

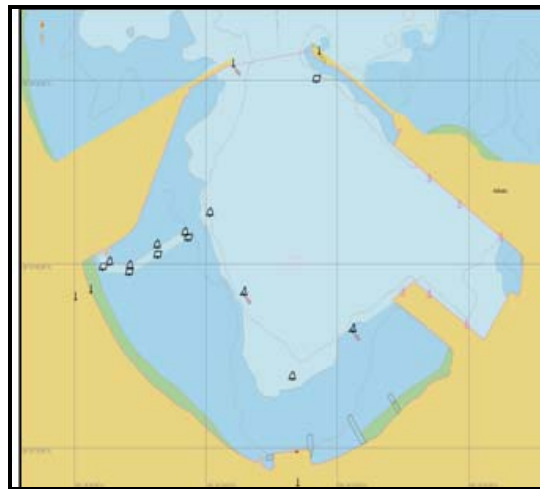
# Ports and Waterways Safety Assessment

## Workshop Report

### Maui, Hawaii

27 - 28 August 2009

#### Kahului Harbor



## United States Coast Guard Office of Waterways Management



Providing Navigation Safety Information  
for America's Waterways

# Port and Waterways Safety Assessment - Workshop Report

## Kahului Harbor, Maui, Hawaii

27 - 28 August 2009

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## **Introduction**

The United States Coast Guard, Office of Waterways Management, is responsible for developing and implementing policies and procedures that facilitate commerce, improve safety and efficiency, and inspire dialogue with port and waterways users that will make waterways as safe, efficient, and commercially viable as possible. To accomplish this objective, the US Coast Guard utilizes the Ports and Waterways Safety Assessment (PAWSA) process. The long-term goals of the PAWSA process are to:

- 1) Provide input when planning for future Vessel Traffic Management (VTM) projects, including establishing or expanding existing Vessel Traffic Services (VTS),
- 2) Further the Marine Transportation System (MTS) goals of improved coordination and cooperation between government and the private sector, and involving stakeholders in decisions affecting them,
- 3) Foster development and strengthen roles of Harbor Safety Committees (HSC) within each port, and
- 4) Support and reinforce the role of Coast Guard Captains of the Port (COTP) in waterway and vessel traffic management within their assigned geographic areas of responsibility.

## **Section I: History of the Ports and Waterways Safety Assessment Process**

The PAWSA process grew out of the tremendous changes that took place during the 1990s in the United States Coast Guard (USCG) Vessel Traffic Service (VTS) acquisition program. In September 1996, at the direction of the US Congress, the Coast Guard began work to identify minimum user requirements for new VTS systems in consultation with local officials, waterways users and port authorities, and also to review private-public partnership opportunities in VTS operations. As a result of this Congressional direction, the USCG established the Ports and Waterways Safety System (PAWSS) to address waterway user needs and place a greater emphasis on partnerships with maritime industry experts to reduce risk in the marine environment

The PAWSA risk assessment process is a disciplined approach to identify major waterway safety hazards, estimate risk levels, evaluate potential mitigation measures, and set the stage for implementation of selected risk reduction measures. The process involves convening a select group of waterway users and stakeholders and conducting a structured workshop to meet these objectives. The risk assessment process is a joint effort involving waterway users, stakeholders, and agencies responsible for implementing risk mitigation measures.

## **Section II: How PAWSA workshops are conducted**

The PAWSA process uses a structured approach for obtaining expert judgments on the level of maritime safety risk in a port complex. The process also addresses the effectiveness of existing and possible future intervention actions for reducing risk in the specified port and waterways. The **first step** in the PAWSA process is for the participants to discuss and then numerically evaluate the baseline risk levels in the geographic area being analyzed using pre-defined qualitative risk descriptions for 24 pre-defined risk factors. The **second step** is for the participants to assess the expertise of each other with respect to the risk categories in the model. Those expertise assessments are used to weight inputs obtained during the other steps in the process. In the **third step**, the participants discuss and then evaluate the risk reducing effectiveness of existing mitigation strategies. Next, the participants offer new ideas for further reducing risk, for those factors where risk is judged to be not well balanced with existing mitigations. **Finally**, the potential effectiveness of those new intervention ideas is evaluated. The PAWSA process produces a consensus view of risks in the port and waterways and has proven to be an excellent tool for focusing follow-on risk mitigation efforts.

### Section III: Explanation of the PAWSA Waterway Risk Model

The Waterway Risk Model includes variables dealing with both the causes of waterway casualties and their consequences. In the Port Risk Model, risk is defined as a function of the probability of a casualty and its consequences. The risk model includes variables associated with both the causes and the effects of vessel casualties.

The six risk categories used in the model are:

1. **Vessel Conditions** – the quality of vessels and their crews that operate on a waterway.
2. **Traffic Conditions** – the number of vessels that use a waterway and their interactions.
3. **Navigational Conditions** – the environmental conditions that vessels must deal with in a waterway relating to wind, water movement (i.e., currents), and weather.
4. **Waterway Conditions** – the physical properties of the waterway that affect how easy it is to maneuver a vessel.
5. **Immediate Consequences** – the immediate impacts of a waterway casualty: people can be injured or killed, petroleum and hazardous materials can be spilled and require response resources, and the marine transportation system can be disrupted.
6. **Subsequent Consequences** – the subsequent effects of waterway casualties that are felt hours, days, months, and even years afterwards, such as shore side facility shut-downs, loss of employment, destruction of fishing areas, decrease or extinction of species, degradation of subsistence living uses, and contamination of drinking or cooling water supplies.

**Figure 1**

<b>Waterway Risk Model</b>					
<b>Vessel Conditions</b>	<b>Traffic Conditions</b>	<b>Navigational Conditions</b>	<b>Waterway Conditions</b>	<b>Immediate Consequences</b>	<b>Subsequent Consequences</b>
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic

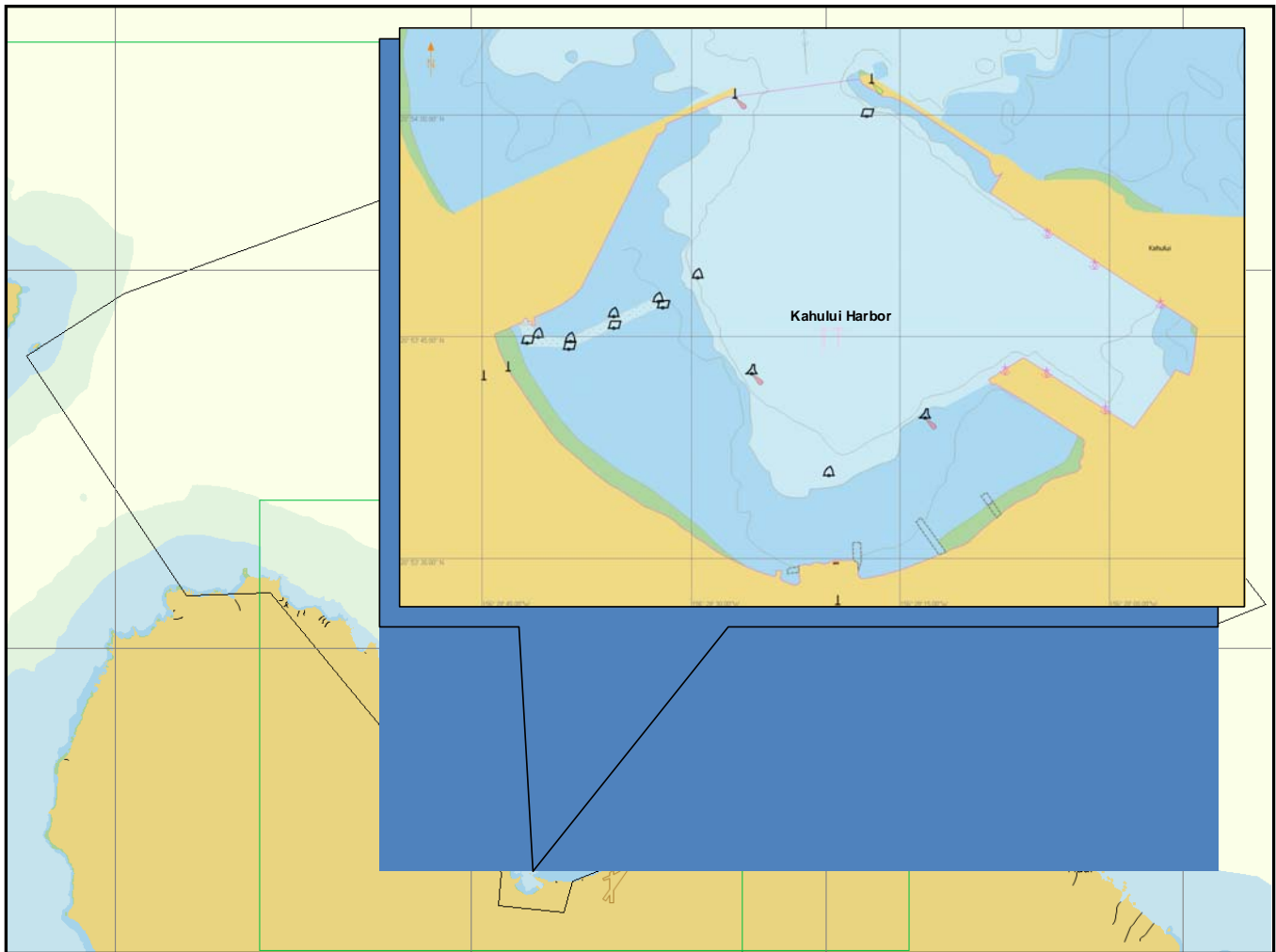
## **Section IV: Kahului Harbor PAWSA – Geographic Areas Assessed**

In support of overall safety improvement activities, a formal PAWSA for Kahului Harbor and the adjacent waters 20 miles offshore was conducted in Maui Hawaii on 27-28 August 2009. The workshop was attended by 14 participants representing waterway users, regulatory authorities, stakeholders, and organizations with an interest in the safe and efficient use of Kahului Harbor, from both a commercial and recreational perspective. A list of the workshop participants, observers, and the workshop facilitation team is included as Appendix A to this report.

This report outlines the baseline risk levels within each specific geographic area, captures workshop participant provided input regarding current operations and trends, and describes existing mitigation strategies that serve to “balance” the risks associated with each of the 24 risk factors in the Waterways Risk Model. For those waterway risk factors where risk is judged unbalanced with existing mitigations, this report also contains ideas for further reducing risks.

- ▶ Kahului Harbor– This includes 20 miles off shore from the harbor entrance.

**Figure 2**



## **Section V: Book 1 – Establishing Baseline Risk Levels**

Book 1 was used to determine a risk level value for every factor in the Waterway Risk Model. To establish baseline risks in the port, the workshop participants discussed each of the 24 risk factors on the Waterways Risk Model.

The following are significant observations and comments made by the workshop participants. Additional participant observations, trends, and comments are included as Appendix B to this report.

***Deep Draft Vessel Quality:*** Gas ships that tie up at Pier 2 are in good condition and are relatively new ships with top-notch crews. Honolulu Harbor generally runs the vetting for gas ships, but Kahului Harbor can request that a certain vessel doesn't call because it causes too much trouble. NCL America line runs Pride of America and has a very good safety record and very safe harbor user.

***Small Craft Quality:*** Locals are usually pretty proficient, and there are generally no tourists. No known small boat collisions have occurred in the harbor. There have been almost no SAR cases on the north side of Maui, unless they were handled by the fire department which doesn't always report cases externally.

***Winds:*** In Kahului Harbor, Pride of America's high profile causes the crew to have to run their bow thruster and stern thrusters to resist the wind, which creates an eddy within the Pier complex. This can be a contributing factor to other risks.

***Water Movement:*** Eddies are created in Kahului Harbor by Pride of America's thrusters when it runs them to adjust for winds. These eddies are strongest around the lower end of Pier 2. This can be a contributing factor to other risks.

***Dimensions:*** The dimensions of the Kahului Harbor make it susceptible to winds and swells.

***Mobility:*** Significant mobility concerns exist for an accident blocking and/or damaging docks or not making it through the unlighted, unmarked jetties.

### **Use of an Electronic Chart System (ECS) to identify high risk areas**

As the workshop participants discussed and identified specific locations associated with a particular risk factor, an Electronic Charting System (ECS) was utilized by the workshop facilitation staff to identify the specific geographic area(s) associated with the risk(s), and annotate the ECS with the location. Appendix C includes ECS information, chart extracts showing the risk factor types, and locations identified by the workshop participants.

The participants evaluated the baseline risk levels in the waterway by selecting a qualitative description for each risk factor that best described conditions in the Kahului Harbor. Those qualitative descriptions were converted to discrete values using numerical scales that were developed during earlier PAWSA workshops. 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.

**Figure 3**

<b>Baseline Risk Levels</b>					
<b>Vessel Conditions</b>	<b>Traffic Conditions</b>	<b>Navigational Conditions</b>	<b>Waterway Conditions</b>	<b>Immediate Consequences</b>	<b>Subsequent Consequences</b>
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
3.2	1.9	5.1	2.8	5.4	3.2
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
2.7	2.4	6.5	5.8	4.1	7.2
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
	4.6	1.5	6.2	6.0	2.7
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
5.2	4.3	2.7	3.4	9.0	5.1

Note: Kahului Harbor does not have a commercial fishing fleet so this risk factor was not scored.

In the Kahului Harbor PAWSA, 10 of the 24 risk factors were scored at or above the mid-risk value. Risk values highlighted red (values at or above 7.7) denote very high baseline risk levels; risk values highlighted green (values at or below 2.3) denote very low baseline risk levels.

- Mobility (9.0)
- Environmental (7.2)
- Water Movement (6.5)
- Bottom Type (6.2)
- Hazardous Materials Release (6.0)
- Dimensions (5.8)
- Personnel Injuries (5.4)
- Small Craft Quality (5.2)
- Economic (5.1)
- Winds (5.1)

**Section VI: Book 2 - Participant / Team Expertise Cross-Assessment**

Book 2 is used to capture the expertise level of each team relative to one another. PAWSA workshop participants are expected to have varying expertise with respect to the risk categories in the Waterway Risk Model. Book 2, *Team Expertise*, is used early in the session to weigh the relative strengths of each team with respect to the six risk categories. After being presented with the concepts underlying the model, each participant team is asked to discuss (among themselves) how their background and experience aligns with the model. They then verbally present their conclusions to the larger group. This presentation gives all teams a sense of where everyone thinks they are strong – or perhaps not so strong. After all teams have spoken, each team evaluates whether they think they are in the top, middle, or lower third of all teams present in knowledge about the six risk category areas. Throughout the workshop, these preliminary expertise evaluations are used to produce preliminary results for all other Books.

The Kahului Harbor PAWSA workshop participants assessed their own and all the other participant teams’ level of expertise for each of the six categories in the Waterway Risk Model. Overall, 33% of the participant teams were placed in the upper third, 37% in the middle third, and 31% in the lower third of all teams. While the “ideal” split should be closer to a 33% / 33% / 33% distribution, the expertise in the room where strong for all categories.

The expertise ranking for each team was used to weight the inputs that each team provided in the other three books used during the PAWSA workshop. The following table further breaks down the participants’ expertise per risk category.

**Figure 4**

**Team Expertise -- Distribution**

<b>Risk Category</b>	<b>Top 1/3</b>	<b>Mid 1/3</b>	<b>Lower 1/3</b>
Vessel Conditions	28%	35%	37%
Traffic Conditions	35%	38%	27%
Navigational Conditions	33%	38%	29%
Waterway Conditions	28%	44%	28%
Immediate Consequences	44%	28%	28%
Subsequent Consequences	28%	37%	35%
<b>All Categories Average</b>	<b>33%</b>	<b>37%</b>	<b>31%</b>



**Section VII: Book 3 – Evaluating the Effectiveness of Existing Risk Mitigation Strategies**

Book 3 was used to evaluate the effectiveness of existing mitigation strategies in reducing the risk level for each factor in the model. In Book 3, the workshop participants reviewed the effectiveness of existing risk mitigations with respect to all risk factors in the Waterway Risk Model. For 18 risk factors, there was consensus that risks were well balanced by existing mitigations; for one risk factor there was consensus that risks were NOT adequately balanced by existing mitigations; and for the other 4 risk factors there was no consensus on whether existing mitigations adequately reduced risk. Consensus is defined as two-thirds (2/3) of the workshop participants being in agreement.

**Figure 5**

Mitigation Effectiveness											
Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
Deep Draft Vessel Quality		Volume of Commercial Traffic		Winds		Visibility Impediments		Personnel Injuries		Health and Safety	
3.2	2.5	1.9	1.6	5.1	4.4	2.8	2.3	5.4	4.4	3.2	2.8
Balanced		Balanced		Balanced		Balanced		Balanced		Balanced	
Shallow Draft Vessel Quality		Volume of Small Craft Traffic		Water Movement		Dimensions		Petroleum Discharge		Environmental	
2.7	2.2	2.4	2.0	6.5	5.3	5.8	4.0	4.1	3.2	7.2	5.2
Balanced		Balanced		Balanced		Maybe		Balanced		Balanced	
Commercial Fishing Vessel Quality		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
		4.6	3.5	1.5	1.2	6.2	4.2	6.0	4.2	2.7	2.1
		Balanced		Balanced		Balanced		Balanced		Balanced	
Small Craft Quality		Congestion		Obstructions		Configuration		Mobility		Economic	
5.2	3.9	4.3	3.4	2.7	2.4	3.4	3.0	9.0	7.2	5.1	5.3
Maybe		Balanced		Maybe		Balanced		Maybe		NO	

\*\*\*Note: Kahului Harbor does not have a commercial fishing fleet and this risk factor shown blank above was not scored.

KEY		EXPLANATION	
Risk Factor		Book 3	Baseline level of risk
		Book 4	Level of risk taking into account existing mitigations
		Balanced	Consensus that risks are well balanced by existing mitigations
		Maybe	No consensus that risks are adequately balanced by existing mitigations
		Rising	No consensus that risks are adequately balanced by existing mitigations and the mitigated risk level either is higher than the result from a previous PAWSA or is higher than the baseline risk level from this PAWSA
		NO	Consensus that existing mitigations do NOT adequately balance risk
Book 1	Book 3		
Consensus			

**Section VIII: Book 4 – Identifying Additional Risk Mitigation Strategies**

The workshop participants next completed Book 4, which evaluated how successfully a proposed risk mitigation / intervention strategy would be at lowering risk levels for each of the five waterways risk factors that were determined to require additional intervention actions. The below table shows the expected reduction in risk when taking the actions specified by the participants. A green **Balanced** indicates that no intervention is needed because risk in the waterway was judged to be well balanced by existing mitigations. A yellow **Caution** indicates that there was a difference between the most effective general strategy and the general strategy most selected by the participants for additional action(s).

**Figure 6**

Additional Interventions					
Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
Balanced	Balanced	Balanced	Balanced	Balanced	Balanced
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Balanced	Balanced	Balanced	Nav / Hydro Info	Balanced	Balanced
			2.0 Caution		
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Balanced	Balanced	Balanced	Balanced	Balanced	Balanced
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
Coordination / Planning	Balanced	Coordination / Planning	Balanced	Waterway Changes	Waterway Changes
2.7 Caution		1.4		3.9	3.7

\*\*\*Note: Kahului Harbor does not have a commercial fishing fleet and this risk factor shown blank above was not scored.

KEY		EXPLANATION	
Risk Factor		Intervention	Intervention general strategy that most participants selected for further risk mitigating actions
Intervention		Risk Improvement	The amount that present risk levels might be reduced if new mitigation measures were implemented
Risk Improvement	Caution	Caution	No consensus alert

The PAWSA Kahului Harbor participants judged that additional risk reduction actions were needed with respect to 5 of the 24 risk factors in the Waterway Risk Model. The table below summarizes that information and is arranged from highest to lowest possible risk improvement. A description of each risk mitigation general strategy is included in Appendix D.

<b>Risk Factor Name</b>	<b>General Strategy</b>	<b>Specific Action(s)</b>
Small Craft Quality	Coordination / Planning	Establish a Harbor Safety Committee for the community to include industry, recreational, Federal, state, and local government, etc.
Obstructions	Coordination/Planning	Develop contingency plan to relocate the Superferry barge
Dimensions	Navigational/Hydro Information	Provide reflective material or lighting for breakwater jetties
Mobility	Waterway Changes	Relocate the Superferry barge outside the Kahului Harbor
Economic	Waterway Changes	Develop secondary port (capabilities)

The specific actions listed are the ones recommended within the general strategy recommended by the majority of participant teams. Appendix E is the complete list of all additional risk mitigations strategies identified by the PAWSA workshop participants.

### **Conclusion**

The ultimate goal of a PAWSA is to establish a baseline of waterways for VTS consideration and to provide the U.S. Coast Guard Sector Commander and members of the waterway community with an effective tool to evaluate risk and work toward long term solutions tailored to local circumstances. The goal is to find solutions that are both cost effective and meet the needs of waterway users and stakeholders. This report supports this goal and should be viewed as a starting point for continuing dialogue between all local maritime stakeholders

The U.S. Coast Guard extends a sincere appreciation to the workshop participants for their contributions to the PAWSA workshop. Their expertise was critical to the success of the workshop, and their recommendations will greatly assist the U.S. Coast Guard as it continues to work with the maritime community to further improve safety and efficiency in the Port of Kahului Harbor, Maui, Hawaii.

## Appendix A

### Kahului Harbor PAWSA Workshop - Attendee List

<b>Participants:</b>	<b>Organization</b>	<b>Email Address</b>
BM1 Travis Araki	USCG 14 <sup>th</sup> District Waterways Mgmt	Travis.H.Araki@uscg.mil
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BMCS David Garrett	USCG Aids to Navigation Team Honolulu	David.L.Garrett@uscg.mil
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OS1 Rodney Hall	Sector Honolulu, Cmd Center	Rodney.L.Hall@dhs.gov
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CDR Robert McFarland	USCG Sector Honolulu, Deputy	Robert.E.Mcfarland@uscg.mil
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BM1 Martin Tremblay	USCG Station Maui	Martin.A.Tremblay@uscg.mil
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Dr. Marc Thibault	USCG Commandant (CG-5413)	Marc.A.Thibault@uscg.mil
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Ms. Liz Webb	ATS Corporation	Nathan.T.Peirce@uscg.mil

## Appendix B

### Workshop Participants – Observations, Trends, and Existing Mitigations

#### Deep Draft Vessel Quality

##### Today:

- LPG vessels are somewhat older. 1.5-2 million gallons are carried by barge. Barges are in fair condition overall.
- Kahului Harbor Administrator often gets communications on restrictions placed on vessels far too late to put the restrictions into effect.
- *Gas ships that tie up at Pier 2 are in much better shape and are relatively new ships with top-notch crews. Honolulu Harbor generally runs the vetting for gas ships, but Kahului Harbor can request, for example, that a certain vessel doesn't call because in the past it causes too much trouble.*
- *NCL America line Pride of America and has a very good safety record and is a very safe harbor user.*
- An articulated barge or “sugar ship” that transports sugar or grain comes into Pier 1. It is ABS class with a regulated inspection schedule.
- RO/RO vessel(s) transport personal effects of military stationed on the island, among other things. .
- Foreign bulk carrier coal ships will stockpile coal here if they get a good deal. The condition of these ships varies.
- Tin ships and large containers ships don't generally come to Kahului anymore, such as Lorelee and Mokihana, which is an un-maneuverable single strew ship which was refurbished too much foreign steel.

##### Trends:

- The State's 2020 Plan may reconfigure where these vessels moor within the harbor.

##### Existing Mitigations:

- Vessels must send notification 96 hours in advance of coming to a U.S. port, at which point certificates are checked and an inspection may be determined necessary, sometimes taking 4-6 hours. Inspection safety topics include navigation, fire, survivability, construction, and the vessel as a whole. Security measures are also considered.
- Substandard vessels are prevented from going into the port by the U.S. Coast Guard, which is known worldwide, so many do not call on U.S. ports in the first place.
- Not a lot of low commodity shipping is coming into Kahului, which means the problems that usually come with them are also absent.
- Few ships call and most ships that call are regular callers.
- Most callers are U.S. flag, so they have to undergo U.S. Coast Guard inspections.

## Shallow Draft Vessel Quality

### Today:

- Cargo, tank, and towing vessels are U.S. flag and ABS class. One or two are from around the 1960s or 1970s and 90% are local to the island or to Hawaii and the Pacific Region.
- There are petroleum products, propane gas, cement, and containerized cargo, such as Young Brothers' flat deck barge and Matson's crane barge. There is also export scrap metal, sand, and gravel. Sand and gravel vessels, as well as fuel vessels, are double-hulled and in fairly good condition.
- Local harbor assist tugs, MAMO and TIGER 6 are in great condition. They can handle a dead ship situation, depending on the weather and the size of the dead ship.
- Towing tugs are a little older, about 10 years.
- Dive boats are uninspected six-passengers.

### Trends:

- [None specified]

### Existing Mitigations:

- Inspection schemes and vetting schemes are similar to those for deep draft vessels.
- Dive boat captains are generally extremely experienced mariners.
- There is currently a voluntary towing vessel inspection program which is slated to become mandatory soon.

## Commercial Fishing Vessel Quality

### Today:

- There are no commercial fishing vessels in Kahului Harbor.

### Trends:

- Kahului is not expected to be a commercial fishing harbor in the future.

### Existing Mitigations:

- [None specified]

## Small Craft Quality

### Today:

- There are 40-foot 6-person canoes, 20-foot 2-person paddles, and 10-foot or 15-foot 1-person canoes, paddle boarders, surfboards, and stand-up paddlers transiting in and around the harbor.
- Small craft often have no lights, no life preservers, etc.
- When a larger vessel comes in or out of Kahului Harbor, usually they will tuck behind the chute.
- Small craft are instructed to stay away from the vessel activity on the east side of Kahului Harbor, so they come down the west side to the beach in the southeast near Pier 2.
- ***Locals are usually pretty proficient, and there are generally no tourists. No known small boat collisions have occurred in the harbor. There have been almost no SAR cases on the north side of Maui, unless they were handled by the fire department which doesn't always report cases externally.***
- Superferry speed is no longer an issue since it has discontinued operations to Maui.
- Windsurfing areas are out of the commercial traffic areas.

- Windsurfers sometimes lose control of the sail and they end up on the breakwater.
- Before the Superferry, about 5 years ago, it seemed that people in canoes, paddlers, kayakers, and clubs in general, did not understand the meaning of a whistle from a tug trying to leave. They now seem to understand the tugs aren't so maneuverable and they get out of the way.
- Recreational vessel operators have no licensing requirement. Around the ramps on the west, there's no real gauge of the level of knowledge of rules of the road and competency, but as an indication there haven't been collisions.
- Interaction between small boats and the commercial harbor is generally not an issue. Once in a while, a couple of them race.
- No lights in the very early morning would seem to be a risk.
- Sometimes a kayaker strokes right alongside a stationary vessel around Pier 1 or 2, but they're too small to do much damage by accident.
- There is a security zone 100 yards around cruise ships, 33 CFR 1408.
- It hasn't happened, but an individual could potentially get pulled into the propellers of a larger ship.

**Trends:**

- [None specified]

**Existing Mitigations:**

- There are lifeguards at Kanaha beach and the fire department has rescue boat(s).
- Because of good communication with clubs, they seem to understand better the safety issues in Kahului Harbor.
- There is some State level enforcement. If DLNR suspects something, they can conduct boardings.
- A local Coast Guard Auxiliary component presently exists and offers boating safety courses.
- There are no lagoons or large marinas, which generally are higher risk areas.
- Strong wind usually discourages smaller boats with less experienced operators.
- A sign has been prepared by the State but is still yet been erected to alert windsurfers and similar small craft users to inherent dangers from commercial traffic in the turning basin.

**Volume of Commercial Traffic**

**Today:**

- Light to moderate volume of traffic, about 10 transits per day.
- There are usually 2 or 3 foreign cruise ships, and the Pride of America comes once per week to Kahului Harbor, generally to Pier 1.
- Cruise ship traffic increases in the turnover season when foreign ships transit to or from Alaska, making a circuit that includes Vancouver and Latin America.
- At the height of traffic, there are about 50 movements per day, counting inbound and outbound separately.

**Trends:**

- Passengers ships and barge traffic have generally increased from 2003-2008, and probably will continue to increase.

**Existing Mitigations:**

- Easy schedule, maintained at the State level, due to low volume of commercial traffic.

## Volume of Small Craft Traffic

### **Today:**

- There is a light or moderate volume of small craft traffic, about 3 transits per day.
- From April to August the small craft traffic is heaviest, but it is still only moderate in regards to the capacity of the harbor.
- From August to October a small number of canoes are going outside of Kahului Harbor.
- Seasonality comes into effect with large northwest swells in the winter causing a large number of people to go into the Jaws, but this is only 10 days per year.
- The biggest problem is visiting sailboats, such as from Canada, Mexico, and the West Coast of the U.S. There are 2 or 3 per year, but it only takes one to anchor in the turning basin overnight and wake up to the problem of a large vessel bearing down on them in the morning.

### **Trends:**

- The canoes, paddle boarders, surfboards, and similar watercraft are increasing in overall numbers.

### **Existing Mitigations:**

- Vessel boardings mitigate risk.
- Weather controls the volume of small craft traffic.
- The lack of a marina in the harbor's vicinity tends to create a relatively low-risk situation.
- There is shore side enforcement for the security zone.

## Traffic Mix

### **Today:**

- Kahului Harbor is a multiple-use waterway.
- There is a narrow area around the Piers for security zones and a small geographic area in general.
- Wayward kayaks sometimes encroach into cruise ship security zones.
- Occasionally, swimmers think it's a good idea to swim across Kahului Harbor.
- The three major tug companies, Hawaii Tug & Barge, Sause Bros., and K-Sea, generally do well. For example, in passing other types of vessels there are no serious problems with them or with them transiting the channel itself.
- Maybe 80% of vessels make the security call coming in or out of Kahului Harbor.
- There are limited times when Kahului Harbor is open.

### **Trends:**

- [None specified]

### **Existing Mitigations:**

- The harbor administrator schedules smaller vessels such as tugs and barges at least half an hour apart. Small and large vessels are scheduled one hour apart. Two large vessels are scheduled one or one and half hours apart. If a coal ship is involved, it is scheduled maybe two hours from other vessels.
- Radio communication conveys awareness of conflicting traffic.
- For canoe clubs and paddling clubs, there are informational safety handouts, but not for trailer boats except



through the Coast Guard Auxiliary, which due to the lack of a marina has limited distribution options.

- Escorts for LPG and passenger ships when they occur address traffic mix issues.
- Conferences such as this convey some of the complexity of Kahului Harbor issues, which gives a better wide-scale perspective.

### Congestion

#### **Today:**

- Often only one vessel transits the entrance channel at a time.
- Kahului Harbor is not generally congested.
- Congestion occurs in the commercial harbor zone (Pier 1-3), not in the turning basin.
- The Young Brothers barge and the Matson barge generally want to leave at the same time.
- 5:00 AM-6:30 AM on Fridays is the highest congestion.
- In Hilo Bay there is a fuel barge that generally waits for the Young Brothers barge to leave Kahului and then follows them.
- Issues are usually handled bridge-to-bridge.
- When a tug and barge leave, they are supposed to send a Sécurité radio call, but sometimes they don't. This, at times, directly impacts inbound traffic and can cause delays for those vessels that may have to back down or divert.
- Sometimes vessels pass each other in the turning basin which could be risky depending on weather, strength of the tugs, and skill of operators.
- A fuel barge already at Pier 3 and a cement barge coming into the same spot require tricky maneuvering and therefore elevates risk.

#### **Trends:**

- As the economy gets better, traffic is expected to increase accordingly.

#### **Existing Mitigations:**

- A scheduler adjusts when vessels show up early, late, or unexpectedly.
- AIS contributes to scheduling efficiency.

### Winds

#### **Today:**

- Winds are mostly constant and predictable.
- West Maui Mountains provide a little shelter, but not much.
- ***In Kahului Harbor, the cruise ship Pride of America's high profile causes the crew to have to run the bow thruster and stern thrusters to offset the winds. This creates an eddy within the commercial pier complex and can be a contributing factor to other risks for vessels transiting pass the cruise ship.***
- Winds get pretty strong, 30 or 50 knots, preventing some boats from coming in or out of Kahului Harbor.
- With very strong winds, small boat stations are unable to deploy their boats. This could become an aggravating factor if vessels cannot leave and others are waiting to enter or tie up.

**Trends:**

- [None specified]

**Existing Mitigations:**

- Problems caused by winds are manageable because of their predictability.
- Up to date forecasts mitigate the risk of winds.
- The Pride of America uses their thrusters to off set high winds that place a strain on their mooring lines, which have parted in the past if used exclusive to hold the ship.
- There is a strong awareness of what it means when winds are coming from a given direction or speed.
- The Captain of the Port and Harbor Administrator receive notifications of severe wind conditions and take appropriate action (i.e. broadcasts, rescheduling, redirecting, etc).

### **Water Movement**

**Today:**

- Eddies by the commercial pier complex are created in Kahului Harbor by Pride of America's thrusters running to off set high winds. The eddies are strongest around the lower end of Pier 2. This can be a can be a contributing factor to other risks for vessels transiting pass the cruise ship.
- When running full-out, the cruise ship's thrusters can turn tugs around 360 degrees.
- At times, the surf just outside the harbor can mask the break wall from both visual and radar view.
- Kona winds can blow water along the face or the edge of the far end, around Berth Charlie.
- On the northwest and another spots in the southeast end of the Kahului Harbor are actual surfing spots.
- At times, there are strong enough waves for a barge longer than 300 feet to surf in.
- Surges/swells and eddies at the entrance sometimes cause large vessels to have to slam on the breaks and get the tugs working to swing it to one side.
- There is risk during the winter at the end of Pier 2 and Pier 3 due to swells coming out of the north. These piers do not have much wash, only 18 feet of water depth at Pier 3.

**Trends:**

- [None specified]

**Existing Mitigations:**

- Tug and tows wishing to transit along side, now radio to Pride of America to shut down their bow thruster temporarily to dissipate the eddies created by the thrusters and allow them better waters to transit.
- Good communications between regular harbor users mitigate risk.
- Swell surges affecting Berth 2 Charlie and Pier 3 are mitigated by looking at the tide data and informing the vessel captains if there is a high tide difference or a tide coming in.
- A database with one year's data has been created. It contains swell direction, height of swell, and period of swell. All correlated to the height and the rise and fall of the barge with laser level readings on a draft barge. From 350 to the east greatly affects the surge in Kahului Harbor. The data is based on a NOAA weather buoy, where readings are about half an hour away.

## **Visibility Restriction**

### **Today:**

- The break wall shows up on radar, unless masked by high waves, but may not be seen visually from behind or in front of a vessel at night because it's very dark in the outer harbor and there are no background lights to frame the break wall as in other harbors.
- Volcanic fog from the Big Island of Hawaii generally does not come into the harbor to cause visibility problems. However, the fog can become an eye irritant for user of Kahului Harbor.
- Rain squalls can be a visibility restriction.

### **Trends:**

- The State's 2020 Plan may alleviate the outer harbors lack of lighting if the ferry/barge terminal is placed as planned on the new west harbor breakwater.

### **Existing Mitigations:**

- Harbor tugs use their spotlights to illuminate the break wall/entrance for vessels.

## **Obstructions**

### **Today:**

- The State-owned Superferry barge does extend past the end of Pier 2 (Berth 2 Bravo) and is therefore considered an obstruction.
- There is a large sand barge that moors at Berth 1 Charlie. When it is moored, it can be an obstruction to others.
- Rocks are a risk factor.

### **Trends:**

- [None specified]

### **Existing Mitigations:**

- [None specified]

## **Visibility Impediments**

### **Today:**

- The State-owned Superferry barge does extend past the end of Pier 2 (Berth 2 Bravo) which is a visibility impediment to other transiting vessels.
- There is a large sand barge around berth 1 Charlie, which is a visibility impediment when in port.
- Trees can block Aids to Navigation and pier side lights a little, but has not been a recent problem.
- Breakwater navigational light signals appear to be dim.
- Little yellow lights used on Private Aids can get mixed in with background lighting near shore.
- The opening in the break wall is a little hard to see. Theoretically, you don't have to see it if you're dead on in terms of the range, but it's an important comfort factor for the mariner.

### **Trends:**

- The State's 2020 Plan may modify the visibility of the port.
- The Coast Guard is actively engaging harbor users to adapt LED/Solarization upgrades to Aids to Navigation throughout the islands. This could increase an Aids' range and eliminate their susceptibility to power grid power outages.

**Existing Mitigations:**

- Vessels take their time to mitigate the risk when in the vicinity of the Superferry barge and sand barge.

**Dimensions****Today:**

- When larger vessels such as the Superferry make a turn to its portside coming into Kahului Harbor, they had to closely watch their stern.
- There is a large container crane and two gantry cranes at the seaward end of Pier 1.
- Transiting between Pier 1 and Pier 2 is tight. There has been at least one allision.
- The overall depth of the turning basin affects the pilots in terms of their options for coming into Kahului Harbor, as well as, the sugar ship at Pier 1 having 1.5 feet under the keel.
- The edges of the turning basin are less than 35 feet.
- *The dimensions of the Kahului Harbor make it susceptible to winds and swells.*
- The jetty's red and green lights are hard to see at night and more so in inclement weather.
- The design of the range light limits visibility of the light within 4 degrees on either side of the range.

**Trends:**

- The State's 2020 Plan may modify the dimensions of Kahului Harbor if implemented.

**Existing Mitigations:**

- One-way traffic mitigates the risk inherent to the dimensions of Kahului Harbor.
- Good scheduling mitigates risk.
- Current tugs employed in the harbor can maneuver to keep a ship stable.
- Surfing in Kahului Harbor near the small boat ramp occurs when the surf is out of the northeast. Kona winds from the south may have an effect on surfing – offshore winds with a large north swell.
- Tow boats move to one side of the breakwater jetties and use their spotlights to light up the entrance to Kahului Harbor.

**Bottom Type****Today:**

- Bottom type is sandy crushed coral. There are coral formations, but they are not significant.
- Bottom inside Kahului Harbor is fairly soft even outside of the turning basin but over by the west break water or east break water, it's coral. So, if you miss the jetties, you're in trouble.
- No streams empty into Kahului Harbor. Therefore, nothing but drainage from city streets carries refuse into Kahului Harbor.
- The current cruise ship has a 28-foot draft and there is sufficient room for them. The sugar ship usually loads to the maximum draft and at times has trouble leaving the berth.

**Trends:**

- [None specified]

**Existing Mitigations:**

- Draft restrictions along Piers mitigate the risk of the bottom: 35 feet along Pier 1, 28 feet along Pier 2, and 18 feet along Pier 3.

## Configuration

### **Today:**

- When larger vessels such as the Superferry make a turn to port coming into Kahului Harbor, they had to closely watch their stern. (Superferry is no longer in operation).
- There is an S-curve coming out of Kahului Harbor with about 45 degree angles to get lined up for the exit.

### **Trends:**

- The State's 2020 Plan may modify the dimensions of Kahului Harbor if implemented.

### **Existing Mitigations:**

- [None specified]

## Personnel Injuries

### **Today:**

- Pride of America could be a high-casualty scenario. (In this context, 150 injuries is considered high-casualty.)
- A fire on a passenger ship could involve risks of high casualty.

### **Trends:**

- [None specified]

### **Existing Mitigations:**

- Cruise ships are required to have a contingency plan that covers mass-casualty, reviewed by the Coast Guard.
- Exercises are performed regularly on cruise ships. Cruise ship crew proficiency in terms of mass evacuation is tested every 3 months in Kahului by the Coast Guard.
- In terms of floating fire platforms, the TIGER 6 tug has a fire monitor.
- Members of the National Guard can be flown over from Oahu.
- Mass evacuation method relies on airplanes now that the Superferry is gone.
- Good island hospitals mitigate risk.

## Petroleum Discharge

### **Today:**

- A 300-foot tank barge coming in around Pier 3 has caused the rare spill.
- The sugar ship fuel tanks involve an integrated tug and tow.
- Barges are all double-hulled and there is only minor bunkering here.
- The cruise ships are the greatest risk of petroleum discharge into Kahului Harbor.
- If a discharge occurs at the jetties, the consequences would be direr than at other locations.

### **Trends:**

- [None specified]

### **Existing Mitigations:**

- There are assets here in conjunction with the Safe Islands Council. About 1600 feet of containment boom is laid out on the deck ready to go, among with other equipment. There are several exercises that go on annually. Manning for oil spill response comes from just up the street and from Miko. Containment within minutes is practiced. Open water booming equipment and vessels are not here.
- All industries work with the Coast Guard to ensure booms can be used in conjunction with one another.
- Mitigation efforts have been generally successful. All incidents have been inside the industrial harbor.
- Outstanding communication and coordination with the State requires effort and cost, but mitigates risk effectively.

### **Hazardous Materials Release**

#### **Today:**

- Liquefied petroleum gas and chlorine is transported.
- Gas release from a carrier could blow into the hotel, mall, etc.
- LPG ships are 300 foot or less, generally under 40,000 gross tons.

#### **Trends:**

- [None specified]

#### **Existing Mitigations:**

- Air-triggered actuator shutoffs can be operated from the pier and on the barge itself.
- Area contingency plan covers HAZMAT response situations.
- There is a shore-based fire department HAZMAT team and vehicle. Quarterly drills and training with HAZMAT scenarios are conducted.

### **Mobility**

#### **Today:**

- *Significant mobility concerns exist for an accident blocking or damaging docks or harbor entrance area.*
- Barges anchored in the turning basin would nearly shut down the port, and would remove Kahului Harbor as a port of safe harbor for others, but might be necessary during a hurricane.
- With the Kahului Harbor out of operation, the only supplies would be from air or landing craft.
- There is about 3 days supply of food on Maui with a complete shut-down.
- County government is focused on maintaining continuity of their own operations, but maybe many of their operations should be shut down from the perspective of making resources stretch while focusing on restoring the port to operation in the case of a disaster.
- State Civil Defense is centered on Oahu, the “hub” to the “hub and spoke” supply system employed throughout in the islands.
- There is no salvage plan for an allision or grounding on the jetties of Kahului Harbor.

#### **Trends:**

- [not specified]

#### **Existing Mitigations:**

- Pearl Harbor has a salvage unit.
- Significant but minimal commercial crane barge assets and diving companies/divisions exist.
- Transit time from Honolulu for assets is over 12 hours with bad weather. This will likely be the condition in the case of emergency, in addition to the time it takes for initial coordination.

- Certain types of vessels are required to have salvage plans, but typically it's an after-the-fact type of endeavor.
- The Army has 3 LSVs, such as the Harold Klinger, with a ramp in the front which can carry a significant amount of cargo.
- The Coast Guard's continuity of operations is focused on security and getting the port open again.
- The Coast Guard has direct support from the District, and support from the Area or Headquarters if needed. However, the later two would be coming from the mainland.

### **Health and Safety**

#### **Today:**

- Gas release from a carrier could blow into the hotel, mall, etc. due to the prevailing winds.
- Fuel spills would significantly impact the population.
- Water source is from reservoirs, so not easily affected by an accident in Kahului Harbor.
- Cooling water comes from outside Kahului Harbor.
- Tank failure could cause cooling water contamination, but not likely because it's up current.

#### **Trends:**

- [None specified]

#### **Existing Mitigations:**

- Local Emergency Planning Committees help to mitigate risk.
- There is an adequate hospital on island.
- In terms of resources, the HAZMAT truck is in close proximity to the port and therefore a fast response in a mass-casualty scenario.
- In the past, gasoline tanker rollover scenarios have been practiced with the Coast Guard.
- The airport is near the harbor for a quick air evacuation if necessary.
- When a 911 call is made, if a first responder has to go into Kahului Harbor, then 911 calls the facility security officer, who can then forewarn the roving guard or gate guard to allow quick access.

### **Environmental**

#### **Today:**

- Petroleum spills would have a large impact on coral, turtles, birds, and wetlands; all the same impacts as on Oahu.
- Cold water coral reefs reproduce very slowly. Dragging wires, dragging anchors, and groundings could have nearly irreparable damage.
- Access to beaches and recreation could be highly impacted by a large oil spill.

#### **Trends:**

- Economic boom increase vessel traffic and increases the chances of an environmental incident increases.

#### **Existing Mitigations:**

- Though not a major resource, the Coast Guard has a trailer and some gear for the purpose of environmental risk mitigation.

- Some of the vessels are required to have response plans and area contingency plans.
- Environmental Science International (ESI) talks about where everything is, such as diversionary booms and sensitive areas to be protected in Hawaii.
- Events that would impact shorelines and putting buoys in waterways are considered as part of the event permitting process.
- State requires everyone to have insurance that involves environmental impact.
- The county is extremely environmentally conscious and the culture is conscious of issues such as the turtles being a protected species.

### **Aquatic Resources**

**Today:**

- There is no commercial fishing, but there is recreational fishing and subsistence fishing.

**Trends:**

- [None specified]

**Existing Mitigations:**

- Invasive species concerns are taken into account and ballast water is exchanged away from shore.

### **Economic**

**Today:**

- Kahului Harbor being closed, such as from cranes being knocked down or the harbor entrance being blocked, would have major impacts. However, it would not cause as drastic an effect as Honolulu Harbor being blocked. In the case of Kahului Harbor being blocked, Honolulu Harbor would still receive Kahului's supplies which would then have to be delivered by other means modes of transportation than is currently employed.

**Trends:**

- In the case of fires on Lanai, passenger vessels stepped in to help. This was coordinated through the Emergency Operations Center.

**Existing Mitigations:**

- Airport and landing craft options (as already discussed) mitigate economic impact to Maui.
- Passenger vessels could not bring tourists, but they might be available for transportation of supplies to Maui depending on the circumstances.
- In terms of a power/fuel reserve plan, there are 650,000 gallons of stockpile that could last a month on Maui with rationing.



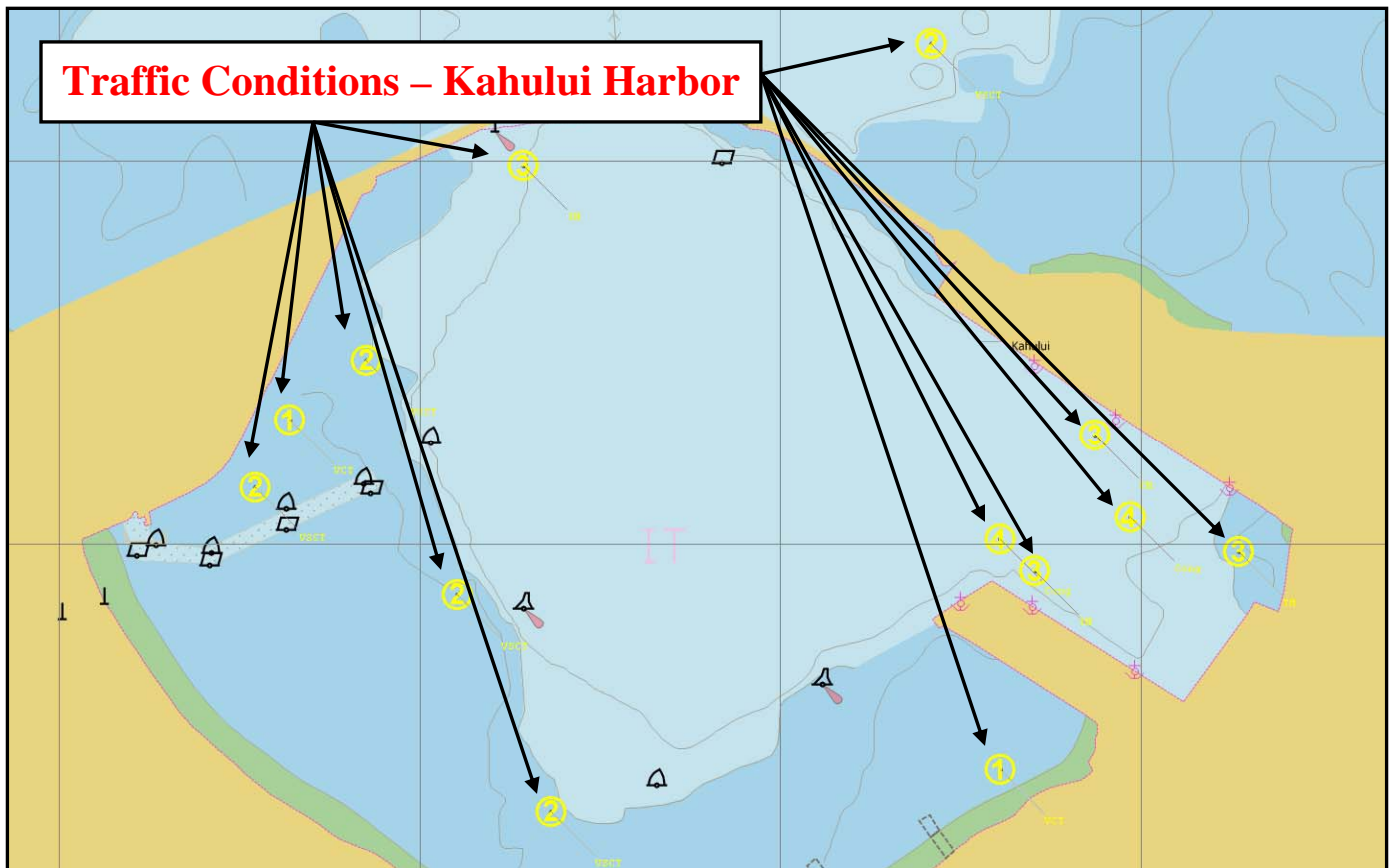
# Appendix C

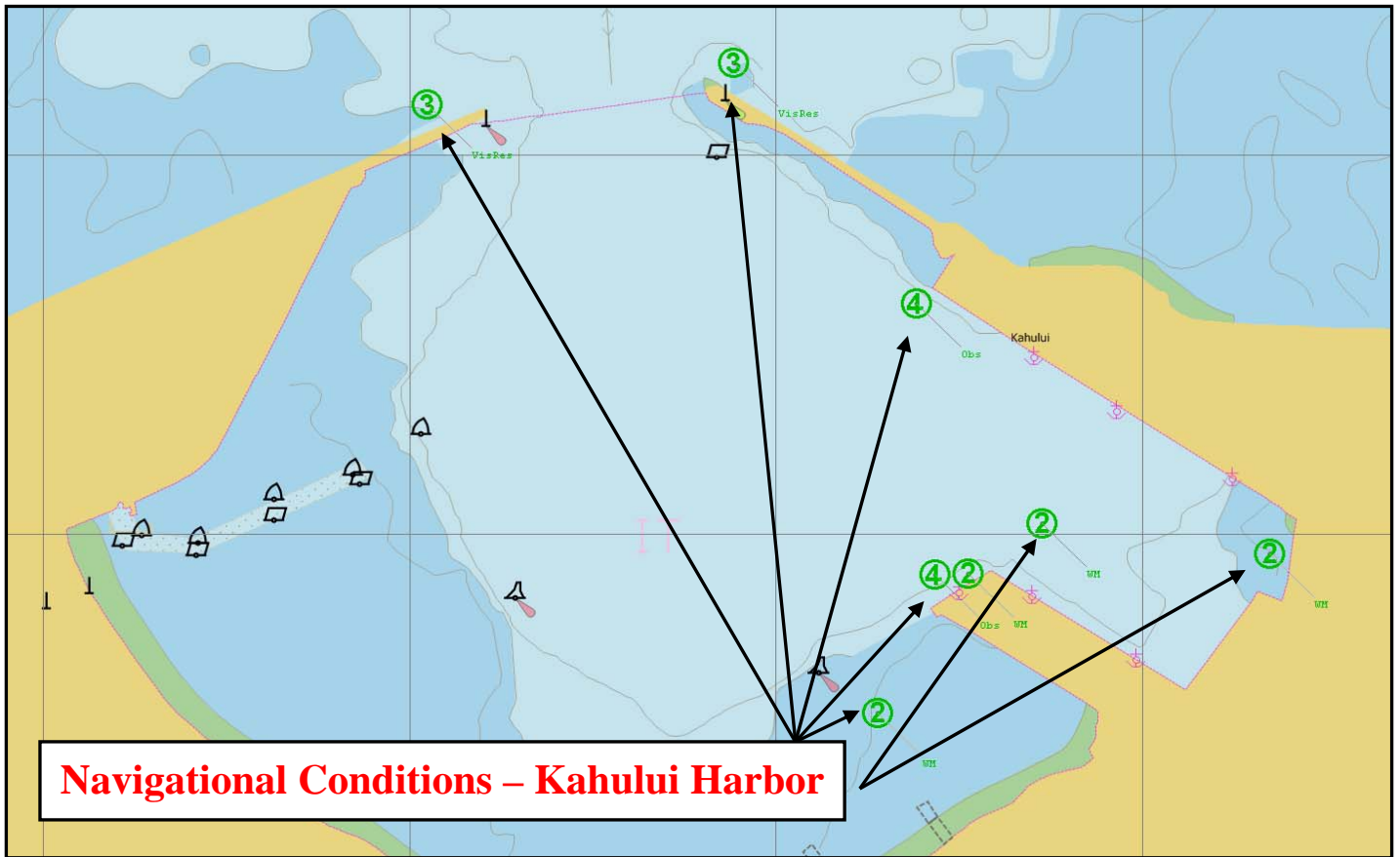
## Waterways Risk Model – Risk Factor locations

As participants discussed the Waterways Risk Model factors, an Electronic Charting System (ECS) was utilized to identify the specific geographic locations associated with the risk factors.

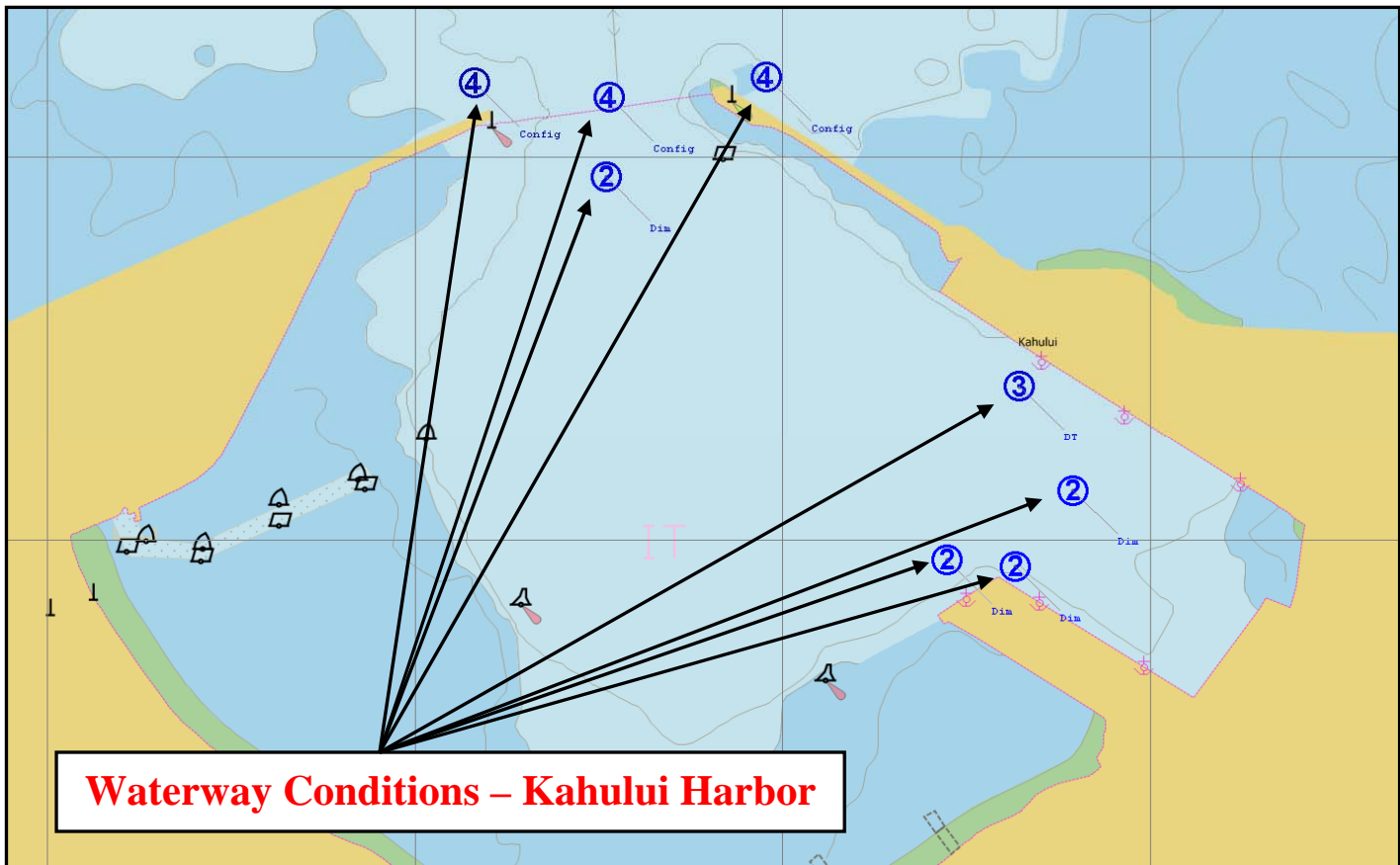
The following legend explains the risk factor locations on the ECS chart excerpts.

Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
1	Deep Draft Vessel Quality	1	Volume of Commercial Traffic	1	Winds	1	Visibility Impediments	1	Personnel Injuries	5	Health and Safety
2	Shallow Draft Vessel Quality	2	Volume of Small Craft Traffic	2	Water Movement	2	Dimensions	2	Petroleum Discharge	6	Environmental
3	Commercial Fishing Vessel Quality	3	Traffic Mix	3	Visibility Restrictions	3	Bottom Type	3	Hazardous Materials Release	7	Aquatic Resources
4	Small Craft Quality	4	Congestion	4	Obstructions	4	Configuration	4	Mobility	8	Economic

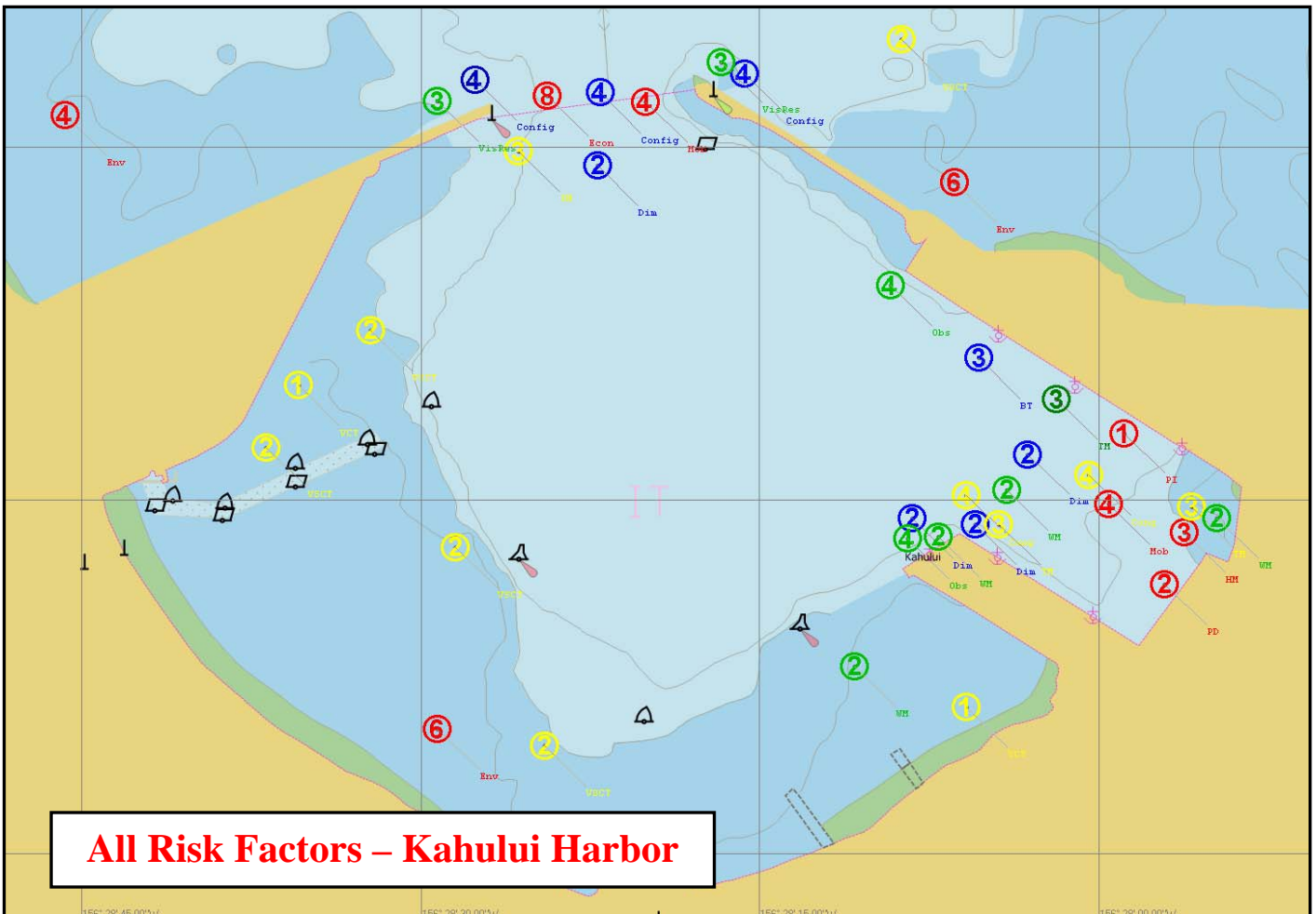
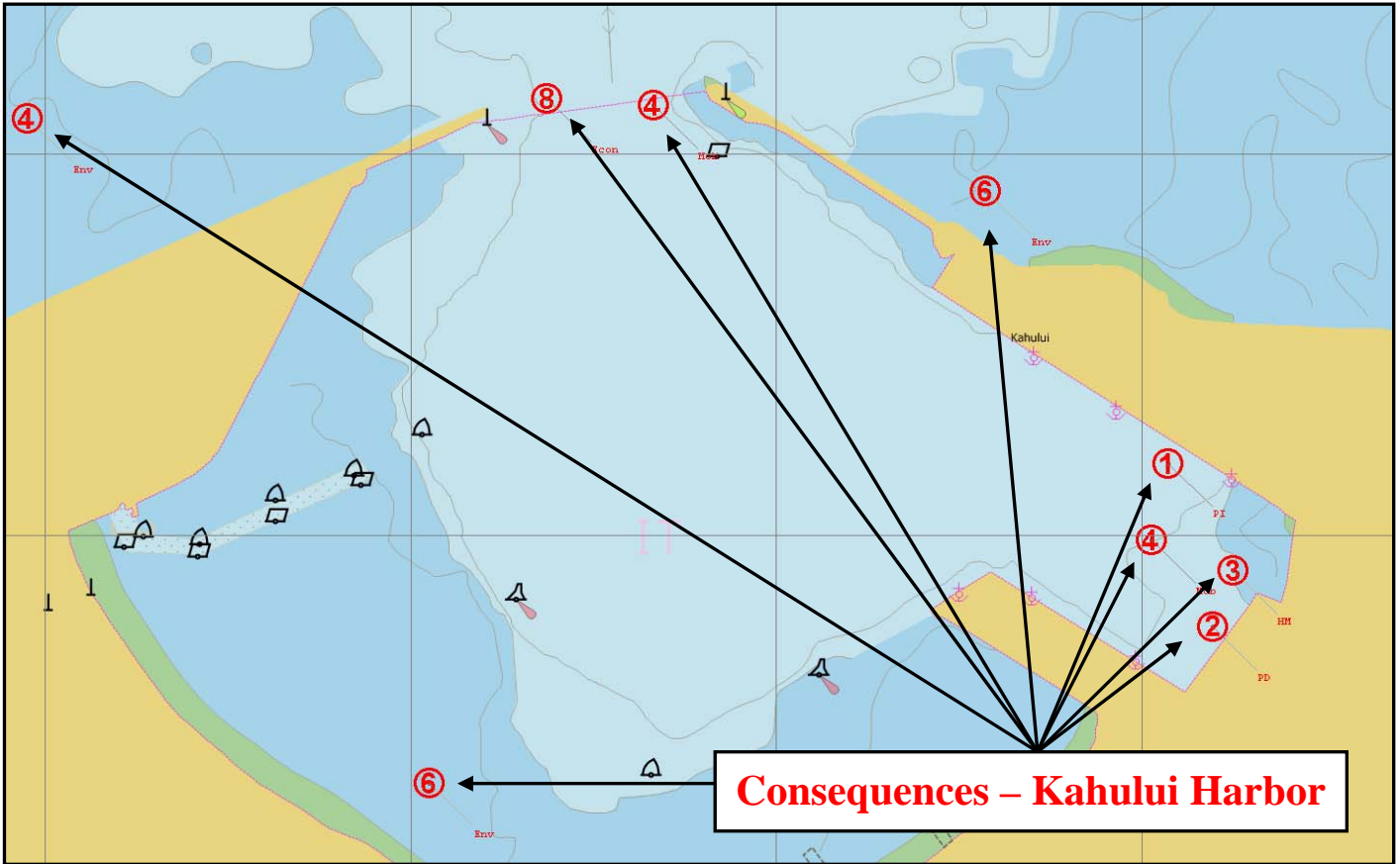




**Navigational Conditions – Kahului Harbor**



**Waterway Conditions – Kahului Harbor**



## Appendix D

### Risk Mitigation Strategy Descriptions

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

## Appendix E

### Additional Risk Intervention Strategies

#### Small Craft Quality

##### *Coordination/Planning*

- Establish Harbor Safety Committee for the community to include industry, passenger, recreational, state, local government, etc (8)

##### *Voluntary Training*

- Increase Coast Guard Auxiliary outreach (8)

##### *Rules & Procedures*

- State license requirements for recreational boats (4)
- Boating safety course requirement for recreational boats (3)

##### *Enforcement*

- Increase CG boarding safety inspections for small craft (vessels under oars) to improve safety standards (i.e. lights on board) (6)

##### *Other Actions*

- Post signs to indicate security zones (8)

#### Obstructions

##### *Coordination/Planning*

- Develop contingency plan to relocate the Superferry Barge (9)

##### *Other Actions*

- Reconfigure the Sand barge to have a side loading gate (7)

#### Dimensions

##### *Navigation/Hydrographic Info*

- Provide reflective material or lighting for breakwater jetties (9)

##### *Waterway Changes*

- Solarize the Range Lights for continuity of service and remove susceptibility to island power grid outages (6)
- Increase intensity of the breakwater jetty navigation lights (2)

##### *Other Actions*

- Relocate the Superferry Barge outside Kahului Harbor (8)

#### Mobility

##### *Coordination/Planning*

- Develop salvage plan for opening up the harbor (list of names, specialty, contact information, etc) (9)

##### *Active Traffic Management*

- Establish parameters for vessel conditions regarding entry into the harbor (8)

##### *Other Actions*

- Relocate the Superferry Barge outside the harbor (10)

#### Economics

##### *Coordination/Planning*

- Develop secondary port capabilities (9)
- Develop Continuity (Salvage) Plan to open the harbor (8)