

# Ports and Waterways Safety Assessment

## Workshop Report

### Savannah, Georgia

03 - 04 August, 2010



## United States Coast Guard Office of Waterways Management



Providing Navigation Safety Information  
for America's Waterways

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## **Introduction**

The United States Coast Guard (USCG), 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 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 Coast Guard VTS acquisition program. In September 1996, at the direction of the U.S. 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 Coast Guard established the PAWSA risk assessment process 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 Waterway 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 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: Savannah PAWSA – Geographic Areas Assessed

In support of overall safety improvement activities, a PAWSA workshop for the Port of Savannah, and adjacent offshore waters out to 20 nautical miles, was conducted in Savannah, Georgia on 03-04 August 2010. The workshop was attended by 15 participants representing waterway users, regulatory authorities, stakeholders, and organizations with an interest in the safe and efficient use of Savannah Harbor, from both a commercial and recreational perspective. A list of the workshop participants 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 comments regarding current observations and trends in the port, and describes existing risk mitigation strategies that serve to “balance” the risks associated with each of the 24 risk factors in the Waterways Risk Model. For those risk factors where risk is judged to be not well balanced with existing mitigations, Appendix E to this report contains new ideas for further reducing risks.

The geographic area assessed during the workshop included the Savannah River, and adjacent offshore areas out to 20 nautical miles.

Figure 2



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

Book 1 was used to determine a risk level value for each risk factor in the Waterway Risk Model. To establish baseline risks in the port, workshop participants discussed each of the 24 risk factors in the Waterways Risk Model. The following are significant observations and comments made by the workshop participants. Additional participant observations, trends, and comments are included in Appendix B to this report.

***Deep Draft Vessel Quality:*** The majority of the vessels calling on the Port of Savannah are newer than fifteen years. The tanker fleet is not very large. There tends to be a mix of charter issue and size for deep draft vessels. Oil barges are newer and are of good quality. Overall the crews are of good quality, and there are not significant language barriers.

***Shallow Draft Vessel Quality:*** Towing vessels and smaller passenger vessels such as ferries and dinner cruise boats are prominent in the Port of Savannah. Most shallow draft vessels are of good quality due to strong industry standards, vetting programs, and participation in the Coast Guard's voluntary bridge inspection program. The average age of the shallow draft vessel fleet is 20 years.

***Commercial Fishing Vessel Quality:*** The shrimp vessel fleet operates mainly offshore between the jetties and the sea buoy. These vessels are older; however, several have steel hulls and are in overall good condition. The majority of the crews and operators are local to Savannah.

***Small Craft Quality:*** The Port of Savannah sees a large increase in small craft population during holiday celebrations. Small craft vessels tend to operate on the inland water area or the South Channel, and tie up in the Wilmington River south of Savannah.

***Configuration:*** Barge traffic has difficulty navigating the bend off of the Isle of Hope. Traffic that crosses from Fields Cut to Elba Cut affects the configuration of the channel. Beacon 48 and City Front bends are difficult to navigate. There is shoaling to the north of Buoy 8.

***Mobility:*** In the event that channel was blocked, there would be a significant impact to vessel operations and mobility within the Port of Savannah. Timing is critical in the Port when responding to a blockage in the waterway. There are currently no marine salvage companies in the area that could respond quickly and remove a large distressed vessel.

***Health and Safety:*** The health and safety of the Savannah population near City Front and the population of Tybee Island would be largely affected in the event of a spill or explosion. Population increases during St. Patrick's Day and other large holiday celebrations pose an increased risk to the health and safety.

### **Use of an Electronic Charting 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 baseline risk levels in the waterway by selecting a qualitative description for each risk factor that best described conditions for the Port of Savannah. Those qualitative descriptions were converted to discrete values using numerical scales that were developed during earlier PAWSAs. 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**

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
2.5	3.7	1.7	1.5	6.8	4.6
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
2.9	2.2	3.0	3.2	7.3	6.9
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
4.6	3.2	2.7	2.7	7.1	4.6
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
5.6	3.1	2.3	3.9	6.1	7.1

In the Savannah PAWSA, 7 of the 24 risk factors were scored at or above the mid-risk value. Risk values highlighted in red (values at or above 7.7) denote very high baseline risk levels; risk values highlighted in green (values at or below 2.3) denote very low baseline risk levels.

- Petroleum Discharge (7.3)
- Hazardous Materials Release (7.1)
- Economic (7.1)
- Environmental (6.9)
- Personnel Injuries (6.8)
- Mobility (6.1)
- Small Craft Quality (5.6)
- Aquatic Resources (4.6)
- Commercial Fishing Vessel Quality (4.6)
- Health and Safety (4.6)
- Configuration (3.9)
- Volume of Commercial Traffic (3.7)
- Dimensions (3.2)
- Traffic Mix (3.2)
- Congestion (3.1)
- Water Movement (3.0)
- Shallow Draft Vessel Quality (2.9)
- Bottom Type (2.7)
- Visibility Restrictions (2.7)
- Deep Draft Vessel Quality (2.5)
- Obstructions (2.3)
- Volume of Small Craft Traffic (2.2)
- Winds (1.7)
- Visibility Impediments (1.5)

**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 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 Savannah 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, 35% of the participant teams were placed in the upper third, 37% in the middle third, and 28% 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 were 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	37%	35%	28%
Traffic Conditions	38%	30%	32%
Navigational Conditions	35%	39%	26%
Waterway Conditions	34%	41%	25%
Immediate Consequences	33%	40%	27%
Subsequent Consequences	34%	34%	32%
<b>All Categories Average</b>	<b>35%</b>	<b>37%</b>	<b>28%</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 20 risk factors, there was consensus that risks were well balanced by existing mitigations; and for the other four risk factors there was no consensus on whether existing mitigations adequately reduced risk. Consensus is defined as 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	
2.5	2.0	3.7	2.5	1.7	1.6	1.5	1.4	6.8	5.8	4.6	3.7
Balanced		Balanced		Balanced		Balanced		Balanced		Maybe	
Shallow Draft Vessel Quality		Volume of Small Craft Traffic		Water Movement		Dimensions		Petroleum Discharge		Environmental	
2.9	2.3	2.2	2.1	3.0	2.3	3.2	2.4	7.3	5.3	6.9	4.7
Balanced		Balanced		Balanced		Balanced		Balanced		Balanced	
Commercial Fishing Vessel Quality		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
4.6	4.2	3.2	2.2	2.7	2.1	2.7	1.9	7.1	5.2	4.6	3.3
Maybe		Balanced		Balanced		Balanced		Balanced		Balanced	
Small Craft Quality		Congestion		Obstructions		Configuration		Mobility		Economic	
5.6	4.8	3.1	2.4	2.3	1.9	3.9	2.6	6.1	5.3	7.1	5.9
Maybe		Balanced		Balanced		Balanced		Maybe		Balanced	

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 four waterways risk factors that were determined to require additional intervention actions. The table below 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	Radio Communications
					1.5 Caution
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Balanced	Balanced	Balanced	Balanced	Balanced	Balanced
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Voluntary Training	Balanced	Balanced	Balanced	Balanced	Balanced
2.7					
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
Radio Communications	Balanced	Balanced	Balanced	Rules & Procedures	Balanced
2.2 Caution				2.6	

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 participants judged that additional risk reduction actions were needed with respect to 4 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.

Risk Factor Name	General Strategy	Specific Action(s)
Commercial Fishing Vessel Quality	Voluntary Training	Create incentives to have fishing vessel community members participate in the fishing vessel examination.
	Rules and Procedures	In order to acquire a state fishing license permit, a vessel operator would be required to obtain a Coast Guard fishing vessel examination.
Small Craft Quality	Voluntary Training	Increase public awareness of commercial vessel traffic hazards via the auxiliary and other educational outreach.
	Rules and Procedures	Establish mandatory boating safety education for all state registered watercraft.
Mobility	Coordination/Planning	Complete Port Resumption plan and salvage plans, which are currently under development.
Health and Safety	Coordination/Planning	During high density events at the waterfront, minimize, limit or reschedule hazardous material transits.
	Voluntary Training	Acquire funding to receive the final piece of maritime fire, law enforcement and emergency response training.
	Rules and Procedures	Have the Savannah Emergency Operations Center create an emergency procedure for the evacuation of the waterfront areas in the event of a marine incident.
	Radio Communications	Improve the communications plan and interoperability between responding and coordinating agencies.

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 additional risk mitigations strategies identified by the workshop participants.

### **Section IX: Waterway Analysis and Management System:**

In a preliminary effort to combine the PAWSA process with the Waterway Analysis and Management System (WAMS) assessment, an initial informal feedback session was held at the end of the Day 1 workshop. This session provided the participants an opportunity to discuss the current waterway aids to navigation system as a whole, as well as specific aids. Appendix F provides the questions and feedback from this listening session.

### **Conclusion:**

The ultimate goal of a PAWSA is not only to establish a baseline of waterways for VTS consideration, but to provide the 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 within the local maritime community.

The United States Coast Guard, Office of Waterways Management, 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 Coast Guard as it continues to work with the maritime community to further improve safety and efficiency in the Port of Savannah, Georgia.

## Appendix A

### Workshop Participants and Facilitation Team

<b>Participant</b>	<b>Organization</b>	<b>Email Address</b>
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## **Appendix B**

### **Participant Observations- Trends in the Port and Existing Risk Mitigations**

#### **Deep Draft Vessel Quality**

##### **Trends:**

- The average age of the tanker fleet in Savannah is 15 years. In general, the tanker fleet is not very large.
- There is a mix of age, charter issue and size for deep draft vessels.
- Scrap metal leaves the port of Savannah regularly; overall scrap metal ship quality is decent.
- There are no large container barges that transit the Savannah waterways.
- A large quantity of oil is brought into the port regularly by foreign flagged tank vessels. These tank vessels are typically newer and are of good quality. A local company provides re-fueling services for vessels calling the port of Savannah through the use of newer fuel barges.
- Deep draft vessel crews are of mixed nationality. Overall, foreign crews are able to get by with little English and there are no major language barriers.
- The quality of deep draft vessel crews are mixed, however, there are not a lot of complaints about these crews.
- There is usually a quick turnover at the pier for containerships. The average length of a container ship stay in the Port of Savannah is 16 hours and the average stay of a bulk vessel is 24-36 hours.
- Container ships entering Savannah are newer and have more capacity than container ships in the past.
- The tanker industry has to go through an inspection process due to the Oil Pollution Act of 1990 regulations; therefore tankers that enter Savannah tend to be newer vessels with double hulls. There are not many single skin tankers that transit the Savannah River.
- Bulk ships are larger than in the past and tend to be older.

##### **Existing Mitigations:**

- System failure reporting to the Coast Guard over time has improved deep draft vessel quality.
- USCG Captain of the Port orders mitigate risk.
- Coast Guard inspections and escorts (when necessary) reduce risk in Savannah waterways.
- Port State Control operations and quality of standards reduce risk.
- Tankers have to meet strong international standardized regulations as well as Coast Guard standards before then can enter the port, reducing risk.
- Industry vetting programs aide in reducing risk.
- Safety and security zones in place for gas carriers reduce risk in the Port of Savannah.

## Shallow Draft Vessel Quality

### **Trends:**

- There are two major towing vessel companies in Savannah; both companies have approximately the same number of vessels. These two companies are equal as far as vessel condition and age. The smaller towing vessel companies do mostly lightering, bunkering, and work on the Intracoastal Waterway.
- All towing vessels are not required to partake in inspections; however, most towing vessel companies participate in Coast Guard voluntary inspection program.
- Most towing vessel companies are compliant with the International Safety Management code, American Bureau of Shipping standards, are members of the American Waterways Operators; and are Responsible Carrier Program participants.
- Towing vessel companies conduct International Safety Management code vetting and have internal vetting processes through their own safety management systems.
- There are not a lot of towing vessels in the area.
- Passenger vessels in the Savannah Harbor are regulated either under 46 CFR Subchapter T or Subchapter K, all fewer than 100 gross tons each. The largest passenger vessel in the area can hold a maximum of 600 passengers, but rarely carries to full capacity.
- The casino boat in the area operates out of the Bull River, transits the Intracoastal Waterway and then passes through the ship channel into offshore waters.
- A passenger vessel with a maximum of 150 passengers departs from Hilton Head and transits the Savannah River several times a week.
- There are three passenger ferries that are operated by the county and can carry approximately 100-150 passengers each. These ferries depart from the Trade Center and transit the river on a regular basis. There is talk of constructing a fourth passenger ferry.
- During the spring and fall seasons, mini cruise ships make calls to Savannah. A 250-passenger passenger vessel usually operates in the Intracoastal Waterway. There is talk of a major cruise ship line calling Savannah sometime in the near future.
- Over the course of a year there are very few large passenger ships at Ocean Terminals 1 and 2.
- The average age of the shallow draft vessel fleet is around 20 years.
- All passenger vessels operating on and transiting the Savannah River are Coast Guard inspected.
- All fuel for the Marine Corps Air Station Beaufort leaves out of Savannah on barges.
- Tank barges are of good quality and have double hulls. There are not many single skin tank barges transiting Savannah waterways.
- Shallow draft vessel casualties occurring on the Intracoastal Waterway are typically not reported. Issues that were reported were mainly due to a lack of dredging and operators that are unfamiliar with the waterway.
- The majority of tank barges in Savannah waterways are bunker barges.
- Savannah has very few school/research ships that call on the Port.

### **Existing Mitigations:**

- Coast Guard inspection of passenger vessels and the upcoming enactment of mandatory towing fleet

inspections according to 46 CFR Subchapter M reduce risk. In addition, the towing vessel industry is working with Coast Guard to bridge the gap in inspections. Inspections have increased the safety and quality of vessels and help make the crews more proficient.

- Cooperation with the American Waterways Operators and the Passenger Vessel Association reduce risk.
- Changes made to the towing vessel operator licensing program have increased the quality of the towing vessel operators.
- Tank barges undergo Coast Guard inspections, have industry vetting, Responsible Carrier Program certification, and are double hulled which reduce risk.

### **Commercial Fishing Vessel Quality**

#### **Trends:**

- Commercial fishing vessels are run by local operators for the most part. The major areas of operation for commercial fishing vessels are between Darien and Brunswick.
- The shrimp fleet operates mainly offshore between the jetties and the sea buoy. These vessels are older; some have steel hulls, and are in overall good condition.
- The majority of commercial fishing vessel crews are local to Savannah and are of U.S. nationality, there are no language barriers.
- Commercial fishing vessels take day trips out of the Savannah River and have usually returned to the inlet by nightfall.
- There are no long liner fleets that conduct lengthy trips out of Savannah.
- There has been a large drop off in fishing exams due to species relation management.
- There were no commercial fishing vessel terminations within the last year.
- Industry activity has dropped off significantly over the past few years due to the poor state of the economy.

#### **Existing Mitigations:**

- Coast Guard 4100 boardings are effective mitigations.
- There is a voluntary exam system that helps the fishing vessel fleet meet applicable standards.

### **Small Craft Quality**

#### **Trends:**

- Small craft quality depends on the time of year and day of the week. The 4<sup>th</sup> of July is a definite issue. The ship channel is closed for deep draft vessels during the annual fireworks events; however, it is difficult to operate on the holiday because small craft vessels anchor all over the waterway.
- Small craft vessels operate mostly in the inland water areas or the South Channel.
- The Wilmington River, south of Savannah, is where most large recreational vessels tie up.
- There is some awareness among small craft operators that there are large ships operating in the

channel, however, not all small craft operators have this knowledge making for a dangerous situation.

- Knowledge of the “rules of the road” and general boating knowledge is lacking with the small craft vessel operators in the area; however, there is the perception that this is a recurring issue that can be seen in all east coast ports.
- The state numbering system and registration are the only processes required to operate a small craft vessel in Georgia waterways. There is not a mandatory safety course for small craft operation.

#### **Existing Mitigations:**

- The Coast Guard auxiliary conducts boater education classes and safety courses in the area reducing risk.
- There is a higher awareness of small craft operations among the local police (Sheriff and Metro) on the water.
- CG 4100 boardings for small craft are effective mitigations. There are a required number of small craft boardings conducted each month in the local waters.
- There is a strict Boating Under the Influence policy of .08 for adults 21 and older and a zero tolerance policy for teenagers onboard recreational vessels and .04 for all crewmembers onboard commercial vessels, pilots, licensed individuals and watch standers with safety sensitive functions onboard a commercial vessel as per 33 CFR 95. The Boating Under the Influence policy for commercial vessels is stricter than the intoxication policy for driving an automobile, and there is a perception that boating intoxication infractions for recreational vessels may be tied to the operator’s driver’s license.

### **Volume of Commercial Traffic**

#### **Trends:**

- Fiscal year 2007-2008 was one of the highest years in terms of volume of container traffic, which could be the reason the 2008 deep draft event data for container ships was so high.
- There is a liquefied natural gas ship arrival approximately once a week. The liquefied natural gas facility has the capability to handle more than one ship at a time if necessary.
- Brunswick receives most of the automobile shipments in the area; however, a few automobile shipments enter Savannah. Shipments into Savannah are mostly used automobiles.
- Refined products enter Savannah on a regular basis.
- The volume of traffic is not an issue for piloting vessels into the port.
- The deep channel can handle two-way traffic, except when a liquefied natural gas ship is transiting the channel. When a liquefied natural gas ship is operating in the channel, traffic is one-way only and there is no passing allowed.
- The overall port infrastructure is good.
- Peak container vessel moving times are Thursday-Friday. Fifty percent of businesses are handled on these days, and there are only minimal issues that occasionally occur.
- Although there can be a large volume of commercial traffic at peak times, there are usually no major events that occur.
- The poor state of the economy has played a factor in the declining volume of commercial traffic.



**Existing Mitigations:**

- There is excellent coordination and communication between the pilots, docking pilots, towboats, vessel representatives, facility representatives, Georgia Port Authority, and the Coast Guard which mitigates risk.
- Pilots are able to coordinate deep draft vessel arrivals and departures after being supplied with information from a variety of sources.
- 24- hour dispatch of tug boats helps to keep a “round the clock” view of commercial traffic volume in the port. Situations are then reported back to the proper entities as necessary.
- Long term forecasting allows for early coordination and planning of deep draft vessel movements and transits.
- Every liquefied natural gas ship has a set time for arrival in order to minimize port disruption.
- All container ship lines require an under keel clearance of six inches for double hulled vessels , and one foot for single hull vessels out of the berth.
- There is an excellent aid to navigation system in place for the waterway.
- The use of Automatic Identification System (AIS) assists in determining where traffic is moving within the port and reduces risk.

**Volume of Small Craft Traffic****Trends:**

- There is a large repair facility for yachts at Thunderbolt marina on the Wilmington River. Vessels transiting to this repair facility typically enter through Wassaw Sound.
- There are several major celebrations each year that affect the volume of small craft traffic on Savannah waterways. These events include: the 4<sup>th</sup> of July fireworks display on the Savannah River, the lighted boat Christmas parade which takes place on the weekend after Thanksgiving; St. Patrick’s Day; and Oktoberfest. Each one of these days sees an increase in recreational traffic along the Savannah Riverfront; however, there are typically no large issues that occur. Weekends also see a small increase in recreational boat volume.
- Foreign private yachts less than 300 gross tons are not required to give a notice of arrival through the National Vessel Movement Center for port calls within the Coast Guard Seventh District. However, these vessels are required by regulation to contact the local Captain of the Port and Customs and Border Protection to report their arrivals. Private yachts over 300 gross tons have to give a notice of arrival to the Captain of the Port through the National Vessel Movement center as per the requirements outlined in 33 CFR 160.
- Areas that see an increase in the volume of small craft traffic are the Intracoastal Waterway to Wassaw Sound; the Wilmington River; Tybee Inlet; and Tybee Roads.
- Small craft traffic that transits the shipping channel to get from one side of the Intracoastal Waterway to the other causes a fair amount of traffic.
- The majority of yacht traffic occurs during the spring and fall. Yachts that conduct international business enter Savannah waterways to have repairs made during their slow periods.

**Existing Mitigations:**

- There is a state program in process that will establish larger restricted areas around piers.

- There are safety zones in place for marine events which reduce risk.
- A regulated navigational area around the liquefied natural gas facility mitigates risk.
- No wake zones throughout the Intracoastal Waterway reduce risk.

### **Traffic Mix**

#### **Trends:**

- Savannah waterways do not tend to see a lot of mixing between recreational vessels and commercial traffic.
- The typical mix of commercial traffic includes: container ships, barges, tankers, towing vessels, and small passenger vessels.
- Fields Cut, where the Intracoastal Waterway crosses the Savannah River, sees a mix of traffic as well as the area surrounding the Houlihan Bridge, which has the only boat ramp into the Savannah River.
- There is not much commercial traffic on the Intracoastal Waterway, with the exception of a delivery of jet fuel that transits the Intracoastal Waterway every eight days from Jacksonville, Florida to Parris Island, South Carolina.
- Intracoastal Waterway traffic has decreased over the years.

#### **Existing Mitigations:**

- There is excellent coordination and communication between the pilots, docking pilots, towboats, vessel representatives, facility representatives, Georgia Port Authority, and the Coast Guard which mitigates risk.
- Regulated navigational areas and safety zones help ease the mix of traffic.
- Excellent aids to navigation are in place and are well maintained.
- Bridge control reduces risk by only opening the bridge at certain times of day.
- Vessels that give a security call when approaching Fields Cut assist in reducing the risk of traffic mixing.

### **Congestion**

#### **Trends:**

- Seasonal congestion occurs on holidays and special occasions (4<sup>th</sup> of July, Christmas Parade, St. Patrick's Day, Oktoberfest). This occasional congestion hinders passenger vessel operation for the dinner boats home ported in Savannah's river front.
- Fields Cut tends to get congested by snow birds traveling south in the fall and north in the spring.
- In general, there is not much congestion in the Savannah River. The Isle of Hope, the area surrounding the Houlihan Bridge, Fields Cut, and the Skidaway narrows see the largest amount of vessel congestion, however, it is still minimal.
- There are plans in place to add another boat ramp in the Back River, north of Hutchinson Island, which should help to ease congestion.
- There are no facilities for lay berth which can cause congestion in the port.

- A recommendation was made to issue a broadcast on VFH channel 16 to keep the center line channel clear during holidays (4<sup>th</sup> of July) in order for passenger vessels and water taxis to operate.

**Existing Mitigations:**

- Constant contact and communication between the pilots and the Georgia Port Authority during high volume times reduces risk.
- Commercial boats communicate well with each other and with the Port authorities.
- The passenger vessels typically run the same schedule from day to day and their transit times are pretty predictable.
- Chatham County Marine Patrol and the Coast Guard conduct waterway patrols and enforce safety zones and perimeters during holiday events mitigating risk.

**Winds**

**Trends:**

- The winds are basically dependant on the time of year. October and March are months when the wind conditions can reach 40-45 knots offshore causing the Pilots to stop deep draft vessel transits.
- The ability to get a Pilot on board a vessel and specific vessel characteristics are determining factors for operations when winds speeds are high.
- Tropical systems occasionally move through the area causing the channel to close. These tropical storms are usually forecasted well and vessels take the proper precautions in advance of the storm.
- The unpredictability of wind squalls can be an issue, but these pop up squalls are not long enough to cause a shut-down of the Port.
- Overall, the winds are fairly predictable and warnings are issued ahead of time. The port is not typically closed due to wind conditions.

**Existing Mitigations:**

- There is a wind policy in place for the Pilots where ships do not move if the wind speed is over 40 knots.
- Constant contact between the Port Authority and the National Weather Service reduce risk.
- Local warnings and severe weather broadcasts are extremely helpful and are very timely.

**Water Movement**

**Trends:**

- There is a fairly predictable tidal range in the Savannah River.
- The current runs with the channel, not across the channel, so there are no cross-current issues. Also there is no flow-out from the Intracoastal Waterway or Back River.
- There currently is not a Physical Oceanographic Real-Time System (PORTS) in place. Sensors did exist in Savannah waterways in the past; however, they were not utilized. The Savannah Harbor Expansion Project currently has many monitoring sensors while the project is underway. Several

groups in Savannah have been working to transfer the monitoring of these sensors to local educational institutions once the Expansion Project is complete to continue the monitoring of water movement.

**Existing Mitigations:**

- The under keel policy assists operators in using the tides to their advantage therefore reducing risk.
- A strong local knowledge by the Pilots and commercial operators helps to reduce risk posed by water movement.
- Real-time data provided by the U.S. Geological Survey reduces risk.
- Properly trained crews that know how to read and use tide tables and the Coast Pilot publications assist in reducing risk.

**Visibility Restriction**

**Trends:**

- Fog is the only major visibility restriction, and it tends to be seasonal. Fog is heaviest towards the end of summer into fall, throughout February, and some of March.
- Visibility impediments due to rainfall occur only for short periods of time.
- The ability to see the aids to navigation is good.
- There is a potential for collisions caused by an over-reliance on Automatic Identification Systems or other electronic navigational systems during foggy conditions.

**Existing Mitigations:**

- Tools such as Automatic Identification System, Radar, Chart plotters, and aids to navigation provide navigation assistance in foggy conditions which reduces risk.
- The pilots control vessel movement and will shut down the channel if necessary due to heavy fog.
- Deep draft vessel control reduces risk.
- The use of fog horns, radio communication, security calls, and having posted lookouts reduce risk.

**Obstructions**

**Trends:**

- The amount and type of waterway obstructions is mostly dependant on the spring tide. In spring, there is more damage to recreational vessels due to waterway obstructions. Local mariners are aware of seasonal obstructions and try to avoid them whenever possible.
- Occasionally rain water brings fresh debris into the waterway.
- Fields Cut and the upper end of the Savannah River are the areas that typically get wash-out debris.
- Smaller boats have to navigate around crab pots located near the outside of the channel.

**Existing Mitigations:**

- In the event of a significant obstruction in the waterway, the Coast Guard will issue an urgent marine information broadcast.

- Towing vessels and other vessels operating in the waterway have a “self-policing” approach to obstructions. If they can safely remove an obstruction, they will do so. If they are unable to remove the obstruction, they will contact the Coast Guard.

### **Visibility Impediments**

#### **Trends:**

- The lash dock at the entrance to the Savannah River does not present a visibility issue.
- The range located in the upper harbor presented visibility issues, however, this area is no longer used for vessels and the range is no longer a problem.
- Additional lighting on piers creates visibility impediments for small boat operators, however, it is adjusted to easily and operators learned to deal with it.

#### **Existing Mitigations:**

- As background lighting issues arise, they are handled promptly by the terminals through good port coordination.

### **Dimensions**

#### **Trends:**

- The dimensions of the ship channel are able to handle two-way traffic with the exception of special large vessels and liquefied natural gas carriers.
- There have not been any air draft issues since the new Savannah River Bridge was built.
- The current depth of the channel is meeting needs accurately.
- The dimensions of the Kings Island turning basin are accurate for deep draft vessels and the basin is maintained at the proper depth. Other turning basins in the area are maintained to 34 feet.
- The turning basin at Elba Island is maintained for liquefied natural gas ships.

#### **Existing Mitigations:**

- There is good communication for two-way traffic from bridge to bridge, between the terminals, and within the port community. The larger the vessel, the more communication and coordination takes place.
- Coast Guard regulations require that liquefied natural gas ships carrying more than five percent cargo cannot be in a passing situation.
- Towing vessel are manned and ready to go 24-hours a day and can assist pilots in anyway necessary, creating a strong tug assist capability within the port.
- The channel is well marked and reduces risk.

## **Bottom Type**

### **Trends:**

- The bottom type is mostly mud inshore and sand offshore with no hidden rock formations.
- There is not much forgiveness for vessels outside of the channel if you are a true deep draft vessel. There is some forgiveness for smaller vessels outside the channel.
- Recreational boats can get hung up on the rock outcropping and have been known to get beached in the area where the Intracoastal Waterway crosses over the Savannah River.
- There are fairly steep banks along the channel.
- If a vessel is on the right side of the marker in the Isle of Hope at low tide, there is a good chance that the vessel will be grounded.

### **Existing Mitigations:**

- The under keel clearance guidelines for Savannah issued by the Savannah Maritime Association help to reduce risk.
- Dredging performed by the Army Corp of Engineers reduces risk.

## **Configuration**

### **Trends:**

- There is no commercial traffic operating on the Back River. A small fleeting area is used by barges, and it may have to be dredged occasionally.
- Barge traffic has trouble navigating the bend on Isle of Hope.
- Crossing traffic from Fields Cut to Elba Cut affects the configuration.
- There are no issues of ferry crossing traffic.
- Beacon 48 and City Front bends can be difficult to navigate. There is also shoaling to the north of Buoy 8.

### **Existing Mitigations:**

- Good communication between larger vessels and pilots plays a large role in mitigating risk.
- Operators that have a strong local knowledge of the area reduce risk.
- Usage of Automatic Identification Systems and strongly regulated navigational areas around the liquefied natural gas facility reduce risk.
- Towing vessel assistance is readily available to assist vessels impacted by the waterway configuration.

## **Personnel Injuries**

### **Trends:**

- Personnel injuries would be most likely to occur on the dinner cruise boats. These boats have a

maximum capacity of 600 passengers; however, they are not usually filled to capacity. Small passenger ferries, water taxis, and casino boats also have the potential for a large number of personnel injuries.

- There are no large charter fishing vessels that enter, exit, or transit the Savannah River.
- During the 4<sup>th</sup> of July holiday there is a much larger potential for recreational boat casualties.
- The Coast Guard Captain of the Port Savannah does not have operational control for search and rescue. First communication should go to Coast Guard Station Tybee and/or Coast Guard Sector Charleston.

#### **Existing Mitigations:**

- There is a good first response team in place stemming from the G8 conference that took place in Savannah in 2004.
- Local police, fire departments, Coast Guard, and towing vessel are readily available to respond.
- The Coast Guard has a mass rescue plan reducing risk.
- Passenger vessels run regular fire and man overboard drills, and have necessary response equipment onboard. They also have another boat that could hold up to 1,200 passengers in an emergency off load situation.
- Drills and exercises reduce risk.
- Some industries have a hurricane evacuation plan that is exercised frequently.

### **Petroleum Discharge**

#### **Trends:**

- Bulk crude, turpentine, methyl ethyl ketone, fuel, jet fuel, bunker diesel, asphalt tankers and tank barges arrive in the port for deliveries on a regular basis.
- 150 gallons of heavy fuel oil was spilled from a chemical tanker in a previous marine casualty 10 nautical miles off Savannah, GA in September 2009. This incident occurred after the accidental release of the vessel's anchor during the inbound transit from the sea buoy to the receiving facility, causing the anchor to puncture the vessel's #1 starboard fuel tank. This incident had a pollution potential of approximately 78, 000 gallons.
- The average size of a tank ship in the Savannah waterways is 35,000 gross tons and between 600-700 feet long. This does not include liquefied natural gas carriers.
- 50,000 barrels of oil is the potential amount of a worst case discharge in the Savannah Harbor. This amount could be the result of spills from multiple sources after a hurricane.

#### **Existing Mitigations:**

- Reporting requirements reduce the risk of petroleum discharge.
- Vessel response plans for tank and non-tank vessels and facility response plans reduce risk.
- There is a strong local oil spill removal organization presence that can respond immediately, provide training, and possesses the necessary equipment to respond to a petroleum discharge.
- The area contingency plan is exercised regularly reducing risk.

## Hazardous Materials Release

### **Trends:**

- Several facilities in the Savannah area package and distribute chemicals using waterway transport.
- Vessels used to transport hazardous materials are both above and below 40,000 gross tons.

### **Existing Mitigations:**

- Liquefied natural gas falls under Certain Dangerous Cargo requirements as opposed to being classified as a hazardous material; however, the liquefied natural gas facility has a facility response plan and also has requirements for the proper handling of the substance.
- Crews of some industries are trained yearly in response procedures in the event of a discharge at the liquefied natural gas facility.
- Towing vessels have self contained breathing apparatus' in the event of a liquefied natural gas release or hazardous material discharge.
- Chemical facilities in the area have facility response plans reducing risk.
- Vessels carrying hazardous materials are required to have a vessel response plan which mitigates risk.
- Several organizations conduct drills that include hazardous material releases.
- Hazardous Waste Operations and Emergency Response training of oil spill removal organization personnel and employees that handle hazardous materials reduces risk.
- Savannah has a regional hazardous materials response team that is coordinated by the state.
- There is good communication between the State and county emergency agencies. These agencies work together in order to comply with regulations.

## Mobility

### **Trends:**

- Timing is critical when crews are responding to a mobility issue in the Savannah River.
- After the port has been closed for 24-hours, significant delays will begin to occur. This has happened in the past due to large storms, in which case ships were then rerouted.
- Typically a vessel that is grounded should become ungrounded at the following high tide. The probability of a vessel running aground in the channel is low.
- There would be a significant impact to vessel operation and mobility if the channel is blocked.
- Currently there are no marine salvage companies in the Savannah area.
- If a vessel sinks and is considered a pollution threat, the Coast Guard can use funds from the Oil Pollution Act on 1990 to stabilize the pollution, however, this may or may not include removing the vessel from the waterway.

### **Existing Mitigations:**

- Towing vessels are able to assist with groundings in order to remove the vessel from the channel if it is restricting mobility; however, their removal capabilities are limited.



- Vessel response plans that identify salvage companies reduce the risk of mobility issues.
- The Army Corp of Engineers has the ability to expedite the removal of a vessel in the channel or Intracoastal Waterway reducing risk.
- If a vessel sinks and blocks the channel, the Coast Guard would form a Unified Command in order to coordinate the effort.
- Various organizations within the Savannah maritime community have prioritized lists detailing which navigational aids would be restored first after the event of a hurricane.

### **Health and Safety**

#### **Trends:**

- The impact on the health and safety of the population is dependent on where an incident occurs. The biggest impact to the population would be along the City Front channel and near Tybee Island. Populated areas along the Intracoastal Waterway and Wilmington Island could also potentially be affected. Marsh lands and dredge spoil cover a majority of the river, so an incident taking place around these areas would not have a substantial effect on the population.
- The repercussions from a major event would extend 1.1 miles from the center of the channel, therefore, other than City Front; there is not a large risk to the health and safety of the population.
- The Hilton Head, South Carolina population could potentially be affected by a tanker spill or fire.
- The increase in the population during certain holidays, such as St. Patrick's Day, poses a greater risk to the health and safety of the population near the waterway.
- The inability to procure funding to train land based fire responders to the level that Coast Guard requires to board ships in an emergency situation creates a greater risk to the health and safety of the local population. Overall, there is limited knowledge for local firefighters with regards to marine firefighting.
- In the past tornadoes downed power lines on St. Patrick's Day and the Riverfront area was evacuated in an orderly fashion.

#### **Existing Mitigations:**

- Local police set up an operations center during major events which aids in mitigating health and safety risks.
- Several facilities and refineries have plenty of resources allowing them to handle casualties in an emergency situation.
- There are enough hospital assets available in the surrounding areas.
- A working group was formed in 2006 with the end result being that a Federal grant was created to fund a substantial list of equipment that will handle maritime and/or facility fires. To this day, 11 entities have signed on to match the Federal funding.
- Drills and exercises conducted by vessel crews and instruments such as high-pressure mist fire suppressors are installed on board large vessels to assist in reducing fire risks. In addition, certain organizations require that specific equipment is to be onboard vessels.

## **Environmental**

### **Trends:**

- Federal Reserve and wildlife refuge areas extend from the City Front downstream.
- According to the Area Contingency Plan, the entire Savannah River is an environmental entity, with the exception being City Front which is economic.
- There are National Wildlife Areas that have higher levels of environmental protection and are more environmentally sensitive areas. These include: Fort Pulaski, Savannah National Wildlife Refuge, Little Tybee, and Williamson Island.
- A large spill in the Savannah Harbor would not affect the quality of the areas drinking water.
- There is a fairly decent distance between where a potential spill could occur and the salt marshes, so it would not cause total devastation.

### **Existing Mitigations:**

- Environmental agencies are very engaged in preserving freshwater and saltwater marshes, as well as raising awareness of environmentally sensitive areas.
- There is good coordination and communication between the Army Corp of Engineers and the community regarding upcoming changes to the waterway.
- The Area Contingency Plan has a strong geographic specific appendix and environmental section.
- Some local vessel companies have a vetting process and conducts extensive training to include environmental issues and local areas of environmental sensitivity.
- There are adequate resources available for environmental protection reducing risk.

## **Aquatic Resources**

### **Trends:**

- Local fisheries include shrimp, crab, and oysters. There is no large fishing industry presence in Savannah.
- There is currently a moratorium on catching striped bass due to the species being “at risk”.
- There are approximately 200 turtle nests on Wassaw Island and approximately 12 on Tybee Island so far this year (2010). The Savannah River is a short nosed sturgeon breeding ground.
- There are many aquatic sensors in the waterway; however, they belong to different government agencies that do not discuss their findings with each other. It was recommended that there should be better communication between agencies.
- From November 1<sup>st</sup> to April 3<sup>rd</sup>, offshore speed restrictions of 10 knots are imposed on deep draft vessels due to the possibility of Right Whales in the area.

### **Existing Mitigations:**

- The U.S. Fish and Wildlife is very active in protecting local aquatic resources and restocks the waterways as needed.
- The oxygen content of various phases of the Savannah River is monitored to make sure environmental needs are met and understood properly.

## Economic

### **Trends:**

- The average cost for a container vessel to sit offshore is \$60,000-\$80,000 a day.
- Savannah is typically 50/50 in imports and exports. Currently there is an empty container issue in the port due to the poor state of the economy, and the port is basically acting as a storage facility for containers. Savannah is beginning to see an increase in export.
- Containers that arrive by water are then transferred to rail or tractor trailers and delivered to the middle of the country. If the Port were to be closed for an extend length of time, the inland country would be impacted, not just Georgia.
- The liquefied natural gas facility has enough inventory to sustain the area for one week. On a high usage day there could be limited liquefied natural gas access. If a port closure extended past one week, liquefied natural gas usage in Savannah and the surrounding areas would be affected. The price of products would be affected in the event of a port closure.
- Savannah is not on the Colonial Pipeline for gasoline as it stops in Augusta, GA. Gasoline arrives by ship, and Savannah is a major gasoline distribution point as well as a distribution point for food including: bulk grain, vegetable oil, and tropical oils.
- If a port closure extends beyond 48 hours, it becomes a major issue for all port operations. Rerouting of all vessels would be necessary.
- If a port crane were to fall in the water, a salvage barge from Charleston would have to come and remove it in sections. It would be a lengthy and expensive process.
- It takes 12 hours to completely lock down the container facility.
- Salvage is important for lessening economic disruption; however, salvage capability in Savannah is limited.
- There is no awareness of an existing plan for economic recovery in the event of a port closure.

### **Existing Mitigations:**

- Savannah is not a port of refuge; a preventative mitigation for lessening economic impacts is to not allowing certain fleets/situations to occur.
- Several companies have extensive plans for locking down facilities in preparation for a category 3 or 4 hurricane.
- Coast Guard orders for vessels to leave port ahead of impending storms mitigates risk.

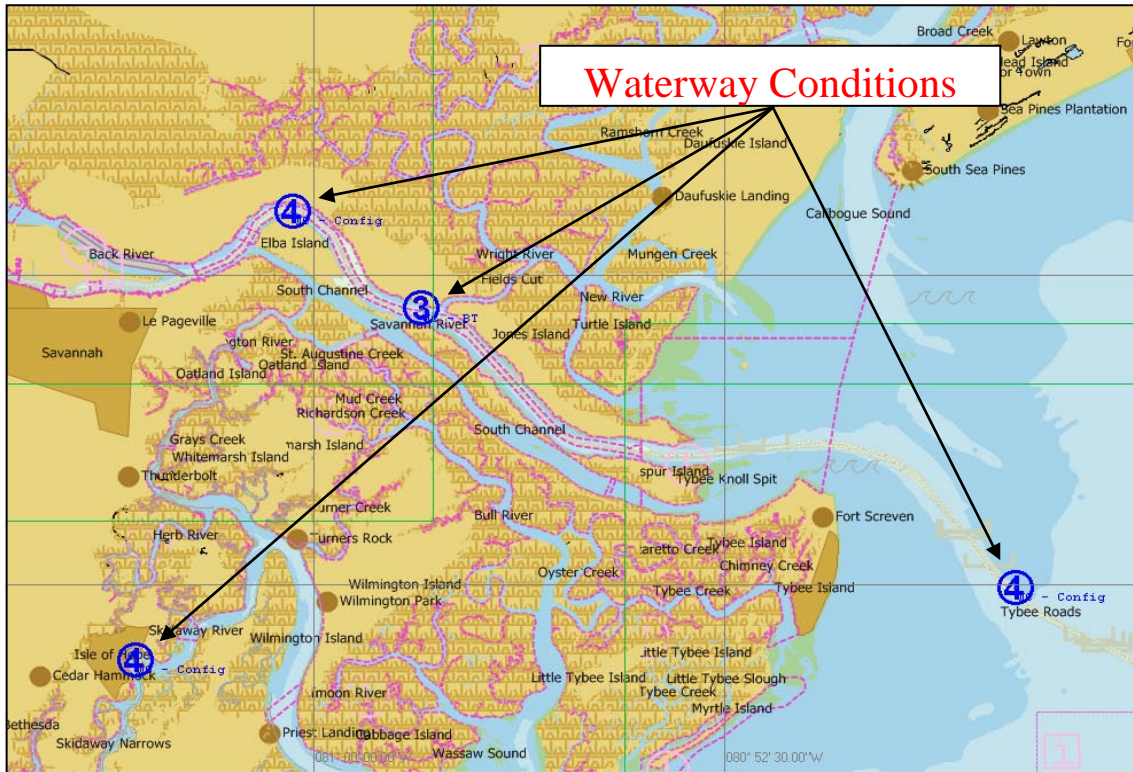
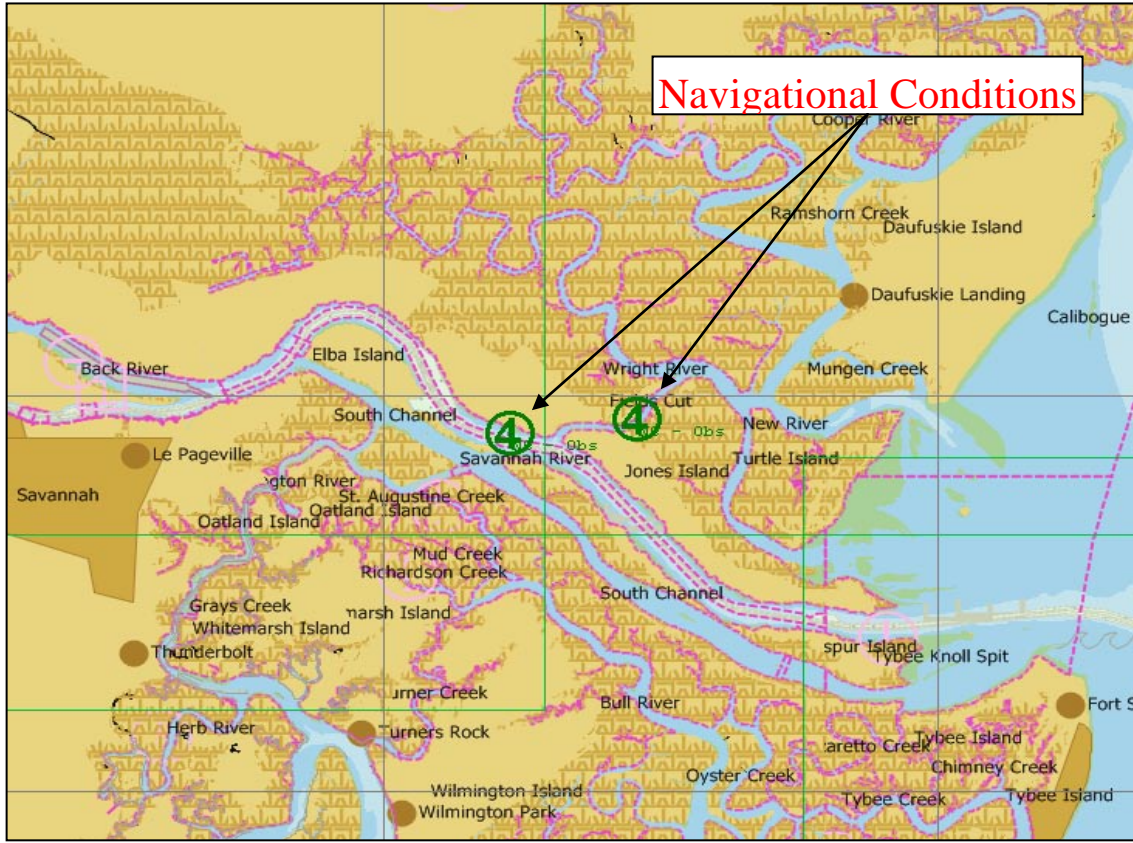
## Appendix C

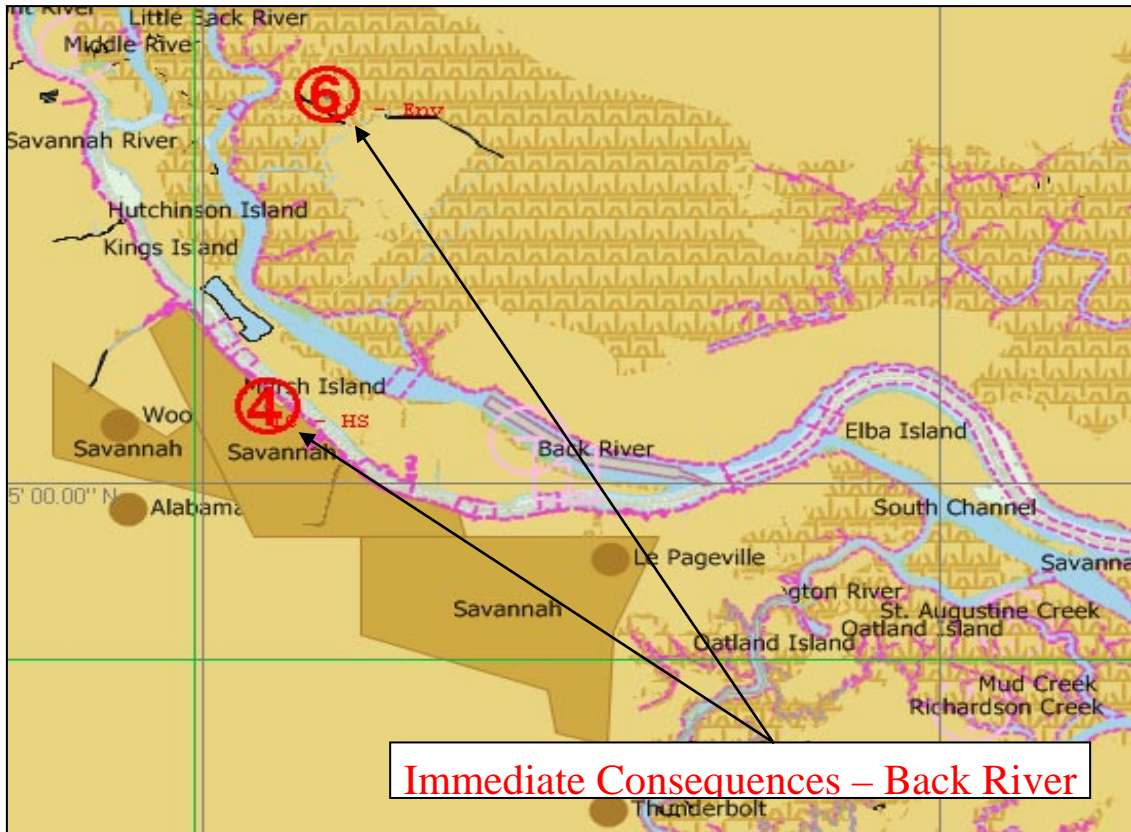
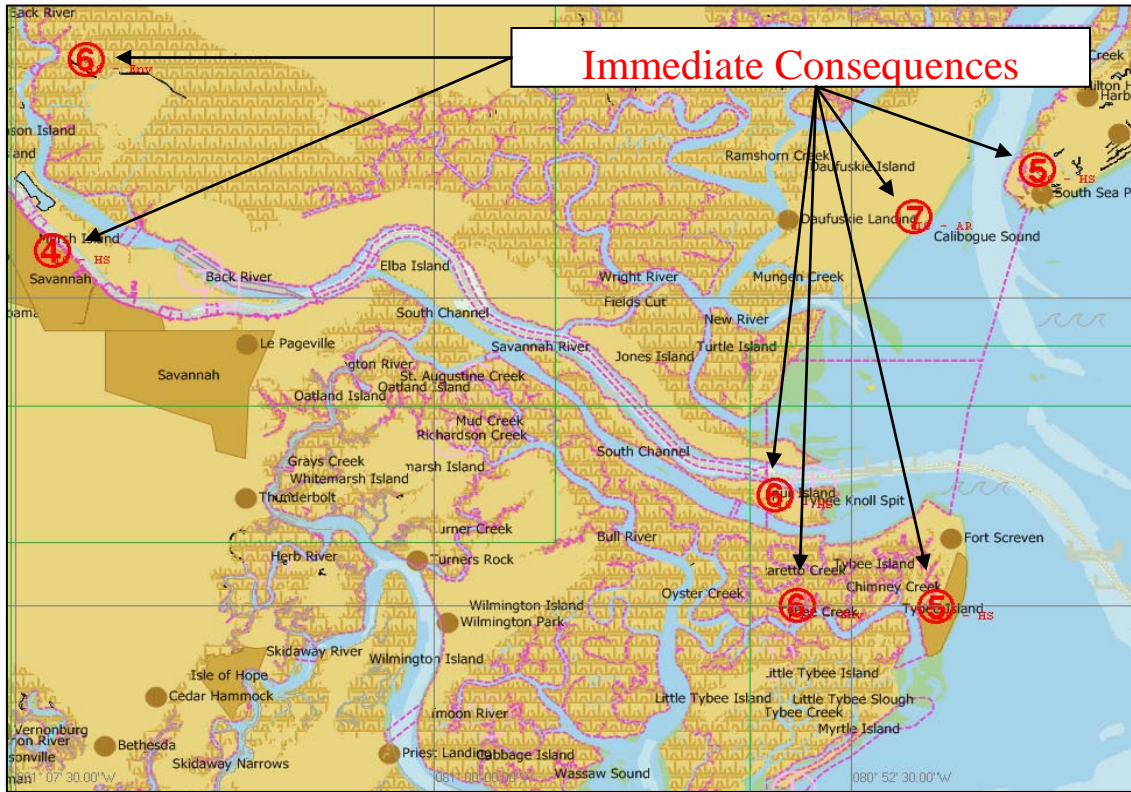
### Location of High Risk Areas

As participants discussed each risk factor, an Electronic Charting System (ECS) was utilized to identify the specific geographic locations of high risk areas identified by the workshop participants. The following legend explains the risk factor locations on the ECS chart excerpts.

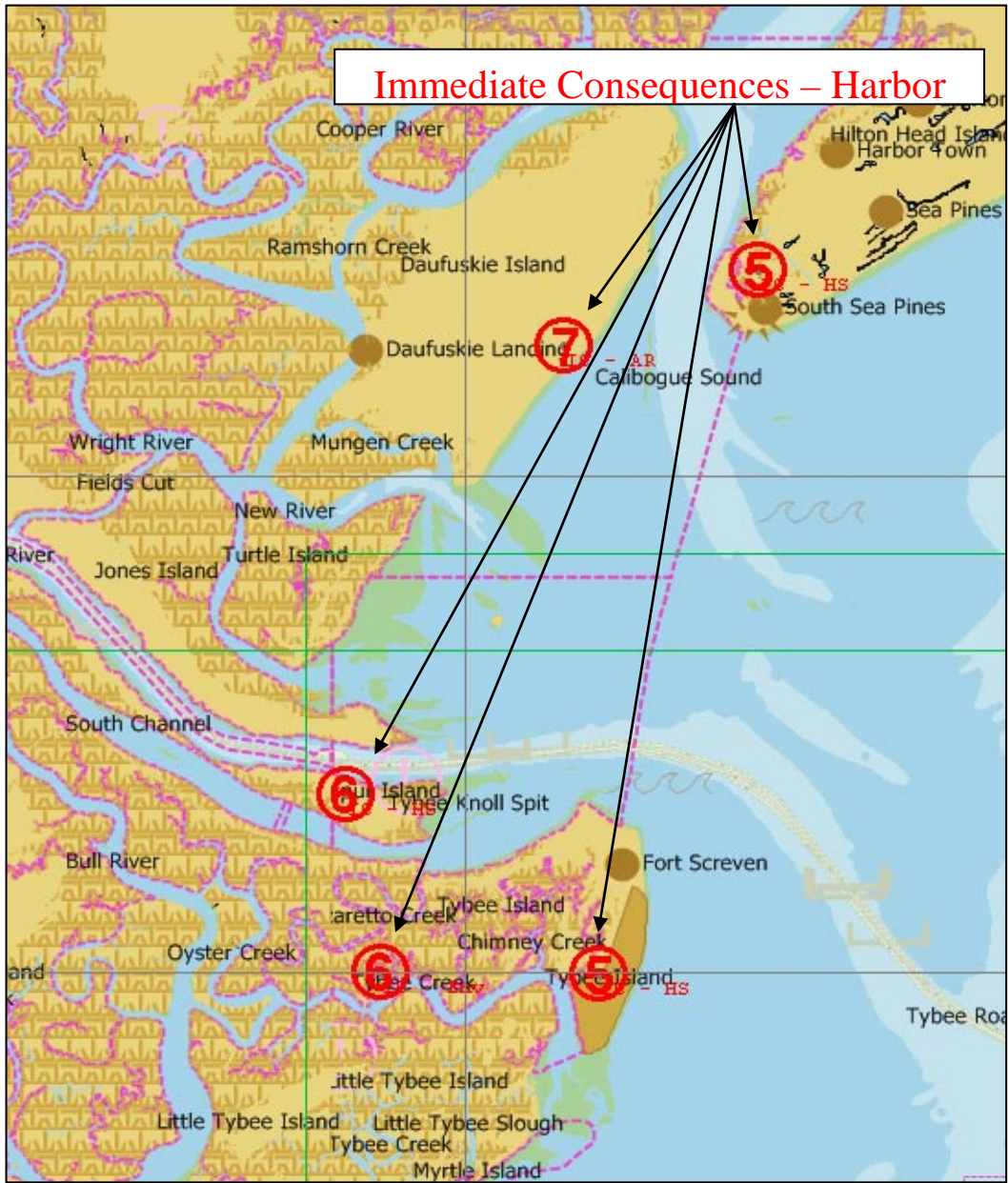
Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
1	Deep Draft Vessel Quality	1	Volume of Commercial Traffic	1	Winds	1	Visibility Impediments	1	Personnel Injuries	5	Health and Safety
2	Shallow Draft Vessel Quality	2	Volume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







## Immediate Consequences – Harbor



## Appendix D

### Definitions – Risk Mitigation Strategies

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



## Appendix E

### Additional Risk Mitigation Strategies

#### Commercial Fishing Vessel Quality

##### **Voluntary Training:**

- Create incentives to have the fishing vessel community members participate in the fishing vessel examination (6)
- Offer voluntary training on general aspects (i.e., rules of the road, environment, navigation, PIC, radio communication, vessel awareness, etc.) and encourage attendance by creating incentives (4)

##### **Rules & Procedures:**

- To acquire a state fishing license permit, require a Coast Guard fishing vessel examination (6)
- Propose licensing regulations to include drug and alcohol testing (2)
- Propose new regulations to Coast Guard inspection programs (1)

##### **Other Actions:**

- Make fishing vessel community members exempt from the Federal Fuel Tax if they have a current inspection (3)

#### Small Craft Quality

##### **Voluntary Training:**

- Increase public awareness of commercial vessel traffic hazards through the auxiliary and educational outreach (i.e., public service announcements, brochures, posted notices in marinas) (7)

##### **Rules & Procedures:**

- Required mandatory boating safety education for all state registered watercraft (9)

##### **Enforcement:**

- Increase resources (people, platforms, budget) for all enforcement agencies (5)

##### **Radio Communications:**

- Interact with the media to increase boating safety knowledge and awareness (5)
- Request signage at boat ramps and throughout the waterway alerting to dangers and changes in the waterway (4)
- Improve communications between commercial traffic and recreational traffic (1)

## **Mobility**

### **Coordination/Planning:**

- Complete Port Resumption and salvage response plans, which are currently in development (8)

### **Rules & Procedures:**

- Create an emergency salvage fund to remove vessels affecting waterway mobility (4)
- Extend Coast Guard Certificate of Financial Responsibility (COFR) requirements to include salvage operations in a timely manner (5)

## **Health and Safety**

### **Coordination/Planning:**

- During high density events along waterfront, minimize/limit/reschedule hazardous material transits (7)

### **Voluntary Training:**

- Acquire funding to receive the final piece of maritime fire, law enforcement and emergency response training (9)

### **Rules & Procedures:**

- Have the Savannah Emergency Operations Center create an emergency procedure for evacuating waterfront areas in the event of a marine incident (could be incorporated into the Chatham Emergency Management Agency (7)

### **Radio Communications:**

- Improve communication plans and interoperability between responding and coordinating agencies (8)
- Increase public awareness of the necessary emergency and evacuation procedures in case of an emergency event (2)

## Appendix F

### **Participant Comments – Savannah River Aids to Navigation System**

In an effort to combine certain aspects of the Coast Guards Waterway Analysis and Management System (WAMS) program into the PAWSA workshop process, a review of the Savannah Rivers Aids to Navigation (ATON) system was held at the end of the Day 1. This session provided the participants the opportunity to discuss the design and functionality of the current navigation aids, and provide comments and recommendations for improving the Savannah ATON system.

Participants were encouraged to provide feedback and offer suggestions to the following nine questions:

**1. Is the Savannah River aid to navigation system adequately designed?**

- There was a general consensus that yes, the Savannah ATON system currently is adequately designed to do the job well.

**2. Should any aids to navigation be added, changed, removed?**

- There are no navigational aids recommended for removal; however, they should be made more reliable.
- It was suggested that aids should be made less susceptible to being pushed off station.
- Buoys located on open waters are critical. They should not be removed.

**3. If 10% of the aids to navigation are removed, what changes would be acceptable (such as removing gated pairs, extending distances between gates for parts of a waterway with ranges, staggering gated pairs)?**

- There currently are no navigational aids that should be removed from the system.
- If removal is necessary, it was suggested to begin with areas that handle little to no commercial traffic.
- The navigational aids in the Savannah River are extremely well placed and all of them are necessary.
- Staggering of buoy gates in the auxiliary channel may be helpful to vessels towing barges.

**4. Do you rely on visual aids to navigation?**

- Overwhelmingly yes. In the channel, buoys are the primary aids relied upon for navigation.
- Visual aids are relied upon 24-hours a day, seven days a week.

**5. How do you use aids to navigation (locating channels, avoid hazards, etc.)?**

- Navigational aids are used as a position confirmation factor when transiting the channel and using electronic navigation systems.
- Navigational aids are also used in passing situations, buoys are used to determine current conditions and the way the water is moving.
- Navigational aids are used to navigate the channel and avoid hazards.

**6. How important are visual aids to navigation for safely operating your vessel?**

- Navigational aids help to navigate around hazards and assists in the safe navigation of two-way traffic.
- When navigating under less than perfect conditions the visual aids currently in place are necessary for safety.

**7. Can you safely operate your vessel without visual aids to navigation?**

- No. Redundancy that includes visual aids is important for comfortable navigation and for safety.

**8. What other types of navigational aids (electronic navigation, ECS, etc.) are used?**

- Electronic Charting System
- Radar
- Paper charts
- Crew lookouts

**9. What are some barriers that affect you from using electronic navigation equipment such as Electronic Charting Systems, Virtual ATON placements, and Global Positioning Systems?**

- Electronic charts are difficult to correct.
- Data errors occur with electronic navigation equipment. These include signal strength, blackouts, and accuracy.
- Visual navigational aids are more reliable.
- When lots of technical navigational equipment is installed on a vessel, it can cause confusion. Devices can lock up, so visual navigational aids are necessary. Visual navigation aids also provide mariners with a comfort factor, they are used to confirm courses and identify errors received from technical navigation devices/equipment.
- When you integrate an Electronic Charting System that process depth, movement, etc, it is a lot to look at while trying to fix your position. This can pose a safety issue when dealing with passing traffic.