

Ports and Waterways Safety Assessment

Workshop Report

Oahu, Hawaii

24 - 25 August 2009

Honolulu Harbor



Barbers Point Harbor



**United States Coast Guard
Office of Waterways Management**



**Providing Navigation Safety Information
for America's Waterways**

**Port and Waterways Safety Assessment - Workshop Report
Honolulu and Barbers Point-Kalaeloa Harbors, Oahu, Hawaii**

24 - 25 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 U.S. 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 and 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 unbalanced 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 including 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

Waterway Risk Model					
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
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: Honolulu Harbor and Barbers Point Harbor PAWSA – Geographic Areas Assessed

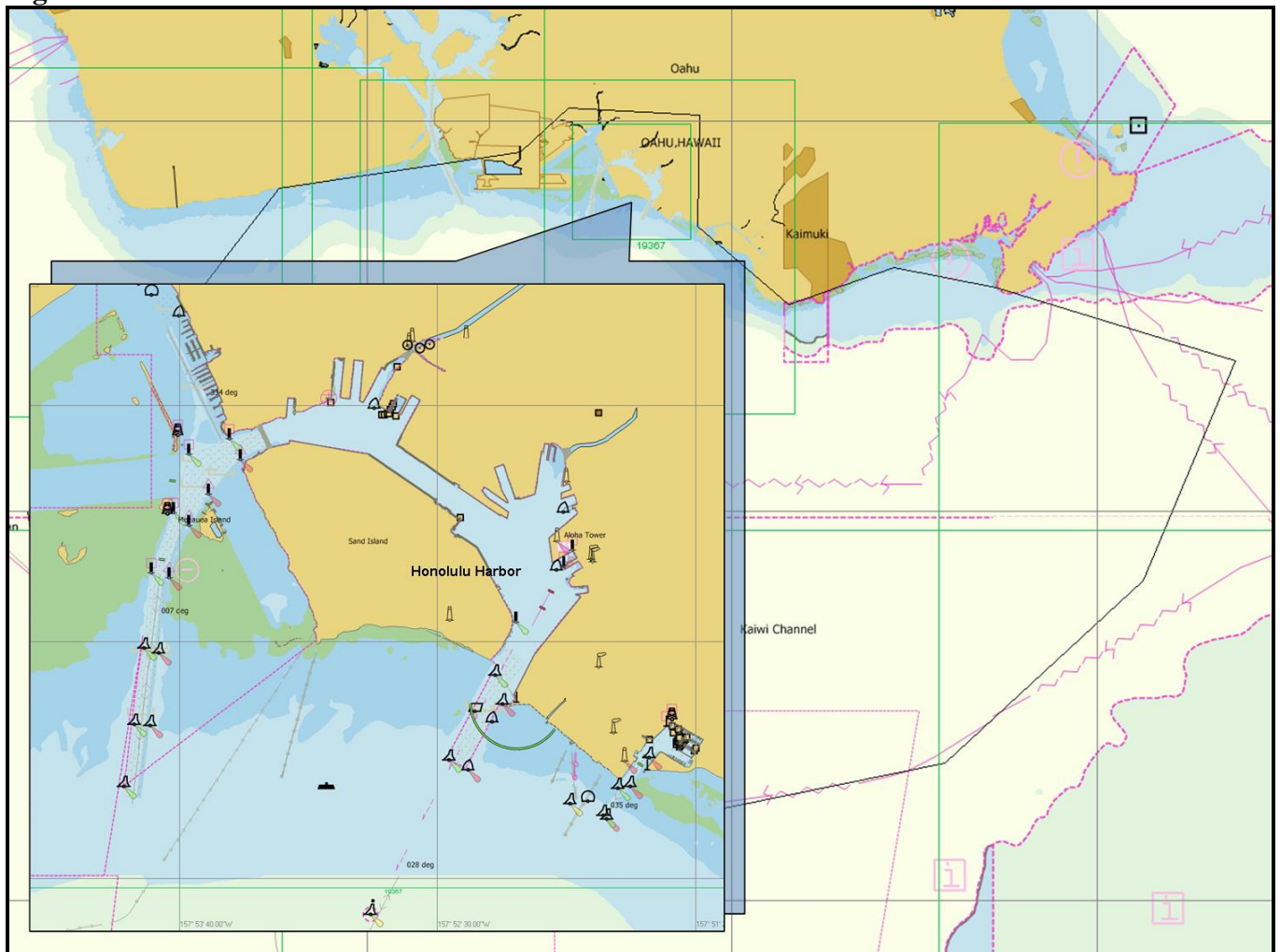
In support of overall safety improvement activities, a formal PAWSA for Honolulu and Barbers Point Harbors and the adjacent waters 20 miles offshore was conducted in Waikiki, Hawaii on 24-25 August 2009. The workshop was attended by 34 participants representing waterway users, regulatory authorities, stakeholders, and organizations with an interest in the safe and efficient use of Honolulu and Barbers Point Harbors, 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 new ideas for further reducing risks.

Two separate geographic areas on the island of Oahu were assessed during the workshop.

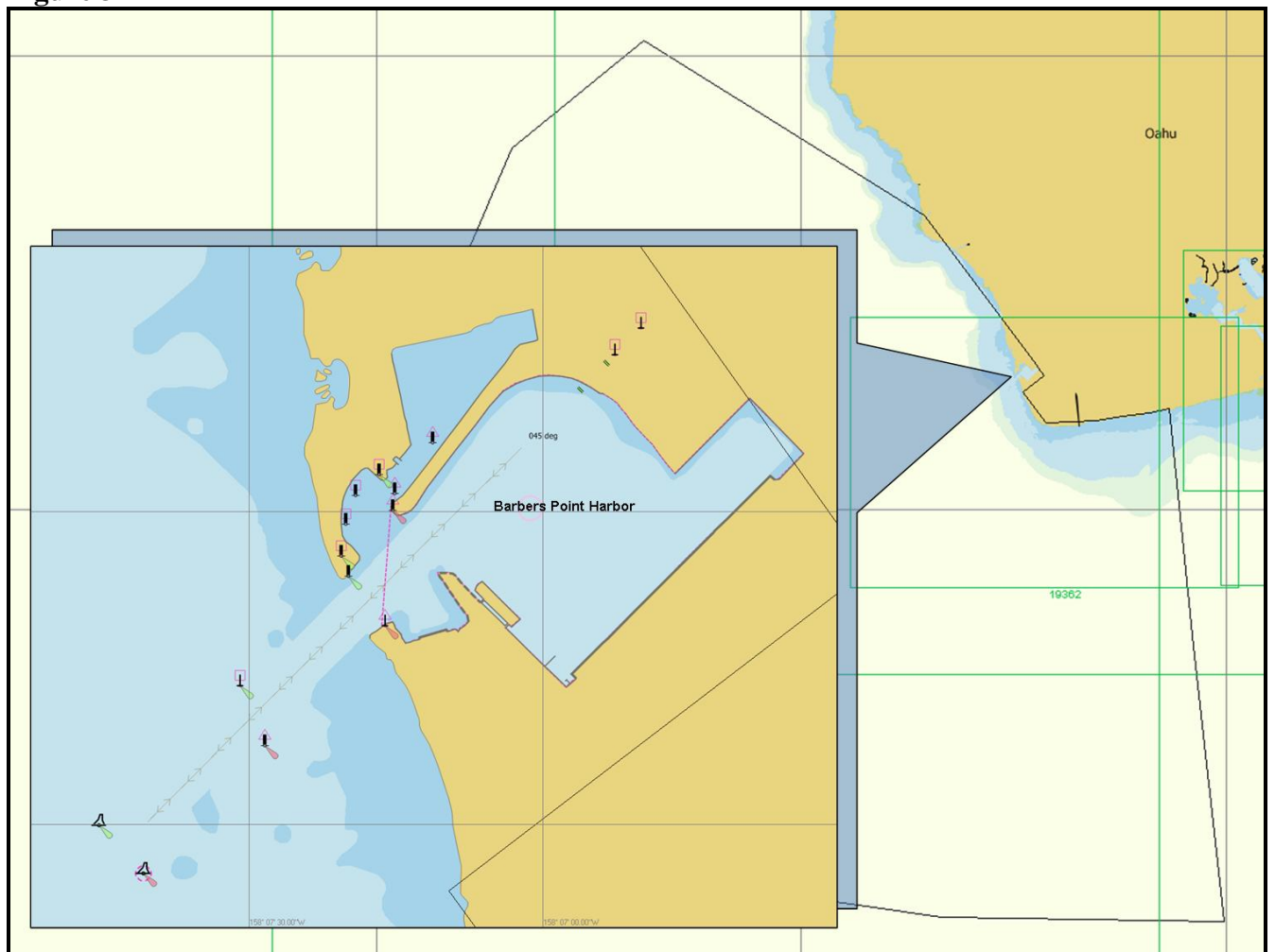
- ▶ Honolulu Harbor– This included the adjacent offshore area up to 20 miles.

Figure 2



► Barbers Point Harbor – This included the adjacent offshore area up to 20 miles.

Figure 3



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 comment points are included as Appendix B to this report.

Deep Draft Vessel Quality: Crude oil and container ships are of good quality. The crews of frequent callers to Honolulu and Barbers Point are of good to high quality. Foreign vessels not making a port call in Hawaii that experience mechanical or other problems causing them to divert and make port call in Hawaii tend to be of a lower quality. Dry bulk carriers such as cement and scrap iron are of low quality. Mother ships (small tankers) that provide fuel to the fishing fleet far off shore are of low quality.

Shallow Draft Vessel Quality: Most shallow draft vessels are of good quality and are part of the interisland transportation system. Parasail boats are a concern, and their crews appear are less experienced. These vessels tend to encroach upon the harbor entrance and vessel approach lanes.

Commercial Fishing Vessel Quality: Fishing vessels are often manned with a mixed crew; usually Korean, Vietnamese, and Pilipino. This can lead to language barrier issues both in crew cooperation during emergencies, and in bridge-to-bridge and bridge-to-shore communications. Crew fatigue can become prevalent for the long liner fleet since they remain off shore for a considerable amount of time.

Small Craft Quality: Hawaii does not require insurance on recreational boats or any type of boating safety education to operate these vessels. Generally, the operators of small craft do not have a good understanding of the navigation rules or understand the meaning of Aids to Navigations.

Congestion: The design of Honolulu Harbor with only one entrance creates a bottleneck. This is prevalent at the beginning of business hours (0600-0800) close of business hours (1600-1900). This is when a majority of the vessels want to transit the harbor. The problem is inefficiency of scheduling, or lack there of and it ultimately costs the public a lot of money unnecessarily.

Water Movement: Winds are an important factor and are usually predictable. However, waves/swells information become more important in many areas, especially Barbers Point. Research to establish the predictability of water movement within Barbers Point Harbor has provided no clear answers. Possibly because of eddies flowing through. Prevailing currents are east to west around Barbers Point and winds can become very strong, very quickly.

Bottom Type: From Diamond Head all the way up past Barbers Point and Honolulu Harbor, there is coral reef built on top of fossilized reef.

Mobility: Grounding in the main channel of Honolulu Harbor would be a catastrophe. The islands' "hub and spoke" system sends 98% of all commercial cargo through Honolulu Harbor. So, there would be major statewide averse consequences if Honolulu Harbor was unusable, regardless of the cause.

Environmental: In Hawaii there is about 25% endemism of species (species found nowhere else in the world) and many of their recovery rates are slow.

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/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 for Honolulu and Barbers Point Harbors. 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 4

Baseline Risk Levels					
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
4.9	5.4	3.0	5.3	8.3	7.9
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
5.4	5.8	4.1	4.8	7.1	7.9
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
8.8	5.4	1.2	8.3	6.2	5.6
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
7.4	7.5	3.8	5.2	9.0	6.0

In the Honolulu - Barbers Point PAWSA, 17 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)
- Fishing Vessel Quality (8.8)
- Bottom Type (8.3)
- Personnel Injuries (8.3)
- Environmental (7.9)*
- Health and Safety (7.9)
- Congestion (7.5)
- Small Craft Quality (7.4)
- Petroleum Discharge (7.1)
- Hazardous Materials Release (6.2)
- Economic (6.0)*
- Volume of Small Craft Traffic (5.8)
- Aquatic resource (5.6)
- Shallow Draft Vessel Quality (5.4)
- Volume of Commercial Traffic (5.4)
- Traffic Mix (5.4)
- Visibility Impediments (5.3)
- Configuration (5.2)
- Deep Draft Vessel Quality (4.9)
- Dimensions (4.8)
- Water Movement (4.1)
- Obstructions (3.8)
- Winds (3.0)
- Visibility Restrictions (1.2)

* Participants commented that the model doesn't take into account the factors of an isolated island state.

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 Honolulu-Barbers Point 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, 47% of the participant teams were placed in the upper third, 38% in the middle third, and 15% 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 5

Team Expertise -- Distribution

Risk Category	Top 1/3	Mid 1/3	Lower 1/3
Vessel Conditions	47%	37%	17%
Traffic Conditions	51%	34%	16%
Navigational Conditions	52%	36%	12%
Waterway Conditions	49%	40%	11%
Immediate Consequences	44%	40%	16%
Subsequent Consequences	42%	41%	18%
All Categories Average	47%	38%	15%

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 16 risk factors, there was consensus that risks were well balanced by existing mitigations; for 3 risk factors there was consensus that risks were NOT adequately balanced by existing mitigations; and for the other 5 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 6

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	
4.9	3.5	5.4	4.8	3.0	2.1	5.3	4.0	8.3	5.5	7.9	5.7
Balanced		Balanced		Balanced		Balanced		Balanced		Balanced	
Shallow Draft Vessel Quality		Volume of Small Craft Traffic		Water Movement		Dimensions		Petroleum Discharge		Environmental	
5.4	4.3	5.8	4.8	4.1	3.4	4.8	4.3	7.1	4.9	7.9	5.9
Balanced		Balanced		Balanced		Maybe		Balanced		Balanced	
Commercial Fishing Vessel Quality		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
8.8	7.6	5.4	5.1	1.2	1.1	8.3	5.7	6.2	4.7	5.6	4.8
NO		Balanced		Balanced		Balanced		Balanced		Balanced	
Small Craft Quality		Congestion		Obstructions		Configuration		Mobility		Economic	
7.4	6.1	7.5	6.3	3.8	3.2	5.2	4.8	9.0	6.9	6.0	8.1
NO		Rising		Balanced		Maybe		NO		NO	

KEY	
Risk Factor	
Book 1	Book 3
Consensus	

EXPLANATION	
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

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 8 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 7

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	Waterway Changes 2.7	Balanced	Balanced
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Enforcement 7.0	Balanced	Balanced	Balanced	Balanced	Balanced
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
Rules & Procedures 4.5	Active Traffic Mgmt 6.2	Balanced	Active Traffic Mgmt 4.6	Waterway Changes 5.6	Waterway Changes 6.3

KEY		EXPLANATION	
Risk Factor	Intervention	Intervention	Intervention general strategy that most participants selected for further risk mitigating actions
Intervention	Risk Improvement	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 Honolulu-Barbers Point participants judged that additional risk reduction actions were needed with respect to 7 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.

Figure 8

Risk Factor Name	General Strategy	Specific Action(s)
Economic	Waterway Changes	Open up the Kalihi Channel to Kapalama Basin for commercial traffic by removing or reconfiguring the two Sand Island Bridges. This will provide a secondary channel for traffic to move through if the main Honolulu Channel is not navigable.
Mobility	Waterway Changes	Open up the Kalihi Channel to Kapalama Basin for commercial traffic by removing or reconfiguring the two Sand Island Bridges. This will provide a secondary channel for traffic to move through if the main Honolulu Channel is not navigable.
Commercial Fishing Vessel Quality	Enforcement	Bilingual requirement for crew watch stander to speak and understand English, and to understand the language of all crew members.
Small Craft Vessel Quality	Rules and Procedures	Require boating safety training and insurance for state boat registration.
Congestion	Waterway Changes	Open up the Kalihi Channel to Kapalama Basin for commercial traffic by removing or reconfiguring the two Sand Island Bridges. This will provide a secondary channel for traffic to move through if the main Honolulu Channel is not navigable.
Dimensions	Waterway Changes	Open up the Kalihi Channel to Kapalama Basin for commercial traffic by removing or reconfiguring the two Sand Island Bridges. This will provide a secondary channel for traffic to move through if the main Honolulu Channel is not navigable.
Configuration	Active Traffic Management	Establish a VTS to cover Honolulu and Barber’s Point Harbors and their approaches.

The specific action(s) listed is (are) the one(s) recommended within the general strategy recommended by the most 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 all maritime stakeholders to further improve safety and efficiency in the Ports of Honolulu and Barbers Point Harbors on Oahu, Hawaii.

Appendix A

Honolulu and Barbers Point PAWSA Workshop Attendee List

Participants:	Organization	Email Address
BM1 Travis Araki	USCG 14 th District, Waterways Mgmt	Travis.H.Araki@uscg.mil
Mr. Charles Barclay	Kewalo Basin Harbor Agent (Fishing)	kbh.harbormaster@gmail.com
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Mr. DC Carter	Pacific Environmental Corporation	DC@PENCO.COM
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Captain Richard Davison	Star of Honolulu (Paradise Cruise Ltd.)	Rdavison@starofhonolulu.com
LTJG Cody Dunagan	USCGC WALNUT (WLB 205)	Cody.B.Dunagan@uscg.mil
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Battalion Chief Jeff Farris	Honolulu Fire Department	jfarris@honolulu.gov
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Mr. Don Grimes	Grace Pacific Corp (BP)	
Mr. David Gulko	DLNR, Division of Aquatic Resources	David.A.Gulko@hawaii.gov
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Mr. Roger Stone	USCG Auxiliary	RCStone1@juno.com
Mr. John Thielst	Tesoro Hawaii Corporation (BPDDH)	John.W.Thielst@tsocorp.com
Mr. Patrick Tom	U. S. Army Corps of Engineers	Patrick.Y.Tom@usace.army.mil
Mr. Arlen Walsten	Pacific Ocean Producers (POP-Fishing)	arlen@pop-hawaii.com
Mr. Keoki White	P & R Water Taxi	
MSTC Dustin Widman	USCG Sector Honolulu, Response	Dustin.T.Widman@uscg.mil
Mr. Logan Williams	State of Hawaii Harbors Division, Kalaeloa Harbor Agent	
Mr. Roland Zwicky	USCG Auxiliary	Roland.M.Zwicky@uscg.mil

Facilitation Team:	Organization	Email Address
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Appendix B

Workshop Participants - Observations, Trends and Existing Mitigations

Deep Draft Vessel Quality

Today:

- The age is medium for the majority of deep draft vessels, generally about 5-10 or 8-10 years old.
- Passenger vessels and tankers tend to be brand new or relatively new.
- Research vessels tend to be older.
- Occasionally there are some new ships with horrible crews, as in a recent event. If the ship was older, the accident could have been more severe.
- Communication with Chinese crews is virtually nonexistent.
- Filipino crews seem to be proficient, fast, and efficient, but lack fluent English language skills.
- Maritime-related English skills are often very good among foreign crews. They may have a lot of difficulty understanding English in high stress situations. When something goes wrong, communications really drop off.
- There are relatively small Korean-style “mother ships”, around 300 feet, which leave the area and service long line boats along the equator. Many of these small mother ships are on their “last leg”. This is unusual in terms of tankers. There are about 2 or 3 of these vessels per month out an average of about 217 tankers per month. Every time it moves, the risk level is elevated.
- Scrap steel vessels used until they are scrap themselves, but recently they are often found to be newer.
- With vessels that don’t intend to call on Honolulu, but end up there as a port of refuge, for example, the vessel quality can be very low.

Trends:

- Bulk ships overall condition is getting better and better.
- There is a trend in deep draft vessel crews that they are getting better in general from the point of view of local pilots.
- Workshop suggestions and additional mitigations were voiced often during off-topic discussions.
- Putting a current meter off Kalaeloa or installing Physical Oceanographic Real-time System (PORTS) in Barbers Point Harbor might help to mitigate risk.

Existing Mitigations:

- Every foreign vessel gets prescreened.
- Local deep draft vessels are inspected annually in dry dock.
- Vessels coming in from offshore are boarded offshore if considered to be a risk, but that is rare.
- Maritime industry does well with reporting vessel casualties to the Coast Guard.
- CG posts notices to mariners with conditions to waterways, so deep draft vessels know what they’re dealing with.
- Biggest single improvement has been that Hawaiian Tug & Barge and Sause Bros. have more tractor tugs.
- After the Cape Flattery grounding, a pilot was put out there on the west side of the island specifically for Barbers Point jobs.
- After the Cape Flattery grounding in 2005, we joined in with Marine Exchange in San Francisco to encourage implementation of a statewide AIS system.
- From the tug assist side, harbor tugs now have AIS.
- Technology such as iPhone allows bringing up a website while on the dock in the harbor or on a boat that helps coordinate movements and operations, or check current meter results.
- Maritime Stakeholders are working with NOAA to install a pipe gauge and a current meter to give real-

time current tide readings.

- AIS cuts response time down to about 90 minutes, versus 2.5 hours previously.
- Tugs and barges can go into Barbers Point Harbor at night, but not large ships.
- Army Corps did a simulation study about night entry into Barbers Point Harbor and it results showed a high level of groundings would occur.
- Salinity of water changes how low in the water a vessel sits, resulting in an inch or two deeper. Fresh water run off does not flush out with the tide as much as it used to.
- There is a large margin of error caused by many estimated factors in even a high-tech system. When a ship is loaded in Indonesia and 12 days later after burning fuel and ballasting comes into Barbers Point Harbor, he's giving an estimate, which is usually a pretty good estimate, but sometimes they load up all the way figuring they're going to come in on a good tide, but they plan to come in no matter what the tide. Ships keep getting bigger and wider, narrowing the margin of error, but the Barbers Point Harbor stays the same.

Shallow Draft Vessel Quality

Today:

- For the most part, shallow draft vessels are operated by locals with a good knowledge of the area.
- On passenger vessels, particularly tour vessels, the pay is probably fairly low (maybe \$20/hr) for captains, which may lead to low quality captains.
- Passenger vessels and research vessels are generally in good condition.
- On passenger vessels and research vessels, crew fatigue and language barrier are minimal.
- There are many parasail boats that operate near Honolulu Harbor. They are a constant source of near misses for commercial traffic, especially large and less mobile vessel configurations. Parasail boats shouldn't be near any harbor entrance. The pay is said to be low for parasail captains, so the skill level is low. Also, they appear much more likely to break rules than most other captains. Owners of parasail operations should take more responsibility in finding out what the navigational rules for shipping lanes and attend maritime conferences and workshops such as this.
- Larger offshore recreational platform vessel(s) transits Honolulu Harbor on a daily basis. When outside the harbor, these types of vessels (s) are supposed to operate at least 3NM offshore. Yet, some have historically flaunted the 3NM rule or skirted the rule when possible, and so it is predicted to be operating less than 3NM offshore. This increases the risk of an accident. Offshore recreational platform vessel(s) should remain beyond 3NM and not operate in the shipping lanes.
- Less regulated industry generally has a lower skill level.
- Off-shore aquaculture cages are relatively safe in themselves. However, their method of operation in tending to them, are less safe. The bottom drops off quickly very close to the shore, within 3 miles, so aquaculture cages are very close to the shore, relative to other locations. Broken away cages have also been a navigational hazard in the past.
- People on the economic fringe appear more a source of risk.
- Canoes are extremely maneuverable. Yet, Molokai season practices are going past dark and they don't have lights or reflective materials which makes it impossible to see them in and around the commercial shipping lanes and harbor entrances.
- Many shallow draft vessels are not regulars, such as auxiliary cargo vessels, transient tugs with or without barges, and school ships.

Trends:

- Large luxury private yachts are increasing in number.
- The number of shallow draft vessels is going up.
- Aquaculture cages on Lanai and the Big Island are increasing in quantity.

Existing Mitigations:

- Tow boat industry is starting to do some voluntary regulatory inspection compliance.
- The two major tow companies are member of AWO, and at least one is going beyond minimum standards.
- The third largest tow company is not a member of AWO but is generally low risk.
- Tows are generally low risk, but parasail boats raise the risk of this category.
- Six-passenger vessels do not need inspections but are subject to random testing and some licensing requirements.
- Major tug companies are voluntarily putting AIS transponders onboard..
- The chartering company can have a strong effect on tugs.
- Some companies have a vessel security plan, non-tank vessel response plan, EPA permit to let engine water go overboard, and are generally participating in a number of government programs to ensure safety.

Commercial Fishing Vessel Quality

Today:

- There are about 123 fishing boats active in Kewalo. Primarily long-line fishing boats at Piers 16 and 17 and commercial fishing areas at Piers 35-37 in Honolulu Harbor.
- About one-third are Korean boats fishing for tuna, about one-third are Vietnamese boats fishing primarily for swordfish. The last one-third of the local fleet speaks English as a first language.
- Many fishing vessels are captained by the owners. There is often a captain and 3 crew members per voyage.
- Currently there is a substantial language barrier with Korean and Vietnamese vessels.
- Foreign crews are mostly Filipino today. This increases the language barrier issues on mixed crew vessels.
- Filipino crews are usually very knowledgeable in commercial fishing, but not as knowledgeable in terms of being a prudent mariner. Sometimes even the captains lack an understanding of what it takes to get a boat away from a pier.
- Average trip for these boats is less than 6 days out and 6 days back, usually 3 days, and coming back is when repair maintenance is usually done. Preventive maintenance is seldom. They tend to fix problems when gear breaks.
- Coming into Honolulu Harbor one can usually see 6-9 fishing boats per day, but 10-12 boats or more is not uncommon.
- Fatigue is strong. The day on a commercial fishing vessel may start at 5-6 AM. Setting baited hooks takes about 3 hours. Around 6-7 PM they start hauling up 65-miles of monofilament nets that cover about 25-30 miles distance across the surface. So, hauling can take 6 to 10 hours. Sometimes until 5am. Transit in and out of the harbor is what presents the greatest risk, not the fishing itself.
- No licensing is required on commercial fishing boats. Out of perhaps 200 boats, probably 35-40% have a license, generally not Vietnamese and Koreans. Most boats with crews that speak English as a first language have a license, partly because of insurance requirements.
- Commercial fishing vessels are right in the midst of the rush-hour harbor traffic, about 2000 trips per year.
- In the statistics of small vessel groundings in the last 10 years, and especially in the last 4 years, long liners running aground are prevalent. They have unsecured hooks and line, and pose many kinds of hazards, environmental and otherwise. This is a unique risk hazard.
- There are fishing vessel collisions with the terminal and buoys, from 6 near misses to 2 collisions over the last 10 years.
- Fires are probably most prevalent on commercial fishing vessels than on others, 2-3 per year. This would not be reflected in MISLE data.
- In the mid to late 1980s, the majority of fishing boats were Vietnamese shrimp boats from the Gulf.
- Currently, only 123 of 150 commercial fishing vessel permits for Kewalo Basin are active.

- There is environmental degradation in the harbor due to urination and sometimes oil.
- In addition to a language barrier, there is also a culture barrier. Filipino and Micronesian crews working for a Korean or Caucasian skipper often don't want to tell the skipper when he's about to make a big mistake.
- The unforgiving reef lined entrance into the harbors increases the risk especially for fishing vessels.
- Safety drill instructor training and safety drills on the boats reveal that if you can get through to the crews, they would definitely like to know what's going on, but the captain doesn't often communicate with them about safety and maritime topics.
- Most of the people that own these types of vessels have a very small fleet, not making a lot of money. Sport fishers are small passenger vessels. This area has a large percentage of sport fishers. They're considered commercial fishing vessels, but they operate very differently from large long line boats.
- Single-day fishers and long line fishers are very different in terms of fatigue. There are 40 charter fishing vessels in Kewalo Basin. These are generally well maintained boats with low crew fatigue. English is generally the first language of the captain and the crew.
- There is often an average of about 50 vessels but about 18-100 vessels, depending on the events going on. Charter vessels will have lulls when vessels fish the other islands, then surge when they return.

Trends:

- Most of the commercial fishing is local owned and we have communication issues now. So, as foreigners continue to migrate into these jobs, we will likely see an increase in language barrier issues.
- There has been a lot of turnover in fishing boats over the last 5 years, some of which are sold to foreign nationals for use locally.

Existing Mitigations:

- To bring a boat into Pearl Harbor voluntary auxiliary and commercial fishing vessel exams from the Coast Guard are mandatory. 20% of boats have an observer assigned. Virtually all of the vessels have a current decal.
- Some decals have been found expired in Kewalo Basin, and subsequently renewed.
- Insurance is required for commercial fishing vessel permits.
- Things are going well in terms of inspections, although sometimes there are no assets available to get the inspections.
- Fishing vessels have satellite base transponders, initially advocated in the 1980s by the Fisheries Management Council, although that doesn't communicate with AIS, and fishers don't like their prime fishing locations to be known.
- There is a commercial fishing vessel group that represents all Hawaiian long liners. So, there is a line of communication. Vessels 69-feet and longer sometimes have stability tests.
- Most of the fisheries in the continental U.S. require that crews are no more than 25% foreign. Here only one U.S. master is required.
- There is an active boarding program.

Small Craft Quality

Today:

- There is a private harbor / marina with private vessels and tour vessels which use the Honolulu Harbor entrance. They don't necessarily follow the rules going in and out.
- Vessels sometimes sink at moorings, more than is reflected in the workshop data. Many boats are in bad shape since these vessels that are people's primary residence become neglected if they become indigent or are doing poor economically.
- Paddlers' knowledge of the rules of the road appears limited.
- Sailing between barges and tugs has occurred. It appears some individuals consider it a sport.
- Generally speaking, small craft operators are poor in quality in terms of knowledge.
- The Coast Guard is focused on this small craft subset in terms of risk.

- Currently there is no vessel insurance requirement in the State of Hawaii for all non-inspected watercraft.
- Kewalo Basin saw a lot of derelict vessels and has instituted an insurance requirement.
- There has been a doubling in the last year in the amount of small boat ventures, which has also transited from residing in Waikiki to Barbers Point. This is mostly non-commercial, families renting boats and diving, in what they've heard are very nice, and open to anything, waters.
- State of Hawaii's DLNR marine officers are focused on marine enforcement. There are not a lot of people to enforce state regulations on boating and boating safety.
- Many people are trying to supplement their diet by fishing due to the poor economy.
- Private marinas are warning their users to stay clear of the commercial traffic at Barbers Point, which has made it fairly safe. Of course that could change along with changes in management.
- Education is not currently mandatory, unlike in most States. Most people doing optional training do not know sound signals or lighting configurations at all, though often have lots of local environment type knowledge like currents and weather, and are otherwise very safe.
- Security zones in Honolulu Harbor are getting a lot of jet skis that know nothing about traffic schemes. Barbers point is seeing a similar increase in jet skis.

Trends:

- Ko Olina had a private ramp that was required. A number of years ago they discontinued its use. A public ramp will be going in there again soon. So, conditions will be different than in the past 4 years. Increased ramp ability should result in recreational boats using it because it will be one of the most advantageous take-off points.
- Small vessel traffic will probably continue to grow around Honolulu Harbor as the economy improves, shifting away from people trying to supplement their diet by fishing, but increasing in terms of recreation.
- There are 3 large marinas currently. At Ocean Point, there will be a big marina opening up next year, which will cause much more traffic. The harbor will be new, so risk will be very high in the beginning. This will cause a lot of crossing traffic in front of Barbers Point.
- There will be an increase in jet skis (rather than larger vessels) around Barbers Point and more fishing to supplement people's diet until the economy improves.

Existing Mitigations:

- There are boating safety courses generally through community colleges and yacht clubs, from the sailing & power squadron and the CG Auxiliary, as well as, miscellaneous other locations, totaling about 100 per year.
- Honolulu fire department provides resources and response.
- The Coast Guard with the State of Hawaii has conducted numerous drills and coordinated outreach efforts to duly inform the public.
- VHS radios have been required for about 4 years, which mitigates the risk.
- Water safety personnel with jet skis are often the first responders.
- Radio and TV stations do a good job of warning the public about conditions.
- There is a new system that allows triangulation of cell phones and transmission to the Coast Guard.
- There is strong community support for responding when they're in the area and official responders are not in the area.

Volume of Commercial Traffic

Today:

- A lot of deep draft movements were observed in the Barbers Point area, with peak years in 2003 or 2004.
- Commercial traffic is about 5,400 transits per year, not including shifting vessels around, and maybe 15-20,000 transits total
- Tug and tow sector movements are huge. There are many oil barges between Honolulu and Barbers Point and inter-island as well.

- Offshore Supply Vessels (OSVs) are not prevalent.
- There are 3-4 small vessels per hour from the small harbors around Honolulu Harbor which adds a lot of traffic and increases the risk of incident to the Honolulu Harbor entrance approach and shipping lanes.
- NOAA ships have moved to Pearl Harbor. The UH ships will remain inside Honolulu Harbor at Pier 35.
- Overall cruise ship traffic is still very low but expected to increase during economic booms.
- There are 40-60 barges per month at Barbers Point.
- The Super Ferry and The Boat between Barbers Point and Honolulu Harbor have discontinued operations.
- This workshop's statistics and statistical charts are based on data from the Coast Guard's Ship Arrival Notification System (SANS). The Coast Guard uses SANS to track vessels arriving internationally that are over 300 gross tons. Around 2,500 inter-island round trips per year do not entirely appear in the SANS data.
- Ports Authority – Harbor Master can provide more complete arrival/transit data than SANS.
- Different types of commercial deep draft vessels should be broken out into different sections. Container ships are not as bad as cement ships, for example.
- Overall traffic volume for Barbers Point has leveled off somewhat. However, the overall traffic congestion is still increasing, despite the economic downturn.

Trends:

- Once the rail transit comes to fruition, construction-related traffic could increase considerably, around Barbers Point in particular as resources for the project flow in.
- Private research vessel traffic is increasing.

Existing Mitigations:

- There is an established, prioritized process used by the watchstanders in Aloha Tower.
- Security zones help control volume within the commercial harbors.

Volume of Small Craft Traffic

Today:

- Small craft traffic is very large and diverse.
- Traffic heightens in the summer, but is relatively constant.
- Humpback whale season increases smaller commercial tourism traffic. This is mostly vessels that have changed their mission rather than additional new vessels.
- The number of recreational vessels hasn't changed that much, except that when Ko Olina was introduced there were more slips, about 14,000.
- Friday night sailboat races drastically increases traffic and have caused a lot of close calls over the last 7 years that they've been conducted. They use Federal channel buoys as turn markers.
- There is an 800-slip small boat marina at Kewalo Basin.
- Boat slips and launching facilities are increasing in number because they can be put anywhere.
- Ala Wai just opened up 380 slips and is renovating 100 more.
- Kewalo Basin will have over 100 additional slips.
- Keehi will have possibly 500 additional slips.
- More boats may be seen in the smaller harbors than are actually out in open waters. Many are derelict and used as stationary primary residences.
- There are sometimes surfers across the channel entrance, which can obstruct traffic.

Trends:

- Kayak, jet ski, and paddleboard traffic has increased in recent years, outdistancing power boats.
- Work on the new marina at Ewa Beach has slowed because of the economic downturn. However, it will increase vessel traffic on the southern side of Oahu when it opens up.
- More slips are being built around the islands. The waiting lists for slips are becoming shorter.
- A racing cup event may return soon, increasing the volume of small craft traffic.

Existing Mitigations:

- In Honolulu Harbor it's pretty well known that recreational boats or watercraft can't come in, but not as well known at Barbers Point.
- Environmental conditions limit small craft traffic and the water tends to be rough once off shore.
- Hard work is being done by the Coast Guard, with the State of Hawaii on the permitting process and knowing where organized events are taking place, as well as, broadcasting this information to mariners.

Traffic Mix**Today:**

- Deep water is so close to shore, that different types of vessels are right on top of each other on a daily basis.
- Due to the design of most harbors in Hawaii, the recreational boats and commercial vessels are on top of each other, sharing the channel and/or basin, but not so in Honolulu Harbor.
- There is more recreational traffic than commercial traffic.
- The smaller basin in the west area of the Barbers Point Harbor is being shared by recreational and commercial traffic. Ko Olina Marina resides inside Barbers Point Harbor.
- There is a lot of non-vessel use that could interact with vessel traffic directly adjacent to the channel. People are paddling around to surf points, spear fishing, and using small boats to maintain research buoys.
- There is a high overlap of use in narrow bands of water at Barbers Point. The same is true for the Honolulu Harbor's main ship channel.
- There is a permanent security zone for Honolulu Harbor and its entrance channel.
- The Aloha Tower Watchstanders cannot see the far end of the Honolulu Harbor, so it is often uncontrolled.
- Some people, regardless of the security zone enter Honolulu Harbor via Keehi Lagoon area a little bit, then leave. Others go quickly through the area and if they not caught or identified, nothing can be done about it.
- In one spot, people can move legally but are still going over submerged pipelines, which is a risk.
- Anchoring is prohibited in a zone 150 feet on either side of the pipelines, but there has been physical evidence of anchoring, sometimes even anchors tied to the pipelines.
- Tesoro anchorage is the only well publicized security zone. However, requirements aren't generally posted anywhere for the common person or tourist to see and know.

Trends:

- [not specified]

Existing Mitigations:

- Hawaiian Ocean Safety Team (HOST) meets monthly and coordinates with the public and industry to mitigate issues.
- Diving problems outside the channel are being worked on by the State of Hawaii.
- Public education about whales is ongoing.
- Aloha Tower gives less priority to smaller boats.
- Rules of the road are fairly widely known for frequent harbor users.
- AIS helps to mitigate risk and congestion.

Congestion**Today:**

- There are definitely congestion issues.
- Kapalama Basin by design has become a bottleneck for cargo movements over the years.
- There can be virtually no traffic all day and then at 1800-1900 everybody wants to depart immediately regardless of what has been pre-arranged with the Aloha Tower.

- Many stakeholders did not make themselves aware of publicly available information about traffic movements. For example, a bunker barge is delayed in Honolulu Harbor and is supposed to be off the dock but isn't, so someone else can't get in before sunset. One cargo ship being late makes the next late, and a snowball effect occurs. The problem is inefficiency of scheduling and lack thereof and it ultimately costs the public in the end a lot of time and money, unnecessarily.
- Various movements of competing forces at the same time are dealt with by harbors scheduling with the agents. They do the best they can, but someone is always going to get stuck and wait.
- Harbor Vessel Schedulers/Watch Standers consider how to time as many vessels as possible, safely.
- If a window of time to transit the harbor is missed by 5 or 10 minutes, it may cost the vessel an hour and other vessels scheduled after them even more.
- There isn't one consolidated place for information and scheduling.
- When commercial fishing vessels come into Honolulu Harbor, they are assigned slips at a Pier, and the Harbor can become very congested with them.

Trends:

- With a good economic, congestion gets worst.
- As more resources are needed, Barbers Point will become more congested since Honolulu Harbor will be maxed out.

Existing Mitigations:

- Rules of the road are fairly widely known for frequent harbor users.
- AIS helps to mitigate risk and congestion.
- There is a lot of flexibility left to Aloha Tower to decide who goes first when there are scheduling conflicts. That works well 90% of the time.
- The harbor's scheduling policy is that no craft can stay at a pier, sitting idle.
- DOT Harbors' vessel prioritization helps with congestion.
- Bridge to bridge discussions has mitigated many bottlenecking issues.

Winds

Today:

- Winds are an important factor. Waves are more important in many areas.
- In some years, prevailing winds from the trade winds can be prevalent as little as 50% of the time, whereas in many other years these winds are perhaps 85% of the time. Kona storm (a storm from the south, southeast, or west) wind and waves are everything.
- Off Barbers Point there is muddy water out of Pearl Harbor and coming up the coastline. The reef cannot be seen. For large boats, this is not much of an issue. For recreational boats cutting across, it adds a factor to the complexity of the situation.
- In reference to the aids to navigation out of Honolulu and up to Diamond Head, "you kind of have to let the wind do what it will".
- Fairly strong trade winds (40 knots or more) from the north are less of an issue than southern Kona winds.
- When the wind is blowing northeast, it can get really windy, but it doesn't seem to change much with respect to ship movements. When there are strong Kona winds, however, ship movements are affected.
- Training would be very helpful for some of the less experienced boaters in the Barbers Point and Ko Olina areas.

Trends:

- [None specified]

Existing Mitigations:

- NOAA has buoys for weather prediction, which is pretty accurate in the short-term.
- All kinds of excellent reporting goes on and many people are involved. Webcams can be accessed through

the internet.

- There are strong tractor tugs that can deal with wind.
- There is a heavy weather plan.

Water Movement

Today:

- On the north slope of Barbers Point water movement is an issue.
- There are long shore currents that can have an effect on small vessels, kayaking, and surfing.
- Prevailing currents are east to west around Barbers Point and winds can get strong.
- Research to establish predictability of water movement in the area has provided no answers, possibly because of eddies flowing through.
- Water movements can be guessed at for a day or two at a time, but are unpredictable beyond that.
- There can be two different directions of current 20 feet apart.
- The current can alternate within 50 yards.
- About half the time, the water movement doesn't follow expectations, so that must be acknowledged when moving ships. The direction of the current at the cut of the entrance can be altogether different than the direction out farther.
- A boat can be anchored in one direction and move all the way over to the other side. If you're a recreational boat with a less secure anchor, you can find yourself in the channel.
- Around Diamond Head the water flows generally from east to west, but on a dead calm day, it can flow west to east.
- Sand has been spilling over the reef around buoy 4, so there's a shoal inside the main ship channel where it's supposed to be basin depth of no less than 45 feet.

Trends:

- [None specified]

Existing Mitigations:

- NOAA is deploying a monitoring system Statewide to gage tides and currents in certain harbor areas.

Visibility Restriction

Today:

- There is volcanic fog called "vog". Vog is less severe around Oahu than on The Big Island.
- Vog obscures buoys offshore, especially at night.
- Heavy rain squalls during the rainy season obscure buoys.
- Overall, there are no major visibility issues.

Trends:

- [None specified]

Existing Mitigations:

- Electronic Chart Display Information System (ECDIS) can give you a good idea of the situation.
- Vog is fairly predictable.
- Aids to Navigation for Honolulu Harbor are on 24-hours a day.

Obstructions

Today:

- Submerged and derelict vessels are a risk factor.

- There are numerous unlicensed, not lighted, uncharted buoys throughout the islands. Who owns them is often unclear.
- Fish aggregating devices placed by dive tour operators can be similarly risky.
- Offshore fish farms have been problematic when their seafloor securing systems have failed.
- Marine Mammal Sanctuaries Act is rather like an obstruction due to operating restrictions in those areas, and are generally avoided by commercial traffic. However, they have pushed recreational craft more offshore and into waters normally used as shipping lanes.
- Frequency of collisions/allisions with whales is disputed.
- Gill nets are set by very small unmarked boats near the reef, often at night, which can become ghost nets.
- Marine debris, most of which is not generated locally, is a risk.

Trends:

- [None specified]

Existing Mitigations:

- Notices to mariners are widely broadcast.
- Pilot boats are used as escorts for races.
- Certificate of inspection has references back to NOAA language so there's no question of lack of awareness.
- Work is being done to coordinate the removal of obstructions and there are temporary safety zones in place when a duration of time is needed to remove items.
- There is annual safety training related to whales.

Visibility Impediments

Today:

- Aloha Tower has no first hand, on site 24-hour watch at Barbers Point Harbor.
- In Kewalo Basin there are traffic lights (background noise) behind the range in the northern corner.
- The park between Kewalo and Honolulu Harbor has lights that change seasonally to red and green.
- The surf pushes Coast Guard positioned buoys into the channel frequently. Though they're still within their watch circle radius and are still within their accuracy range for that class of buoy, special care must be taken when maneuvering by them for large vessels and tug & tows.
- View of the Honolulu Harbor range can be blocked by large ships at Pier 1 when trying to get lined up while approaching from the east.
- The power has gone out for the Honolulu Harbor range. There is no way to light the ranges with emergency power. The range for Honolulu Harbor has fixed characteristics, not flash characteristics, so they are not solarized.
- The range for Honolulu Harbor is basically pretty good, however the ranges can't be seen during daytime squalls.
- Most of the harbors' Aids to Navigation are susceptible to going out when the island sustains a power outage to the main grid.
- The ranges would be used from 0500-0700 and 1600-1900, but not readily used outside those hours.
- In Barbers Point, there are two blind spot for recreational boats.

Trends:

- Lights along facility piers can be an issue to waterway users navigating at night, especially at Pier 1 near the entrance to Honolulu Harbor.

Existing Mitigations:

- The Honolulu Harbor Traffic Control Workgroup helps, such as dealing with the lights shining from Pier 1.
- The Industry Advisory Board helps open discuss between harbor users and works with HOST.

- Good industry partnerships help to ensure new terminals are designed so that problems from the past aren't repeated in the design.
- Good working relationship between Aloha Tower with pilots and tug operators at Barbers Point.
- ECDIS helps.
- New LED technology deployed has increased some Aids to Navigation ranges and removed the susceptibility to going out when the island's power grid goes down.

Dimensions

Today:

- Sometimes the dimensions are adequate for smaller vessels to pass each other.
- There is a shoaling area next to buoy 4 in the Honolulu Channel.
- The two Sand Island Bridges are permanently down, making the harbor inaccessible for all but very small watercraft.
- Barbers Point was designed for ships coming in at no more than 750 feet, and the ships coming in now are about 740 feet.
- In Honolulu Harbor the ships coming in now are over 1,000 feet, whereas the channel was originally designed for ships about half that length.

Trends:

- The two bridges being down and Kapalama Basin itself may be important in the future.

Existing Mitigations:

- Aloha Tower prioritization and scheduling protocols.
- Commercial vessel transits into Barber Point Harbor are "daylight only".
- Scheduled by the harbormaster's office (i.e. Aloha Tower), bunker barges don't generally go alongside another ship.
- Aloha Tower Watch Standers inform vessels of hazards during check in/out verbal communications.

Bottom Type

Today:

- From Diamond Head all the way up past Barbers Point and Honolulu Harbor, there is coral reef built on top of fossilized reef.
- In some places there is a sand and mud layer on top of coral reef.
- If someone had to drop an anchor in these areas, it is unclear what would happen. It would probably bounce along the hard bottom with a little silt on top.
- The bottom type is all mud around Kalihi.
- Honolulu Harbor has living coral reef inside of it.
- The side walls of some areas are also coral.
- Nothing really happens when a vessel touches the bottom of Honolulu Harbor within the confines of the basin/channel, but outside its hard coral.

Trends:

- The State's 2020 Plan may greatly modify existing dimensions of Barbers Point Harbor.

Existing Mitigations:

- The buoy system and generally good condition and standardization of aids to navigation reduce the risk.
- Admiralty law is being used by the State to protect coral as a resource by prosecuting offenders. There is a half million dollar fine for touching the bottom and damaging the coral reef, which is a deterrent to repeat offenders. It also raises awareness and attention to the issue, thereby helping to avoid it.

- Restrictions of load help to mitigate risk.
- There are better navigation systems now than in the past.
- There is robust bathymetric data.
- Pressure is being put on chief mate to do things within his control to be safer.
- When bottom issues come up, there is a mechanism to deal with things such as unforeseen high spots in the level of the bottom.

Configuration

Today:

- The State's maximum deep draft to harbor distance is 36 feet, now 36.6 feet normally, and the basin is 38 feet. Alongside the Pier, 1 foot is the safe distance, and in general in the basin it is 2 feet. In other parts of the country, this clearance is greater.
- Due to the configuration, outside the channel there's crossing traffic right in front of Honolulu Harbor. Outside the approaches, it's okay again.
- There is a lot of recreational traffic from the entrance to Kapalama Basin to the northeast end of Kalihi channel, which is made more risky due to the configuration of the channels.
- The design of the new pier in the area is being aligned with the idea that there may be a channel in the future, despite the current immobility of two bridges linking Sand Island to Honolulu.

Trends:

- The State's 2020 Plan may greatly modify existing dimensions of Barbers Point Harbor and could introduce another container facility to the most western end of Kapalama Basin within Honolulu Harbor.

Existing Mitigations:

- Local knowledge of harbor and their entrances limitations, as well as, vessel capabilities.
- Introduction of more powerful tractor tugs into the area reduce the risk.

Personnel Injuries

Today:

- The most likely scenario involves a dinner cruise boat incident involving fire or sinking.
- If a cruise ship is destroyed by fire or sinks, casualties could be 5,000-10,000.
- Movable items like bar stools around the perimeter of such vessels like the Kandoo Island could cause injuries.

Trends:

- Almost all injuries currently involve individuals unfamiliar with the vessel they are on (i.e. slips, trips and falls) and not something unduly happening to the vessel itself.

Existing Mitigations:

- There are permanent security zones set up around all high capacity cruise ships as a buffer between vessels.
- There are interoperable communications between harbor stakeholders. There is radio communication between the fire department dispatch, its shore units, and the Coast Guard.
- In Honolulu Harbor, catastrophe response assets are within the harbor itself.
- In Barbers Point the commercial side has 24-hour CPR-trained security to call the fire department, police, etc.
- The Area Maritime Security Committee has plans in place to minimize the effect of a catastrophe such as a sinking cruise ship.
- Airport Rescue and Fire Fighting (ARFF) has one ship covering each side of the reef to put a large number of lifesaving flotation devices in the water. One is sent from the Keehi Lagoon area and could go down to Kalaeloa Harbor if necessary.

Petroleum Discharge

Today:

- There are offshore moorings on the southwest side of Oahu. Offshore discharge could involve 30,000 barrels of oil.
- If a jet fuel tanker or an ethanol tanker, which has a gross tonnage of roughly 3,500 wedges itself in the channel, the assets to deal with a spill could possibly be stuck in Honolulu Harbor.
- A container ship losing power and going aground in the main ship channel is the most likely scenario, which would heavily impact Waikiki beach or Ewa beach/Pearl Harbor depending on the tides/current.
- There is a refinery at Barbers Point and an LPG terminal where barges are loaded. LPG ships generally do not come into Honolulu Harbor, just small fuel barges.

Trends:

- As the population of the islands increase and during upswings of the economy, the amount of fuel needed also increases.

Existing Mitigations:

- There are equipment plans in place to mitigate spills within the Harbor.
- Plans for Maritime Transportation System Recovery and Pollution Incident Response are in place and practiced regularly. There are also tabletop exercises and equipment deployment exercises.
- Oil companies do training beyond Federal & State requirements, such as inline inspection programs, hydrostatic testing, and discharge spot checks.
- Knowledgeable local third party cargo coordinators reduce the risk.
- Facilities provide in-place containment.
- There is first responder orientation with local Oil Spill Response Organizations (OSROs) and the fire department.
- The Coast Guard has spill response equipment. Buoy tenders have additional resources.
- On the commercial side, pollution prevention information is handed out, such as pollution placards and spill requirements.
- There is now better communication with NOAA observers on fishing vessels.
- Barbers Point has mandatory tug requirements to reduce risk.

Hazardous Materials Release

Today:

- There is a 5 to 6 mile evacuation area for a chlorine discharge, including all of downtown Honolulu.
- Containerized cargos are primarily offloading at Pier 51-53 as a weekly occurrence. Pier 39 and 40 involves the same cargo that just came off the ship.

Trends:

- In Barbers Point, a recent chlorine cylinder released some gas and nearby businesses were quickly notified door-to-door to evacuate. No one was injured.

Existing Mitigations:

- National Recovery Bureau offers a HAZMAT class, including blocking and bracing of materials.
- Stevedore training gives them the understanding of the dangers associated with moving cargo.
- Two major carriers have vast plans in place in case of a HAZMAT release, and have searched around for information on what else could be done.
- The fire department has great HAZMAT teams.
- Ships are required to send dangerous cargo lists ahead their actual arrival to Hawaii.
- Since 9-11, visibility of a potential HAZMAT release has increased, and public awareness has increased.
- The 93rd Civil Support Team helps mitigate the risk of a hazardous materials release.

- Standardized training (i.e. the Incident Command System, ICS) for industry and agencies means the same terminology will be used and themes will be understood when a multiple-entity response is required.
- Kalaehoa and Honolulu Harbors winds are generally blowing in the right direction to minimize risk.
- Most training is driven by Federal regulations that stress foreknowledge and checking for materials release before coming into port.

Mobility

Today:

- Something grounding in the main channel of Honolulu Harbor would be a catastrophic event.
- The islands' "hub and spoke" system results in about 95% of all commercial cargo coming through Honolulu Harbor. So, there would be adverse statewide impacts if mobility were disrupted.
- A vessel could hit a crane at Pier 51 and 52 (which did actually happen) and the crane could topple over into the Kapalama Basin. This would block and reducing or even shutting down mobility inside Honolulu Harbor. Luckily, this did not happen, but attention has since been given to this possibility.
- Due to the design, if you hit 1 crane, all 5 could plausibly collapse along the Sand Island side.
- The impacts to mobility are made more critical by the fact that many businesses operate on just-in-time delivery. In a very short duration, supplies could run out.
- About 60% of every container ship is loaded with food, so there is about a 4-5 day supply if mobility in Honolulu Harbor is shut down.
- In the case of catastrophe, changing the hub of the current hub-and-spoke system to another island would be nearly impossible.

Trends:

- If the State's 2020 Plan is adopted, Barbers Point volume of traffic could increase and Honolulu Harbor could see the addition of another container facility at the far west side of Kapalama Basin.
- An earthquake a few years ago greatly slowed harbor and airport operations until infrastructure safety checks were performed.

Existing Mitigations:

- Salvage and response plans at the State and Federal levels establish response protocols if something were to happen.
- The Area Maritime Security Committee has identified what it has available.
- A Statewide hurricane plan exists.
- Prioritizing needs should help if an earthquake occurs.
- The Pacific Tsunami Warning Center predicts tsunamis and is tested monthly. The public is accustomed.
- Disaster preparedness and recovery plans exist.

Health and Safety

Today:

- Depending on which way the wind is blowing, the impact on health and safety of the population for a chlorine discharge could be large.
- Hospitals run at about 97% occupancy. In the case of a major HAZMAT release, Oahu would rely on help coming from Federal resources on the mainland U.S. for medical assistance teams or resource stockpiles. Plans are in place to free up beds in the case of a major emergency.
- Terrorism-related mass casualties involve a lockdown.
- There is a portion of the population that ignores the warnings and continues to surf during tsunami warnings and even in oil spills.

Trends:

- As the economy grows in the islands, so does the population. The reverse is also true.

Existing Mitigations:

- The population is well informed and familiar with the local emergency communications system due to monthly tsunami tests of the early warning system and mandated radio and TV system tests.
- The commercial maritime community is also familiar with local Weather and VHF emergency broadcasts.
- Industry is aware and is as prepared as possible for a potential massive health and safety event (such as HAZMAT, tsunami, hurricane), but the public may not be as prepared.
- Because LPG vessels are refrigerated, it reduces the likelihood of an explosion.
- There are organized community responses coordinated with the Coast Guard. For example, Community Local Energy Action Network (CLEAN) designs disaster scenarios.
- With respect to the LPG situation at Kalaeloa (i.e. Barbers Point), there is a buffer zone requirement developed in the 1970s and 1980s wherein residential housing cannot be built within a certain distance of the LPG Piers.

Environmental

Today:

- If the environment is damaged, the economy is damaged for a lot of people.
- Water in Honolulu comes from the mountains. Hence, accidents in the harbor wouldn't affect drinking water but could have an effect in terms of cooling water and substance fishing, as well as, adversely affect the islands' number one industry, tourism.
- Keehi Lagoon between Honolulu Harbor and Pearl Harbor contains wetlands.
- There is a large native population with cultural and subsistence ties to the environment, this includes making strong use of seaweed and other natural marine resources.
- In Hawaii there is about 25% endemism of species (species found nowhere else in the world) and many of their recovery rates are slow.

Trends:

- Coral reef degradation has been on the rise. Most damage has been done by individuals unfamiliar with the area or just cutting harbor entrances way too close.

Existing Mitigations:

- In the last 2 years the State of Hawaii created a biologist position to inspect the hulls of vessels for invasive aquatic species.
- Use of dispersants for an oil spill is regulated near land because the dispersant is worse for the coral than the oil.
- Sewage spills can have worse effects than oil on marine life and this is at least recognized danger.
- There is a generally high level of recognition of environmental needs by the local community.
- Deep draft vessels have ballast exchange systems for dumping ballast water in the middle of the ocean to prevent invasive species from arriving in the old ballast water.
- Inspection requirements help mitigate risk.
- Intense training and IMO requirements help mitigate risk.
- Industry has changed very much in the last decade to prevent environmental damage.
- "Zero release" policies (which are less than legally allowed) help to mitigate risk.
- Grinding paint and metal in the harbor is not permitted.

Aquatic Resources

Today:

- Year-round fishing is a major aquatic resource.
- Shellfish are recreationally fished, but not commercially.

- Aquatic resources for tourism include the coral reefs, whales, monk seals which sun themselves year-round on the Waikiki beach area, and a large turtle population.

Trends:

- [None specified]

Existing Mitigations:

- The Oceanic Institute and the University of Hawaii have plans for restoring species after a disaster.
- NOAA has an injured animals facility.
- There has been an increase in scientific support on the Federal side.
- Better State laws and active enforcement to manage aquatic resources helps to mitigate risk.
- There is a long line exclusions zone around the main Hawaiian island out to 750 miles where fishing is not allowed. There is a monument where fishing is prohibited and entry other than transit is prohibited without a permit.
- The islands drop off in depth so quickly that there is a natural shelter for many commercially important aquatic species, not including seaweed and opihi.

Economic

Today:

- Grounding in the main channel of Honolulu Harbor would be an economic catastrophe.
- The “hub and spoke” system results in about 95% of all commercial cargo coming through Honolulu Harbor. So, there are adverse statewide impacts to the economy.
- A vessel could hit a crane at Pier 51 and 52 (which did actually happen) and the crane could topple over into the Kapalama Basin. This would block and reducing or even shutting down mobility inside Honolulu Harbor. Luckily, this did not happen, but attention has since been given to this possibility.
- The impacts to economy are made more critical by the fact that many businesses operate on just-in-time delivery. In a very short duration of time, supplies could run out in the islands.
- About 60% of every container ship is loaded with food, so there is about a 4-5 day supply harbors are critical to the economic success. Less on the neighboring islands that Honolulu Harbor supplies.
- In the case of catastrophe, changing the hub of the current hub-and-spoke system to another island was determined to be nearly impossible.

Trends:

- As the economy grows in the islands, so does the population. The reverse is also true.
- The State’s 2020 Plan if implemented has a number of expansion options for many of the commercial harbors.

Existing Mitigations:

- There is more storage capacity here than at most airports and backup delivery systems for delivery from the airport.

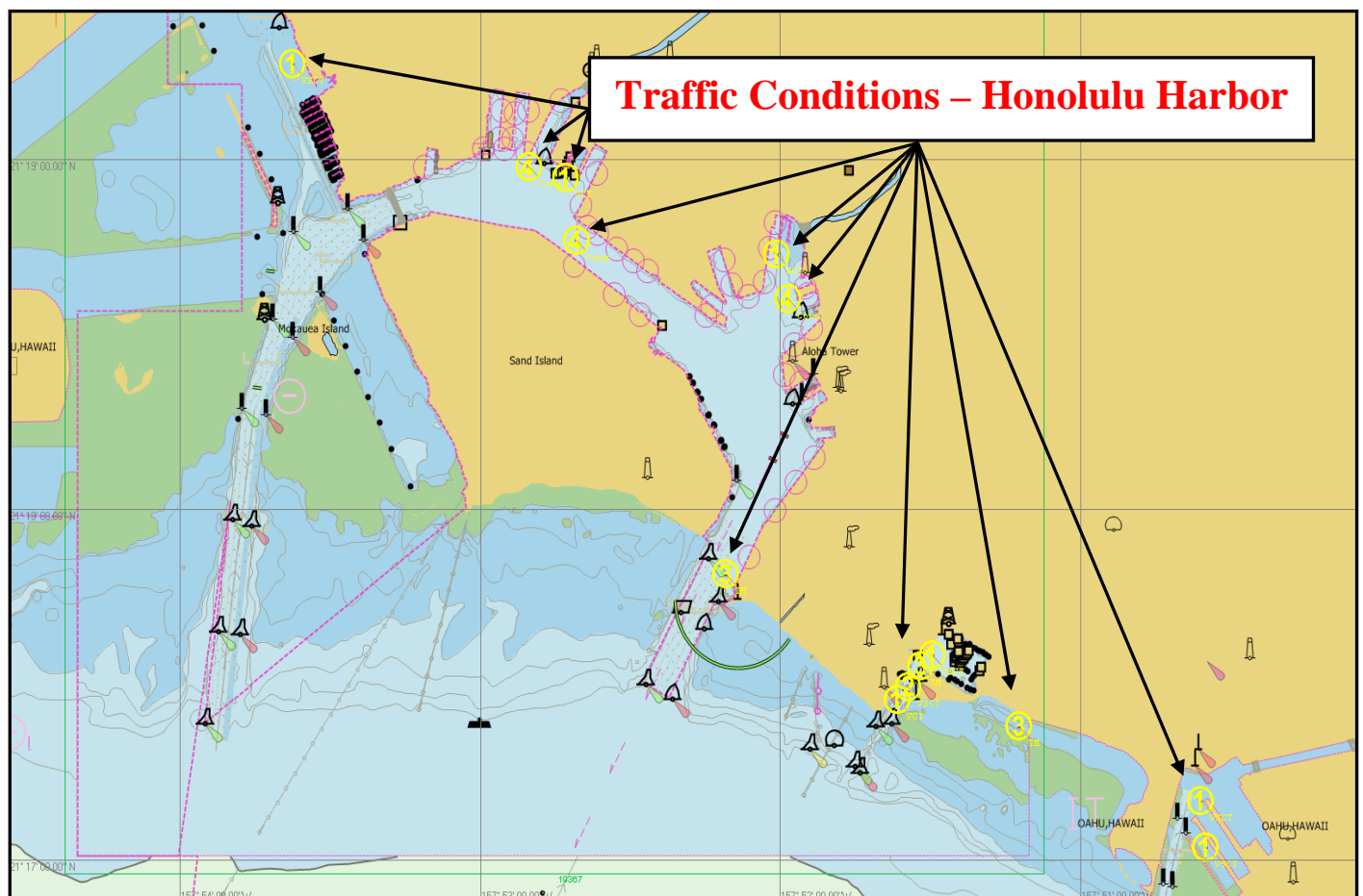
Appendix C

Waterways Risk Model – Risk Factor locations

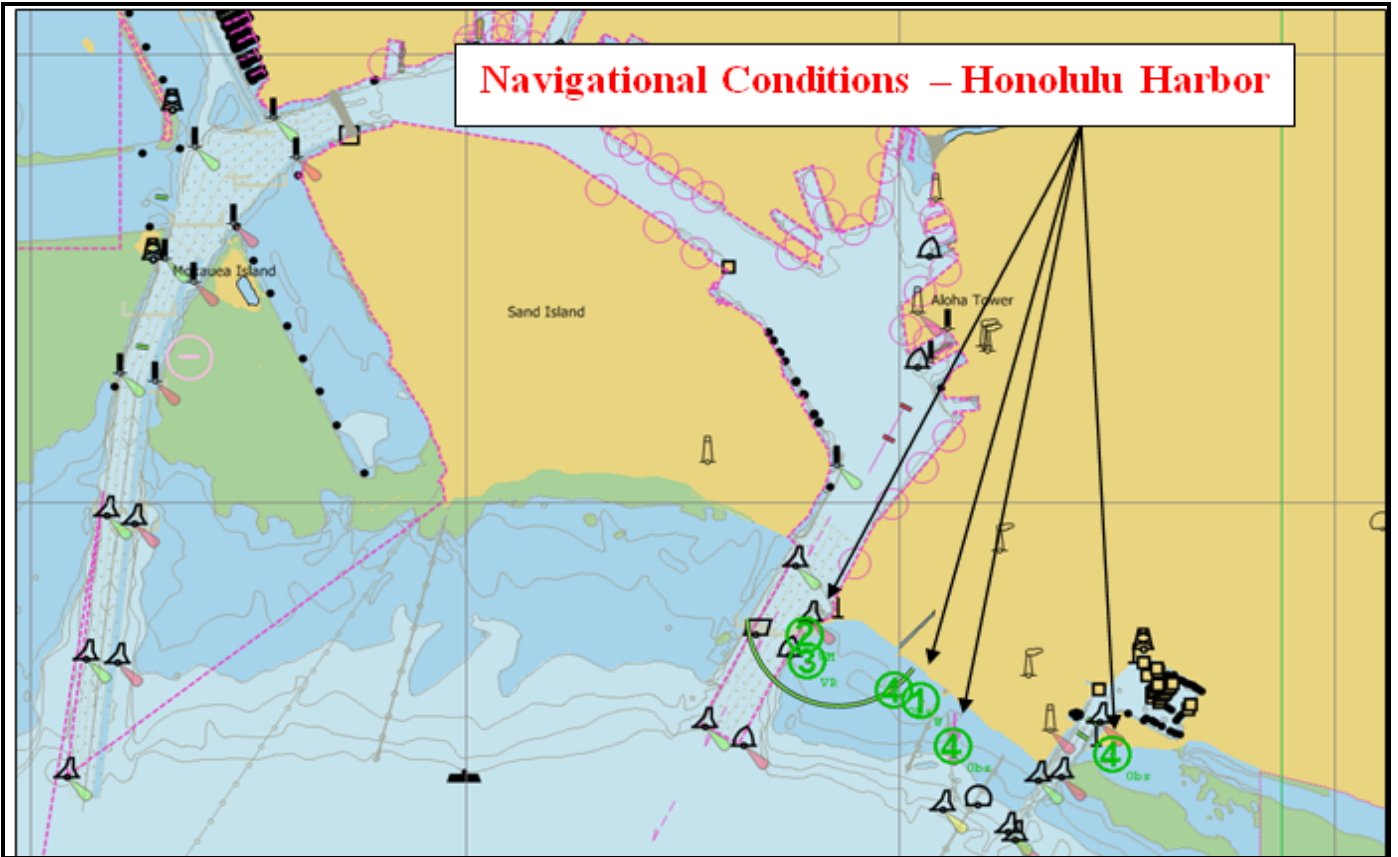
As participants discussed the Waterways Risk Model factors, an Electronic Charting System (ECS) was utilized to identify the specific geographic locations associated with the risk factors.

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

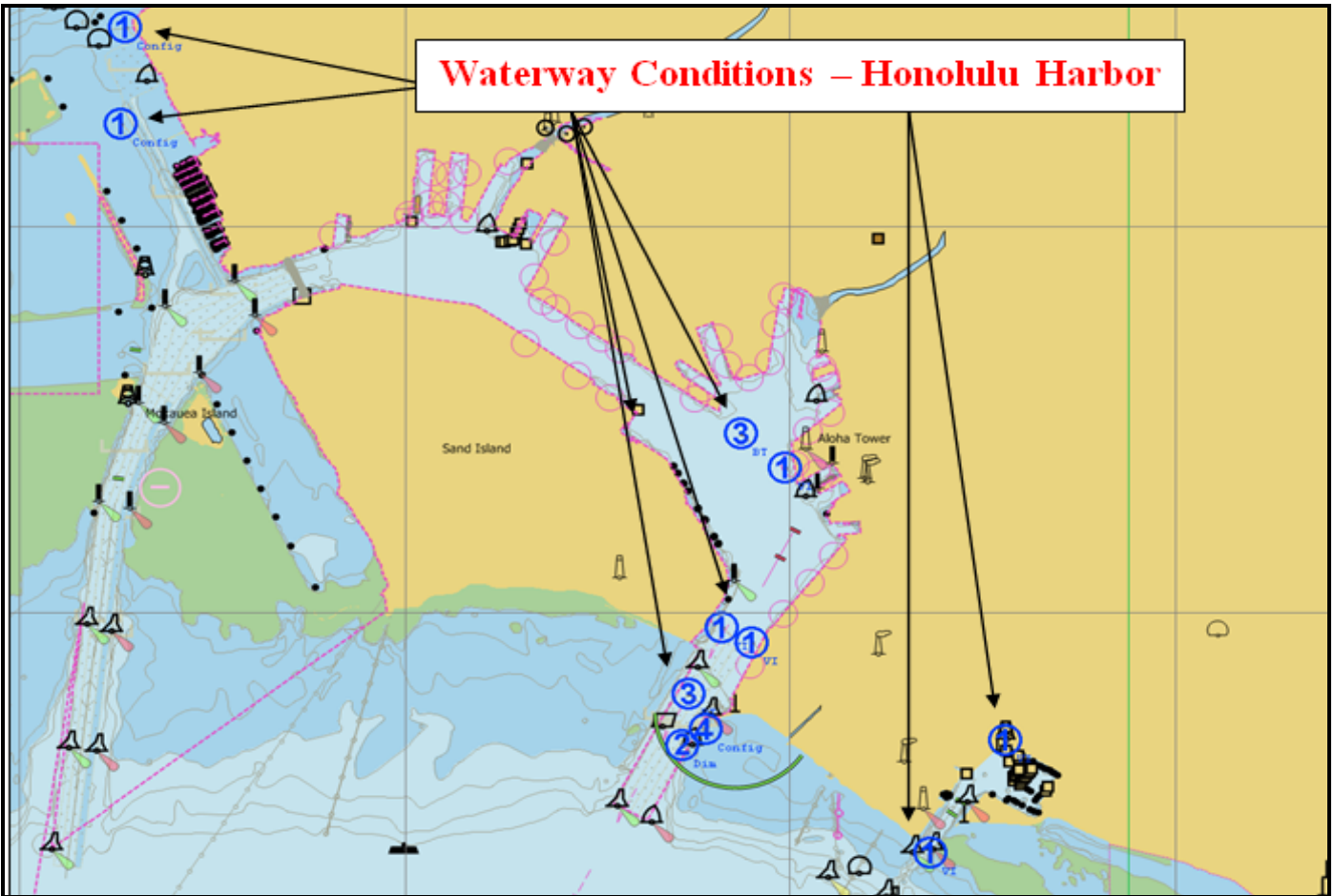
Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
1	Deep Draft Vessel Quality	1	Volume of Commercial Traffic	1	Winds	1	Visibility Impediments	1	Personnel Injuries	5	Health and Safety
2	Shallow Draft Vessel Quality	2	Volume 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

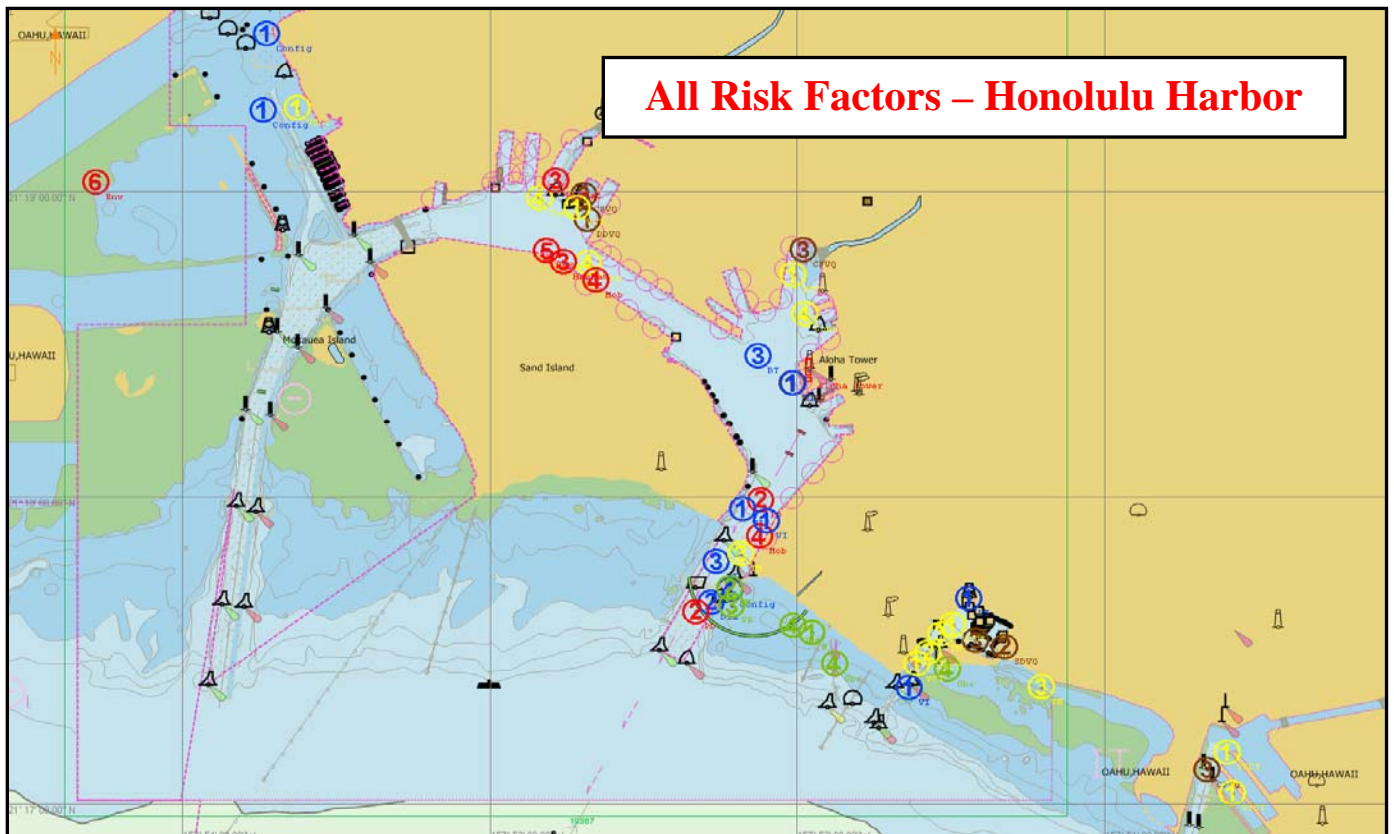
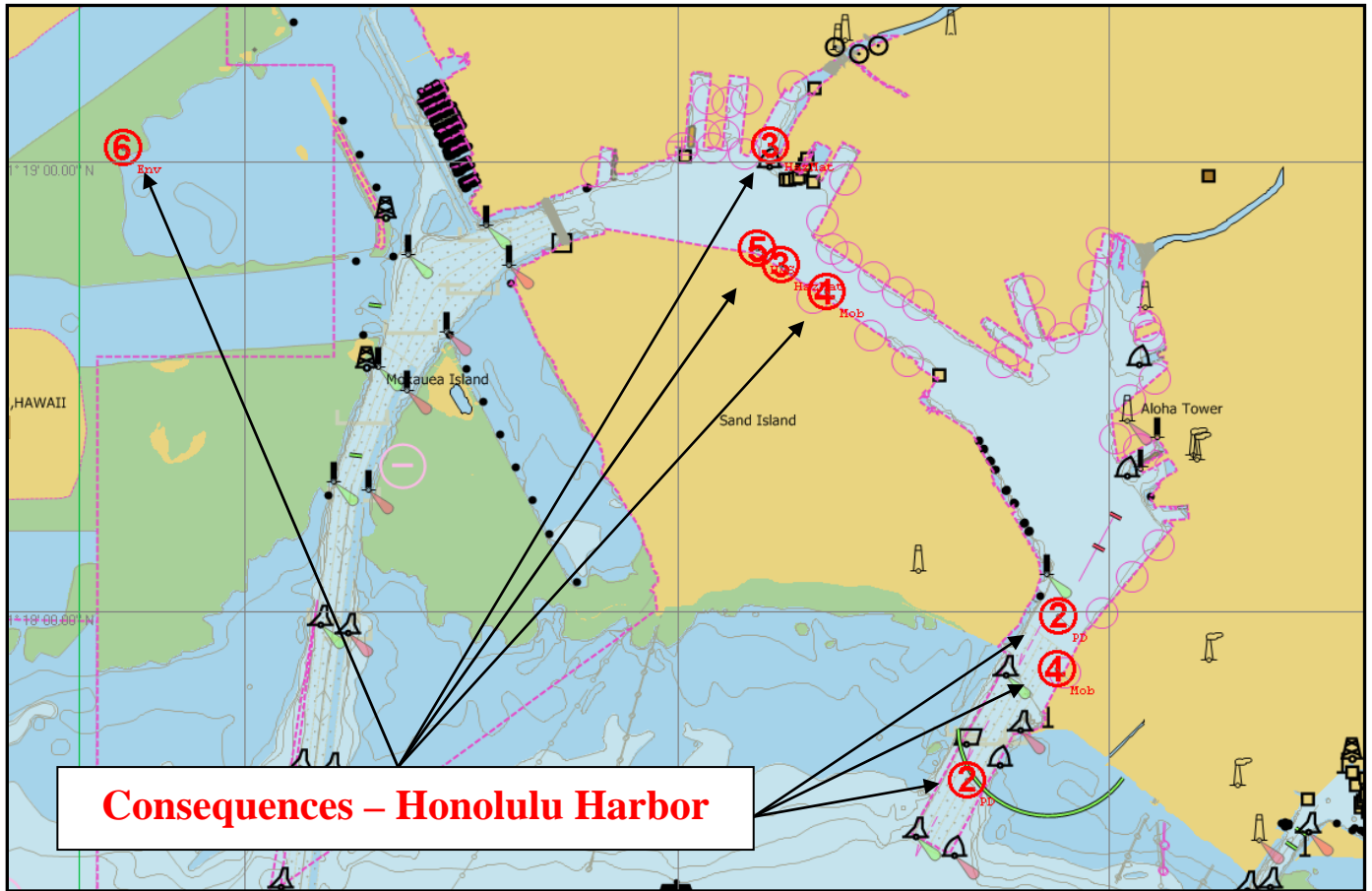


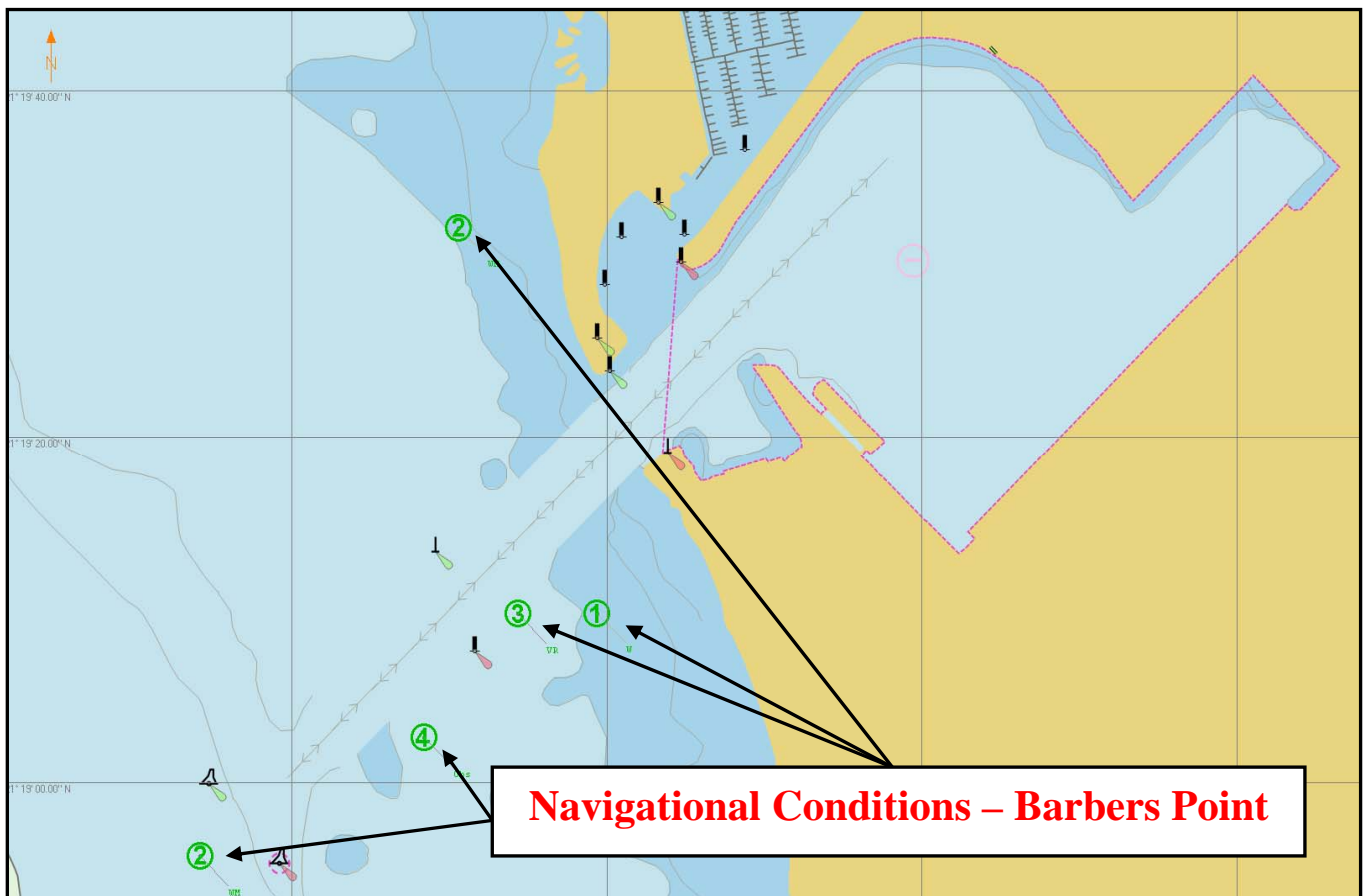
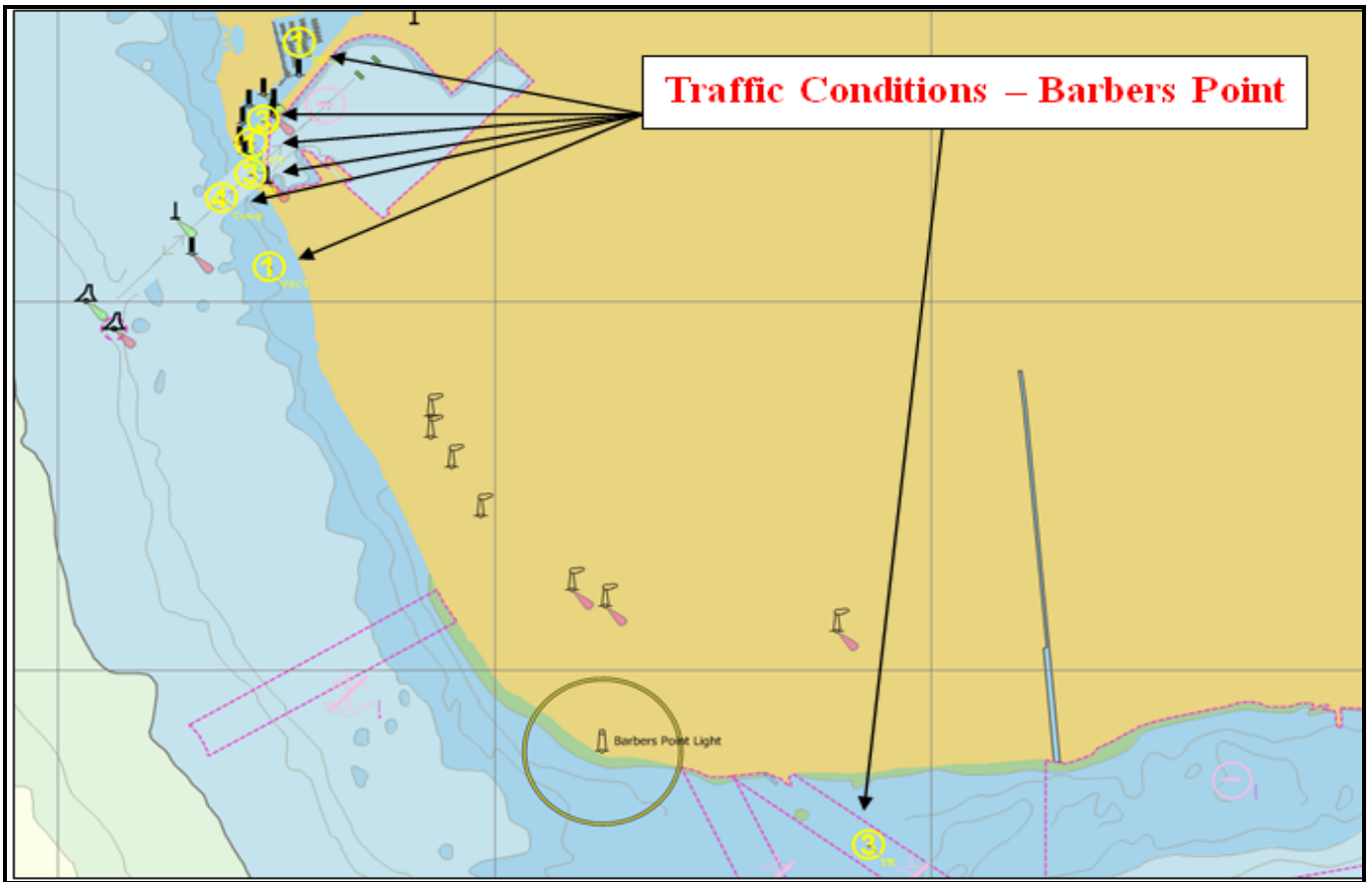
Navigational Conditions – Honolulu Harbor



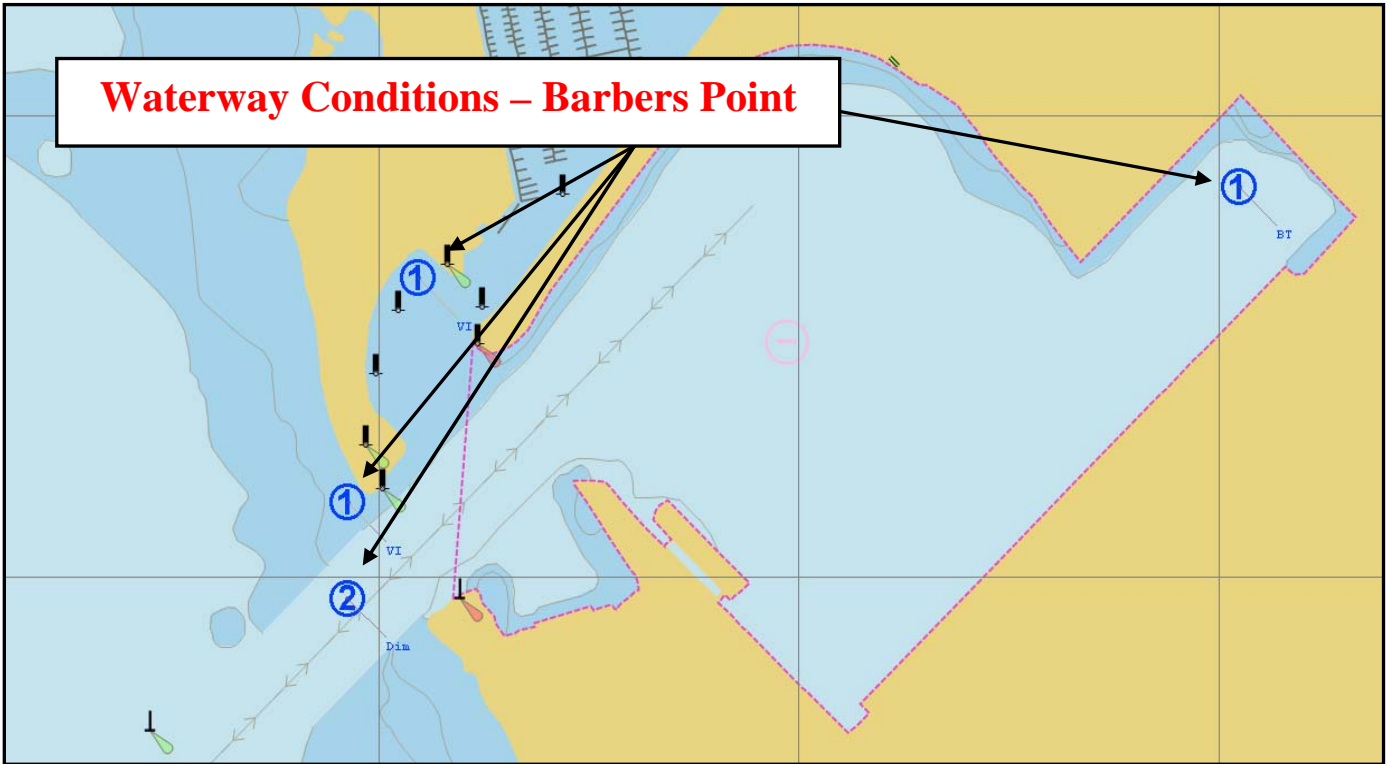
Waterway Conditions – Honolulu Harbor



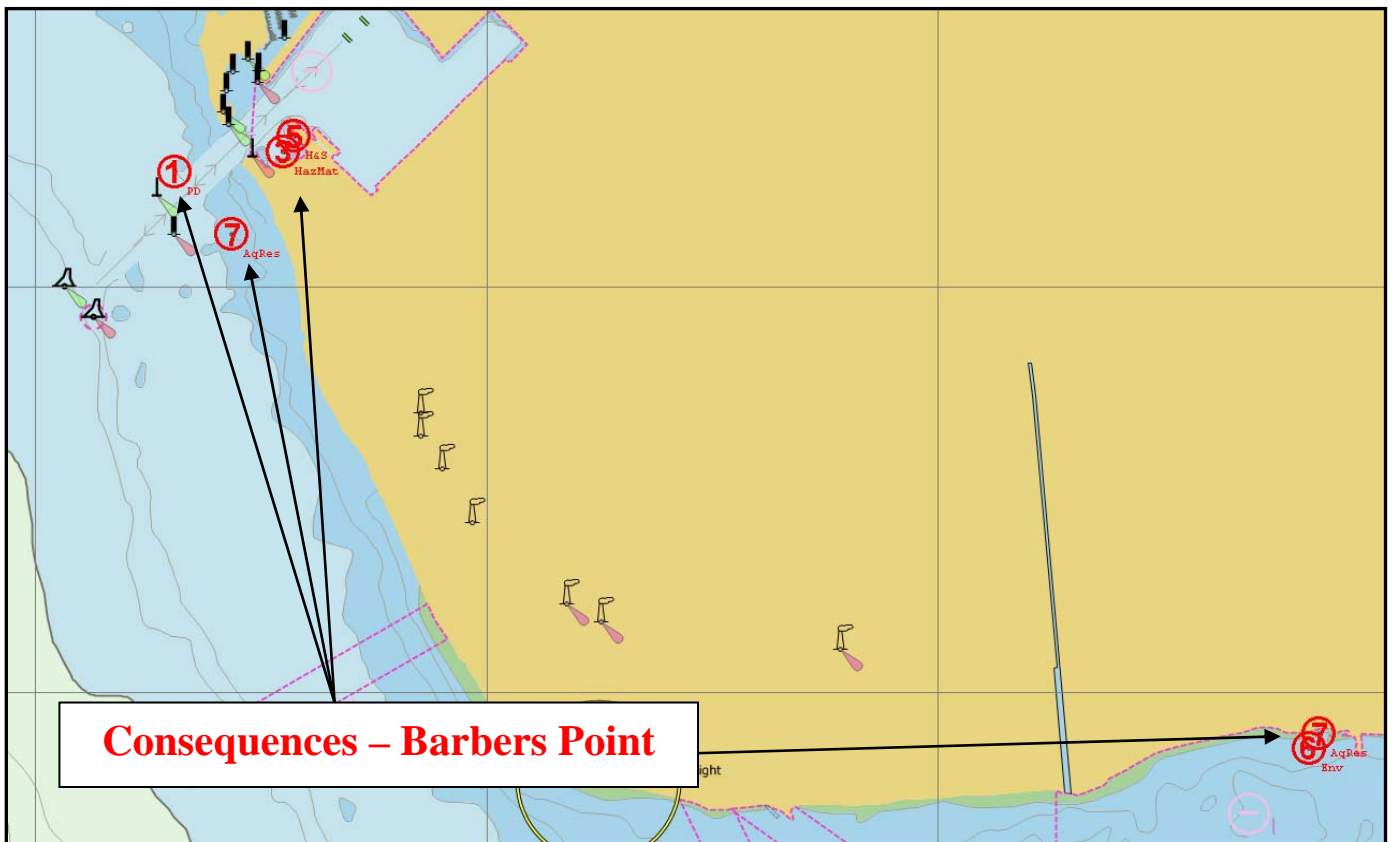


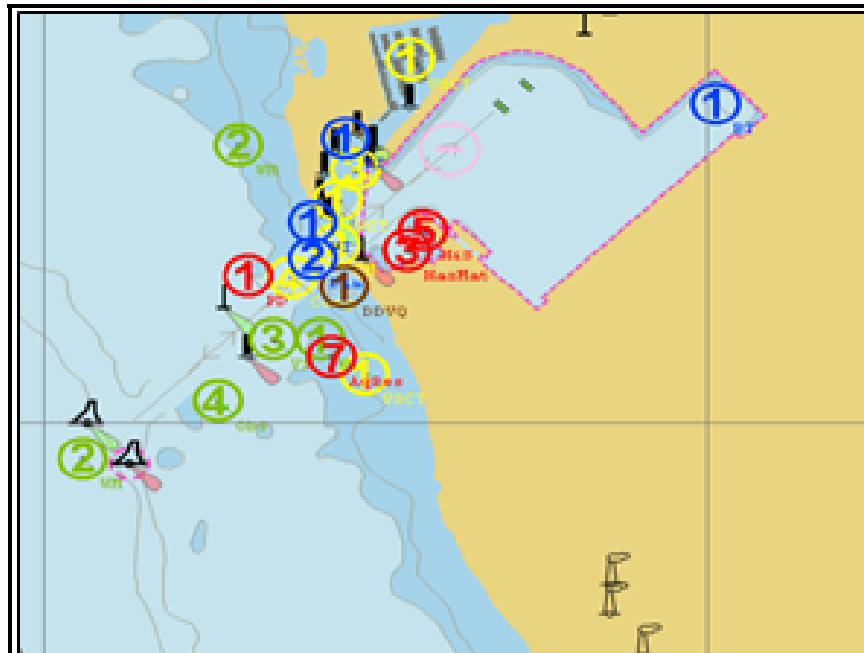
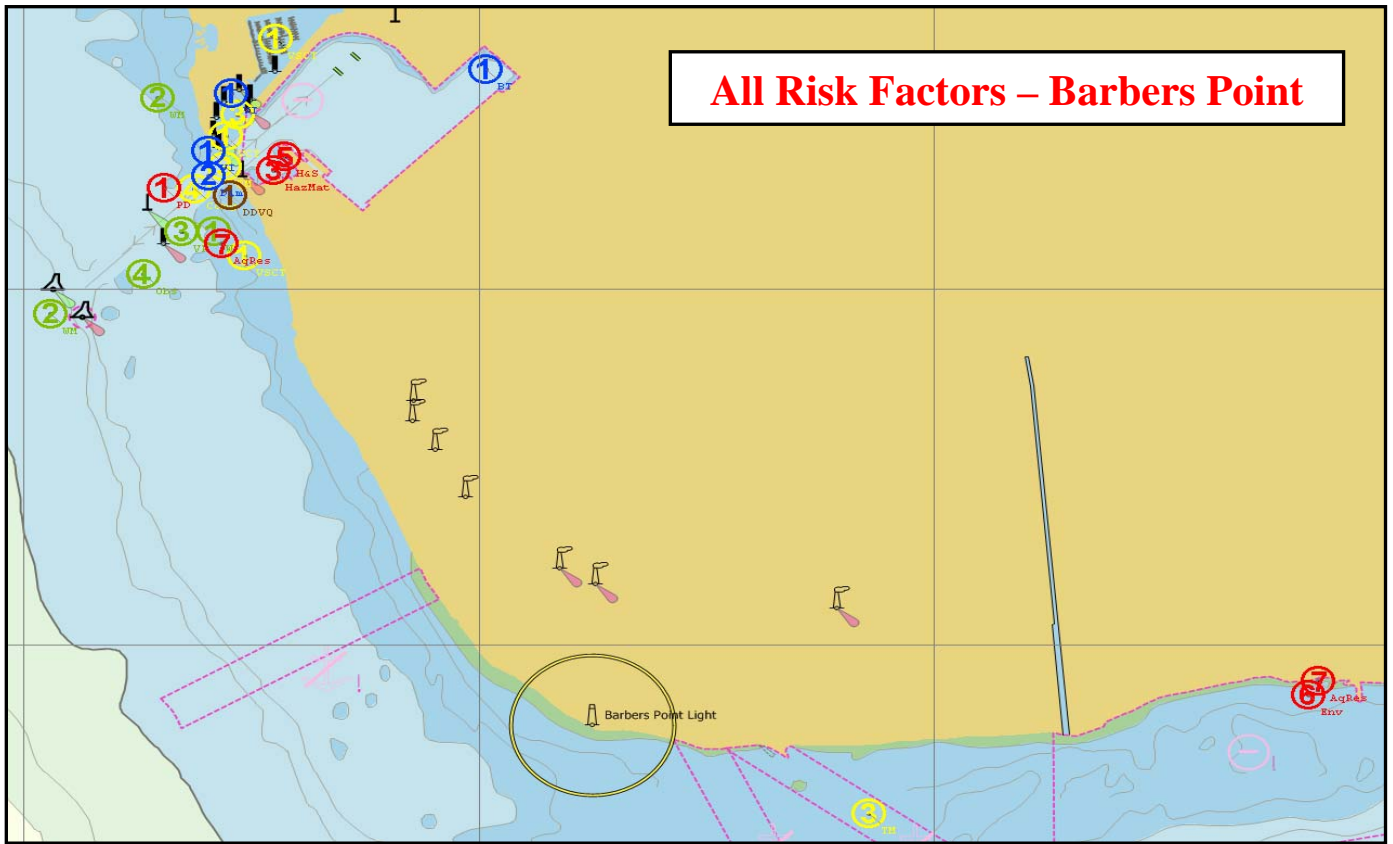


Waterway Conditions – Barbers Point



Consequences – Barbers Point





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 & 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

Commercial Fishing Vessel Quality

Radio Communication

- Bilingual requirement for vessel watch standers to speak understandable English and the language of crew (9)

Enforcement

- Make compliance cheaper than fines imposed (8)

Voluntary Training

- Training for captains and crew to ensure understanding of risks, elevate awareness (7)

Rules and Procedures

- Mandatory check in point for vessels returning from fishing trips prior to entering harbor (4)
- Require license for all fishing vessel operators (4)
- Require insurance for fishing vessels (5)

Small Craft Quality

Coordination/Planning

- Require float plans (6)

Voluntary Training

- Expand the safe boating outreach activities by providing more freely available educational material (5)

Rules and Procedures

- Mandatory boating safety training (13)
- Mandatory insurance for boat registration (13)

Enforcement

- Increase fines so that compliance is cheaper than noncompliance (5)
- Increase state resources to help in enforcement (1)

Radio Communications

- Implement VTS Broadcasts for recreational users (6)

Congestion

Active Traffic Management

- Establish a VTS (9)

Waterway Changes

- Open up the Kapalama Basin west channel to commercial traffic by removing or reconfiguring the two Sand Island Bridges to provide a secondary entrance for traffic to transit Honolulu Harbor (11)

Dimensions

Rules and Procedures

- Mandatory tug requirements applied to all ports equally. (7)

Waterway Changes

- Open up the Kapalama Basin west channel to commercial traffic by removing or reconfiguring the two Sand Island Bridges to provide a secondary entrance for traffic to transit Honolulu Harbor (8)
- Develop Barbers Point Harbor by deepening, widening, and adding a northwest jetty (State's 2020 Plan) (5)

Configuration

Coordination/Planning

- Ensure active control by the private marina operators of recreational boats collocated with Barbers Point Harbor (7)

Voluntary Training

- Train mariners at the marina about daytime and nighttime Aids to Navigation signals to clarify issues of traffic convergence at Barbers Point channel and inner harbor (5)

Active Traffic Management

- Establish VTS to cover both Honolulu Harbor and Barbers Point Harbor (9)

Mobility

Coordination/Planning

- Continue to develop, implement and exercise the Resumption of Trade Plan (9)

Navigation/Hydrographic Information

- Solarize the Aids to Navigation to eliminate susceptibility to power grid blackouts (9)

Active Traffic Management

- Establish a VTS for Oahu (9)

Waterway Changes

- Open up the Kapalama Basin west channel to commercial traffic by removing or reconfiguring the two Sand Island Bridges to provide a secondary entrance for traffic to transit Honolulu Harbor (12)

Economics

Coordination/Planning

- Continue to develop, implement and exercise the Resumption of Trade Plan (9)

Voluntary Training

- Educate the community and perform political outreach regarding the economic importance of the harbors (9)

Active Traffic Management

- Implementation of a Vessel Traffic Information System will benefit all stakeholders (9)

Waterway Changes

- Establish a secondary channel to ensure movement of cargo if the Honolulu Harbor channel gets blocked (9)