Traditional Fisher Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic
Balanced	Rules & Procedures 1.8	Balanced	Balanced	Coordination / Planning 1.7	Balanced

KEY

Risk Factor	Intervention	Intervention category that was judged most effective in further mitigating risk
Intervention	Risk Improvement	Expected improvement in risk level if new mitigation measures were implemented
Risk Improvement	Caution	Caution No consensus alert

Legend:

The intervention category listed is the one category that most participants selected for further reducing risks. The Risk Improvement is the perceived reduction in risk when taking the actions specified by the participants. A green **Balanced** indicates that no intervention is needed and risk is balanced in the waterway, and a yellow **Caution** indicates that there was a difference between the most effective category and the category most selected by the participants for action. Intervention category definitions are:

Coordination / Planning	Improve long-range and/or contingency planning and better coordinate activities / improve dialogue between waterway stakeholders
Voluntary Training	Establish / use voluntary programs to educate mariners / boaters in topics related to waterway safety (Rules of the Road, ship/boat handling, etc.)
Rules & Procedures	Establish / refine rules, regulations, policies, or procedures (nav rules, pilot rules, standard operating procedures, licensing, <u>require</u> training and education, etc.)
Enforcement	More actively enforce existing rules / policies (navigation rules, vessel inspection regulations, standards of care, etc.)
Nav / Hydro Info	Improve navigation and hydrographic information (BNTM, charts, sailing directions, coast pilots, AIS, tide and current tables, etc.)
Radio Communications	Improve the ability to communicate bridge-to-bridge or ship-to-shore (radio reception coverage, signal strength, reduce interference & congestion, monitoring, etc.)
Active Traffic Mgmt	Establish/improve a Vessel Traffic Service (info, advice and control) or Vessel Traffic Information Service (information and advice only)
Waterway Changes	Widen / deepen / straighten the channel and/or improve the aids to navigation (buoys, ranges, lights, DGPS, etc.)
Other Actions	Risk mitigation measures needed that do NOT fall under any of the above strategy categories

Analysis:

For 14 of the 16 risk factors needing additional risk reduction action, the most selected intervention category had the largest risk improvement.

- Deep Draft Mariner Proficiency – Rules & Procedures
- Shallow Draft Mariner Proficiency – Rules & Procedures
- Volume of Commercial Traffic – Rules & Procedures
- Traffic Mix – Active Traffic Management
- Congestion – Rules & Procedures
- Currents – Navigation & Hydrographic Information
- Dimensions – Rules & Procedures
- Bottom Type – Navigation & Hydrographic Information

Risk factors needing additional risk reduction. (continued)

- Personnel Injuries – Rules & Procedures
- Petroleum Discharge – Coordination & Planning
- Hazardous Materials Release – Coordination & Planning
- Mobility – Coordination & Planning
- Environmental – Coordination & Planning
- Aquatic Resources – Coordination & Planning

Two consensus alerts occurred because there was a strong secondary intervention (Vessel Quality) or there was not a strong majority for the most selected intervention (Health & Safety). No consensus was reached, but the intervention categories possibly offering risk improvement are listed below.

- Vessel Quality – Enforcement
- Health & Safety – Coordination / Planning

Planned Actions

The catalogue of risks and possible mitigation strategies derived from the Torres Strait PAWSA workshop is set forth at the end of this report. This provides an excellent foundation from which the Australian Maritime Safety Authority can further examine and take appropriate risk mitigation actions for both near-term action and for future risk mitigation planning.

The section has been annotated to include those initial actions that appear appropriate in response to the participants' expressed concerns. Identification of initial actions will help focus subsequent discussions with the local maritime community, waterway users, and stakeholders regarding each risk, permitting the testing of each proposed action for validity and appropriateness prior to implementation. The listing of initial possible actions should be viewed as a starting point for continuing dialogue between the local maritime community, leading to clear identification of risks and well conceived mitigation measures.

The number in parentheses after each new idea represents how many times the idea was suggested by the participants in *Book 5*. If there is no number in parentheses, then the idea only was mentioned in the brainstorming discussion session.

Vessel Conditions: Vessel Quality

Today:

Deep Draft

- Vast majority of ships are adequately maintained.
- Vessels of high quality well above 90%.
- Bulk trade vessels of high quality 80 – 90%.
- Unpiloted ships are a concern.
- Four Australian flag vessels in good shape.
- Lack of port state control in PNG.

Shallow Draft

- No real tourist industry in Torres Strait.
- No real statistics for small vessels under 50 metres
- Shallow draft vessels do not have as high a quality as SOLAS vessels. Gap is wide.
- Local barges maintained to a good standard.
- Barge traffic is small, but transits regularly.
- Local tugs maintained to a good standard. No information on international tugs, although indicated to be well maintained.
- Ten-foot aluminium boats should not be out on the water. No oars / life vests on board. Potential SAR problems.
- Difficult to quantify the traditional community fishers.
- Financial strains keep only the best commercial fishing operators in business. Low end operators can not compete.
- No current mandatory inspection regime for fishing boats.

Trends:

- Deep draft vessel quality increasing.
- Quality of commercial fishing boats increasing; however that of recreational ones is decreasing.

Existing Mitigations:

- Port state control deterring and detaining inadequate vessels.
- Large shipping organizations have own vetting process to offset ineffectiveness of foreign port state controls.
- Pilots encouraged to report inadequate or substandard vessel quality.
- Insurance companies more interested in vessel quality.
- AMSA recognizes 6 entities for vessel classifications.
- New vessel design:
 - Handling properties and hull design.
 - IMO design standards via International Association of Classification Societies.
- Major fishing fleets have completely restructured.

New Ideas (number of times suggested) [action by]:

- Port State Control improvements and enforcement. (15) [**Action:** _____]
- Require compulsory pilotage. (3) [**Action:** _____]
- Enhance REEFCENTRE reporting requirements (vessel types and information). (2) [**Action:** _____]
- Present IMO with recommendations for international change. (2) [**Action:** _____]
- Create ship/owner database. (2) [**Action:** _____]
- Improve bridge-to-bridge information exchange. (1) [**Action:** _____]
- Provide detailed transit plans to ships. (1) [**Action:** _____]
- Mandate double hulls. (1) [**Action:** _____]
- Require ISO 1400 & ISO 9000 certification. (1) [**Action:** _____]
- Require ECDIS. (1) [**Action:** _____]
- Provide voluntary GMDSS training. (1) [**Action:** _____]
- Perform port state control further out at sea, not in port. [**Action:** _____]
- Establish more transparency and openness. [**Action:** _____]

Vessel Conditions: Deep Draft Mariner Proficiency

Today:

- Operating costs encourage mixed crews which creates communication barriers.
- Some flag states giving away or selling licenses and/or certificates.
- Groundings since 1985:
 - Alert Patches – 3 groundings (one due to pilot error and shifting buoys).
 - Endeavour Strait – 2 groundings due to navigational error.
 - Harrison Rock – due to lack of full situational awareness by pilot.
 - Hammond Rock.
 - Wednesday Island – due to ship loss of power.
 - Larpent Bank – 3 groundings due to waiting for the tides.
 - Harold Patches – denial of pilot request by ship owner.
 - Mojan Reef – inexperience with GNE Channel.
- No compulsory pilotage. Major issue of vessels less than 70 metres in length going up GNE channel.
- REEFCENTRE shallow water reports show that all the incidents in the Torres Strait are with unpiloted vessels.
- Far Eastern ships (i.e., Asian crews) have hierarchal culture structure which deters reporting of master error.
- Electronic charting creating false sense of safety. Breeding laziness.

Trends:

- Crew competency decreasing.
- Cost cutting measures increasing.

Existing Mitigations:

- GPS.
- Bridge Resource Management (BRM)
- Recommended pilotage program.
- REEFCENTRE:
 - Radar monitors covering entire pilotage area.
 - Issue alerting reports if vessels are heading for shallow water.
 - Not a VTS.
- Electronic charting.
- Companies running cheaper crews also are running with fewer crew.

New Ideas (number of times suggested) [action by]:

- Audit IMO training programs. (9) [**Action:** _____]
- Increase REEFREP participation / interaction. (7) [**Action:** _____]
- Require compulsory pilotage. (7) [**Action:** _____]
- Implement STCW 95. (2) [**Action:** _____]
- Create ship/owner database. (2) [**Action:** _____]
- Implement education awareness program. (2) [**Action:** _____]
- Improve interstate coordination. (1) [**Action:** _____]
- Mandate ECDIS for select vessels. (1) [**Action:** _____]
- Implement voluntary fishing education. (1) [**Action:** _____]
- Require dual watch keepers. (1) [**Action:** _____]
- Encourage reports of bad operators. (1) [**Action:** _____]

Vessel Conditions: Shallow Draft Mariner Proficiency	
<p>Today:</p> <ul style="list-style-type: none"> • Level of proficiency at least 10 – 20% lower than deep draft mariner proficiency. • Proficiency of trollers is better than proficiency of mackerel fishermen. • Master qualifications are the responsibility of the state. Each state has different standards causing little cohesion. • In protected zone, numerous PNG vessels have no licensed crew on board. • Commercial pressures result in minimally manned vessels. Minimal manning results in fatigue and degraded situational awareness. • Most fishing vessels carry 2 people, and when fishing no one is on the bridge. Putting 3 people onboard would put fishing company out of business. • Number of trollers has halved in last 8 years. • Emerging technology breeding laziness. <p>Trends:</p> <ul style="list-style-type: none"> • Last 5 – 10 years, mariner numbers have decreased. Other fisheries fairly steady with older vessels. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Federal Customs and Queensland fisheries cooperating. • Most operators have good local knowledge.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Upgrade and enforce certification regime. (13) [Action: _____] • Establish mandatory education programs. (4) [Action: _____] • Increase REEFCENTRE participation through access to Vessel Monitoring Service (VMS) data for commercial fishing vessels (4) [Action: _____] • Require excess premium compulsory insurance for non-SOLAS vessels. (1) [Action: _____] • Create ship/owner database. (1) [Action: _____] • Require radio speaker on aft deck of fishing vessels. (1) [Action: _____] • Standardize state licensing requirements. (1) [Action: _____] • Increase consistency between jurisdictions. [Action: _____] 	

Vessel Conditions: Traditional Fisherman Proficiency	
<p>Today:</p> <ul style="list-style-type: none"> • Not licensed. Rely heavily on state and customs for boat maintenance. Many request voluntary inspections. • Fatigue not an issue. • Language barriers not an issue. • Fish near the #1 Reef, but usually stay away from the channels, so no need for radio traffic. <p><i>Recreational Boaters</i></p> <ul style="list-style-type: none"> • Worldwide travellers sail to Thursday Island. • Local recreational fishers have over 20 years experience. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Traditional fishers advisory group concerned with equipment and quality of vessels. • Cooperation between traditional fishers, commercial fishers, and deep draft vessels. • Fishers receiving westernized training and formal training through joint ventures.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • No new ideas discussed due to balanced risk levels in this category. 	

Traffic Conditions: Volume of Commercial Traffic	
<p>Today:</p> <ul style="list-style-type: none"> • 3,000 deep draft transits a year. • Approximately 10 ships a day; 2 ships a day in the GNE Channel. • 20% of traffic accounts for 70 – 80% of all transits. • Choke point for deep draft vessels located at POW Channel because of tide windows needed for safe transit. • Underkeel clearance (UKC) is a big issue. • Every 1 centimetre in reduction results in 2 more transits and just short of a \$1 million in additional costs. <p>Trends:</p> <ul style="list-style-type: none"> • Commodity exports to China and Korea increasing. • ASP using 4 additional ships. • Larger, deeper draft vessels increasing. Will need to arrange business around channel limitations. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Figures from Australia Bureau of Agriculture and Economics show that commercial traffic volume will not change significantly for the next few years.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Require compulsory pilotage. (12) [Action: _____] • Improve REEFCENTRE traffic condition reporting by integrating AIS. (7) [Action: _____] • Improve bridge-to-bridge information exchange. (4) [Action: _____] • Mandate AIS carriage. (2) [Action: _____] • Coordinate with industry to assess future volume increases. (1) [Action: _____] • Mandate hazardous cargo reporting. (1) [Action: _____] • Improve tidal information. (1) [Action: _____] • Increase available information. (1) [Action: _____] • Require radio speaker on aft deck of fishing vessels. (1) [Action: _____] • Require or encourage radar enhancing devices on fishing vessels. (1) [Action: _____] 	

Traffic Conditions: Volume of Traditional Fishery Traffic	
<p>Today:</p> <ul style="list-style-type: none"> • Very low volume. <p><i>Recreational Boaters</i></p> <ul style="list-style-type: none"> • Volume increases due to calm weather usually in December, January, and February. <p>Trends:</p> <ul style="list-style-type: none"> • Volume increasing. • Unused fisheries licenses potentially could increase volume. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • There are a set number of licenses. • Availability of fish.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Increase REEFCENTRE participation through access to Vessel Monitoring Service (VMS) data for commercial fishing vessels (4) [Action: _____] 	

Traffic Conditions: Traffic Mix	
<p>Today:</p> <ul style="list-style-type: none"> • Mostly commercial vessels. • Commercial fishing GNE Channel Roberts Islets to north of Stephens Islet. • Plenty of sea room for larger vessels to reroute around commercial fishers. • Collisions and near misses by deep draft ships usually involve fishing vessels. • Barges sail inter-island with few conflicts. • Bridge-to-bridge radio not being used. • Deep draft vessels and commercial fishing vessels are in the channel simultaneously. • Fishing vessels difficult to detect on radar. • Collisions and near misses usually involve fishing vessels. • Deep draft ships running silent and fast. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Deep water outside of GNE Channel. • Recommended pilotage. • Cooperation between commercial and shallow draft vessels. • Bridge-to-bridge radio communications. • Vessels calling REEFCENTRE with location. • Vessel Monitoring System compulsory on fishing vessels. • Education awareness and pamphlets created for Queensland. • REEFCENTRE radar covers out to 35 nautical miles north of the Sue Island. • Pilotage companies communicate and distribute information. • Equipment on fishing vessels includes radar and GPS. • Australian Transport Safety recommending radar reflectors on fishing vessels.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • REEFCENTRE data to include VMS (fishing vessel) information thereby enhancing the quality of Shipping Traffic Information broadcast by REEFCENTRE. (8) [Action: _____] • Require or encourage radar-enhancing devices on fishing vessels. (7) [Action: _____] • Improve bridge-to-bridge information exchange. (4) [Action: _____] • Enhance REEFCENTRE and traffic information. (2) [Action: _____] • Provide (by REEFREP) advice concerning hazmat carrying traffic. (1) [Action: _____] • Implement Traffic Separation Scheme (TSS). (1) [Action: _____] • Establish seasonal area closures. (1) [Action: _____] • Ensure AIS carriage. (1) [Action: _____] • Improve education and awareness. (1) [Action: _____] • Establish exclusion zones for fishing vessels. (1) [Action: _____] • Create new routing measures. (1) [Action: _____] • Require compulsory pilotage. (1) [Action: _____] 	

Traffic Conditions: Congestion	
<p>Today:</p> <ul style="list-style-type: none"> • Tidal restrictions create congestion at: <ul style="list-style-type: none"> ○ Varzin Passage ○ Gannet Passage ○ Alert Rock close to OG Rock ○ Nardana Patches • Same class of ships • Small window of opportunity due to the tides. • Collisions have occurred in: <ul style="list-style-type: none"> ○ GNE Channel ○ Kirkcaldie Reef <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • No marine events. • REEFCENTRE has near real time information. • Real time reporting system through MSRC. 70-80% participation • Cooperation between commercial and shallow draft vessels. • Bridge-to-bridge communication between REEFCENTRE and pilots. • Recommended pilotage. • Education awareness and pamphlets created for Queensland. • New traffic lanes printed on charts for GNE channel.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Require compulsory pilotage. (9) [Action: _____] • Enhance REEFCENTRE and traffic information. (7) [Action: _____] • Improve bridge-to-bridge information exchange. (2) [Action: _____] • Create plan for future changes. (1) [Action: _____] • Create one-way traffic schemes. (1) [Action: _____] • Increase Notice to Mariners event notification. (1) [Action: _____] • Increase knowledge of underkeel clearance window. (1) [Action: _____] • Implement voluntary fishing vessel education. (1) [Action: _____] • Give REEFCENTRE control of non-piloted vessels. (1) [Action: _____] • Broadcast plain language tidal data. (1) [Action: _____] • Install AIS (3 months away). [Action: _____] • Chart area for Electronic Navigation Charts. [Action: _____] 	

Navigational Conditions: Winds	
<p>Today:</p> <ul style="list-style-type: none"> • From March to November: <ul style="list-style-type: none"> ○ 20 – 25 knots with an occasional maximum of 35 knots. ○ South-easterly winds perpendicular to GNE channel. • Squalls, up to 60 knots, can move in very quickly and reduce visibility to hundreds of metres. • During northwest monsoon months, no prediction of squalls, but usually can see them coming. • High, predictable winds during the southeast winds. • Northwest winds kick up swells outside of Varzin and Gannet Passages. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Pilotage program. • Local knowledge. • Forecast system by the Australian Hydrographic Service. • Marks and beacons. • Precision navigation on ships. • Tow shortening to keep effective width minimal in confined waterways.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • No new ideas discussed due to balanced risk levels in this category. 	

Navigational Conditions: Currents	
<p>Today:</p> <ul style="list-style-type: none"> • Current information not available for all areas. • Hydrographic information for tidal stream is inadequate. • Foreign vessels do not know of or use tidal gauges broadcast. • Predicted current: <ul style="list-style-type: none"> ○ POW Channel is 8 knots maximum near Hammond Rock. ○ Varzin and Gannet Passages are 1 – 1.5 knots. • Current generally true to the channels • Current swirls around Nardana Patches and Ince Point. • Current at Kirkcaldie Reef flows with wind. • Cross currents at Harrison Rock. • Need gauge at Hammond Rock, but mounting gauge is impossible. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Local knowledge. • Pilotage program. • Tide gauges: <ul style="list-style-type: none"> ○ Booby Island ○ Goode Island ○ Hammond Island at Turtle Point ○ Wednesday Island at Ince Point • Tide charts. • More powerful ships with better control. • Available waterway (minimal congestion).
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Establish a proper observation program where data is analysed and tables are produced. (16) [Action: _____] • Broadcast plain language tidal data. (5) [Action: _____] • Transmit tidal information through REEFCENTRE. (3) [Action: _____] • Require compulsory pilotage. (2) [Action: _____] • Install planned current meter and tide gauge for Nardana Patches. [Action: _____] • Deliver real time data to ECDIS. [Action: _____] 	

Navigational Conditions: Visibility Restrictions	
<p>Today:</p> <ul style="list-style-type: none"> • Squalls <ul style="list-style-type: none"> ○ Intense and short. ○ Occur daily during wet season. ○ Duration could last multiple hours. ○ Visibility below 1/2 mile. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Radar. • Electronic charts. • ECDIS. • GPS. • Bridge-to-bridge communications. • Increased interaction between REEFCENTRE and pilots.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • No new ideas discussed due to balanced risk levels in this category. 	
Navigational Conditions: Obstructions	
<p>Today:</p> <ul style="list-style-type: none"> • Logs float out of rivers. • Abandoned nets outside of channels. • Water pipeline between Horn Island and Thursday Island. <p>Trends:</p> <ul style="list-style-type: none"> • Proposed natural gas pipeline from PNG to Cape York. Multiple prospective routes. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Reporting of obstructions by pilots.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • No new ideas discussed due to balanced risk levels in this waterway. 	

Waterway Conditions: Visibility Impediments	
<p>Today:</p> <ul style="list-style-type: none"> No visibility impediments in this waterway. <p>Trends:</p> <ul style="list-style-type: none"> No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> No existing mitigations discussed.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> No new ideas discussed due to balanced risk levels in this category. 	
Waterway Conditions: Dimensions	
<p>Today:</p> <ul style="list-style-type: none"> Narrowest point, Alert Patches, is 800 metres. Alert Patches also has convergences. Constrained waterway due to depth. Pilots time transits closely with tide level due to underkeel clearance concerns. POW Channel has shallow depths. Danger occurs when tide does not meet predicted height. Very few overseas masters know of transmitting tidal gauges. Sufficient tidal window depends on ship's draft. History shows that 12.2 metre draft can sail through Torres Strait at least once per day. No real science behind calculating tides. Electronic chart for ECDIS is based on Chart 293. which needs to be updated. Only one grounding due to draft – M NURI CERRAHOGLU at Larpent Bank. <p>Trends:</p> <ul style="list-style-type: none"> Deeper overseas ships increasing. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> Pilots communicate with AMSA via REEFREP. Local knowledge key to safe transit. Complex calculation and monitoring of tidal window is critical 0.3 – 0.4 metres deviation between predicted and actual tides. Dr. Barrass method of vessel squat calculation is quick and easy. Accurate tidal gauges that are constantly monitored to see if results are close to predictions. Under 1 or 2 metres, echo sounder decreases in effectiveness.

<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Collect underkeel clearance (UKC) data and review draft requirements. (14) [Action: _____] • Require compulsory pilotage. (12) [Action: _____] • Increase REEFCENTRE traffic reports. (3) [Action: _____] • REEFCENTRE broadcast tidal information. (2) [Action: _____] • Green Party incentive scheme. (1) [Action: _____] • Increase and improve hydrographic data. [Action: _____] • Establish dynamic underkeel clearance systems. [Action: _____] • Collect federal and state funds to be given back to the industry. [Action: _____] • Reward shippers who are in compliance and have good records. [Action: _____] 	
<p>Waterway Conditions: Bottom Type</p>	
<p>Today:</p> <ul style="list-style-type: none"> • Rock bottom through the POW Channel from Harrison Rock to Alert Patches. • GNE Channel is broken coral and sand. • Moving sand ridge along western end of Endeavour Strait. • Hydrographic surveys show widths and depths, not material. • Can not lower any rocks due to cultural issues of the Islanders. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Local knowledge. • Transmitting tidal gauges. • OG Rock taken down to 12.2 metres.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Survey bottom composition. (14) [Action: _____] • Require compulsory pilotage. (2) [Action: _____] • Increase REEFCENTRE monitoring and interaction capabilities. (1) [Action: _____] 	

Waterway Conditions: Configuration	
<p>Today:</p> <ul style="list-style-type: none"> • Inter-island barges sailing to Wednesday Island and Thursday Island. • Barges usually head into Thursday Island, but cross POW Channel at several places. • Barges coming down from Twin Island. • Convergences: <ul style="list-style-type: none"> ○ Adolphus, GNE Channel, and POW Channel ○ At Kirkcaldie Reef: two GNE Channel branches ○ East of Varzin and Gannet Passages • Numerous bends with a maximum of 40 degrees at tightest bend. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Bridge-to-bridge communications. • Radar. • Local knowledge. • REEFCENTRE provides information. • Channel alterations – easterly route of the GNE Channel recently established. • Aids to navigation system. • Pilots issue securité broadcast 30 minutes before Harrison Rock and likewise at Harold Patches westbound.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • No new ideas discussed due to balanced risk levels in this category. 	

Immediate Consequences: Personal Injuries

Today:

- Issue is not necessarily how many passengers are onboard, but the location of an incident.
- Cruise ships:
 - 3,000 passengers.
 - 3 month season during northern winter.
 - 25 voyages over three months.
 - SARS outbreak tripled cruise ships transits.
 - Cruise ship terminal planned for Townsville.
- Domestic and foreign Navy vessels transit more than once a year. Vessels are not required to report themselves.
- Small number of ferries operating out of Thursday Island. 10-20 passengers.
- Community fishing boats can carry 5-6 passengers.
- Ferry from Cairns to **Saysha??**. [in Endeavour Strait]
- Ship in Trinity Bay carries up to 150 passengers.
- Completely unprepared for cruise ship incidents.
- Inadequate medical facilities for mass casualty incident, even in Cairns.
- No night winching capabilities on helicopters.
- Perception of importance of the environment versus human life.

Trends:

- Cruise ship transits:
 - Increase dramatically.
 - Increase exponentially during irregular world events like SARS.

Existing Mitigations:

- Response vessels are very small; Customs vessels are 30 metres.
- Proximity to land in the POW Channel.
- Air based SAR resources on Horn Island.
- Shallow depths.
- Many commercial fishing vessels, particularly in GNE Channel, could be used for response.

New Ideas (number of times suggested) [action by]:

- Create mass casualty plan and hold exercises frequency. (9) [Action: _____]
- Implement / enhance information sharing system. (4) [Action: _____]
- Form Torres Strait volunteer Coast Guard. (2) [Action: _____]
- Improve airport on Horn Island. (1) [Action: _____]
- Complete implementation of the Island Watch once money from the Queensland government is available. [Action: _____]

Immediate Consequences: Petroleum Discharge**Today:**

- Crude and product tankers:
 - 12.2. metres loaded.
 - 80,000 ton tankers.
 - One transit a day.
 - Mixture of gas and oil.
 - 30,000 tons in bunkers (heavy fuel oil) which are more exposed than tankers. Can cause greater environmental damage.
- Barges:
 - Carry 200 tons of fuel.
 - Haul fuel through Adolphus Channel to Horn Island for the islands to burn.
- PNG reportedly is building an oil refinery. Fuel stock will come from Indonesia, probably via Torres Strait.

Trends:

- Gas tankers are increasing.
- Larger number of types of ships carrying bunkers increasing.
- Ships getting larger means larger bunkers being carried.

Existing Mitigations:

- Change in design and double hull requirements to tankers. Implementation date is 2010.
- Some tankers are double bottomed, not double hulled. International requirements of double hull of bunkers being discussed.
- Communication response system via REEFCENTRE.
- Cleanup material 18 hours away with small amount of cleanup material at Horn Island.
- Enormous evaporation rates for light products.
- Possess more beach clean-up supplies than on-water clean up supplies.
- Vessel response plans.
- Trained individuals / experts readily available.
- Numerous exercises performed to test competence of experts, adequate equipment.
- Performed exercise in Torres Strait in 2002.
- AMSA has oil spill trajectory model.

New Ideas (number of times suggested) [action by]:

- Review, update, exercise oil spill command and control plan. (12) [Action: _____]
- Enhance oil trajectory model. (6) [Action: _____]
- Increase monitoring and prosecution of illegal discharge. (4) [Action: _____]
- Prohibit heavy crude transits. (1) [Action: _____]
- Create continuous satellite monitoring system. (1) [Action: _____]
- Increase education and awareness. (1) [Action: _____]

Immediate Consequences: Hazardous Materials Release

Today:

- Chemical carriers.
- No knowledge of chemicals transiting.
Difficult to identify substance.
- Bulk shipments of metal concentrates.
- Copper concentrate coming from Kuramba.
- Caustic soda going into Gladstone.
- Various cement-making materials.
- Ammonium Nitrate possibly being unloaded.
- Accident occurred 1994:
- Lost several containers of cyanide and a container of bleach.
- Materials travelled down from PNG.
- Large effect on community and economy.

Trends:

- No trends discussed.

Existing Mitigations:

- Response network already in place.
- Contingency plan widened to include hazardous materials.
- Hazardous cargo lists showing materials.

New Ideas (number of times suggested) [action by]:

- Gather detailed hazardous material information. (13) [Action: _____]
- Improve REEFCENTRE hazardous material data collection. (2) [Action: _____]
- Schedule dangerous cargo vessel transits. (1) [Action: _____]
- Improve hazardous material inspections. (1) [Action: _____]

Immediate Consequences: Mobility	
<p>Today:</p> <ul style="list-style-type: none"> • Physical ship size determines closure. • Potential for waterway closure: <ul style="list-style-type: none"> ○ Oil spill. ○ Collision resulting in fire. • Simpson Channel was surveyed, but is not marked. • No salvage vessels close to Torres Strait <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Redundant routes for most restricted waterways such as: <ul style="list-style-type: none"> ○ Varzin and Gannet Passages. ○ Part of Adolphus and GNE Channel. ○ Simpson Channel to the north of POW Channel. • Emergency towing and salvage review occurring currently. • No shoreside infrastructure along waterway
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Establish contingency plan for buoy placement in Simpson Channel. (12) [Action: _____] • Survey / update information on Simpson Channel. (2) [Action: _____] • Risk assessment and traffic type review. (2) [Action: _____] • Coordinate / review towing and salvage capabilities. (2) [Action: _____] • Marine environment high-risk area designations. (1) [Action: _____] 	

Subsequent Consequences: Health and Safety

Today:

- Prevailing winds will blow gaseous fumes from natural gas carrier way from land.
- 8,000 people on islands.
- 6,500 (2/3 of population) on Thursday Island, Wednesday Island, Horn Island, and Friday Island.
- Centers of population:
 - Thursday Island (3,500)
 - Horn Island
 - Hammond Island.
- Water supplies:
 - Dam on Horn Island.
 - Wells on Hammond Island.
 - Horn Island supplies water to Thursday Island via pipeline.
- Cooling water at generator station on Thursday Island, miles away from the shipping channel.
- Lack of emergency medical facilities.
- Police presence not in all areas.

Trends:

- No trends discussed.

Existing Mitigations:

- Backup from the Royal Flying Doctor Service (RFDS).
- Disaster plans of the Australian government are managed by Attorney Generals. Wider based plans would possibly have evacuation components to it.
- Mutual aid agreements between Australia and PNG.
- Cyclone watch. Army, Navy, Air force, and customs would be available to help.
- States are broken up into disaster districts. Torres Strait is a disaster district.

New Ideas (number of times suggested) [action by]:

- Create community-centered training. (7) [Action: _____]
- Review plan and increase exercise frequency . (4) [Action: _____]
- Perform state disaster controller exercise. (1) [Action: _____]
- Perform communities risk assessment. (1) [Action: _____]

Subsequent Consequences: Environmental	
<p>Today:</p> <ul style="list-style-type: none"> • Entire area designated by IMO as a Particularly Sensitive Sea Area (PSSA). • Endangered species: <ul style="list-style-type: none"> ○ Dugong. ○ Turtles. ○ Numerous bird species. • Indigenous community extremely reliant on and sensitive to environment. • Cultural significance is strong. • Treaty obligation with PNG with regard to cultural and marine use. • There would be a cataclysmic disaster to the traditional fishers if the waters were negatively affected by an incident. • Any major environmental incident might cause the traditional fishers to retaliate. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Insurance for civil liability. • Better containment on ships. • Mindset of the area: <ul style="list-style-type: none"> ○ A living being. ○ Legends tied to the land. ○ Tremendous socio-political structure deeply rooted in tradition. • Communication between Torres Strait Regional Authority and traditional fishers. • In the last 5 years, far greater receptivity and cohesive approach of the Islands by the Australian Government.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Determine cargo transiting area. (7) [Action: _____] • Review and enforce existing conventions. (5) [Action: _____] • Increase contingency plan exercise frequency. (4) [Action: _____] • Improve education and awareness campaign. (4) [Action: _____] • Tighten surveillance & compliance. (3) [Action: _____] • Enhance/review post-spill monitoring programs. (1) [Action: _____] 	

Subsequent Consequences: Aquatic Resources	
<p>Today:</p> <ul style="list-style-type: none"> • Year round fisheries of many species. • Islander rely heavily on fishing for sustenance. • Insoluble metal concentrate will sit on bottom. No clean up capabilities. • Waste disposal would be an issue. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Mass evacuation of islands and importing food are in existing contingency plans. • Contingency plans to move people.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • Develop restoration plan. (5) [Action: _____] • Engage western & traditional experts regarding stock. (2) [Action: _____] • Monitoring of sea resources. (2) [Action: _____] • Develop assessment and monitoring procedures. (2) [Action: _____] • Review mapping. (1) [Action: _____] • Improve education and awareness campaign. (1) [Action: _____] 	

Subsequent Consequences: Economic	
<p>Today:</p> <ul style="list-style-type: none"> • Clean up might take time, much will come from evaporation and breakdown. • Closure might have a major impact on domestic and international economy. • GBR Review recognized a closure would cost \$50 million a day. • Gladstone would be affected in 10-12 days. If refineries were to close down, serious impacts would occur within another 3-4 weeks. • Cruise ship industry might be affected and decide not to come back to the area. • Queensland cruise ship ports would be affected. Those cruises going from Singapore to New Zealand would not be as greatly affected. <p>Trends:</p> <ul style="list-style-type: none"> • No trends discussed. 	<p>Existing Mitigations:</p> <ul style="list-style-type: none"> • Alternate channels available. • Channel is so important that if it was closed intense actions would take place to get it open again. • International status of waterway would require something to be done quickly. • Waterway closure for longer than a couple of weeks very unlikely due to strong currents and winds.
<p>New Ideas (number of times suggested) [action by]:</p> <ul style="list-style-type: none"> • No new ideas discussed due to balanced risk levels in this category. 	