

Ports and Waterways Safety Assessment Detroit Workshop Report

Introduction

A Ports and Waterways Safety Assessment (PAWSA) Workshop was conducted for Detroit, Michigan, on February 12 – 13, 2003. This workshop report provides the following information:

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

Strategies for further reducing unmitigated risks will be the subject of a separate report.

Assessment Process

The PAWSA process is a structured approach to obtaining expert judgments on the level of waterway risk. The process also addresses the effectiveness of possible intervention actions for reducing risk in the waterway. The PAWSA process uses a select group of waterway users / stakeholders to evaluate risk factors and the effectiveness of various intervention actions. The process requires the participation of local Coast Guard officials before and throughout the workshops. Thus the process is a joint effort involving waterway experts and the agencies / entities responsible for implementing selected risk mitigation measures.

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

The first step in the process is for the participants to assess their expertise with respect to the six risk categories in the model. Those self assessments are used to weight the experts' inputs during all subsequent steps. The second step is for the participants to provide input for the rating scales used to assess risk. The third step is to discuss and then numerically evaluate the absolute risk levels in the waterway using pre-defined qualitative risk descriptors. In the fourth step, the participants discuss and then evaluate the effectiveness of existing mitigation strategies in reducing risk. Next, where risk is not well balanced with existing mitigations, the participants are asked to offer new ideas for further reducing risk. Finally, the effectiveness of various intervention actions in reducing unmitigated risk is evaluated.

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Participants

The following is the list of waterway users and stakeholders who participated in the process:

Participants	Organization	Phone	Email
Capt. Tom Allor	Propeller Club – Detroit	(248) 521-1886	captallor@comcast.net
Mr. Bob Babcock	MI Dept. of Environ. Quality	(517) 373-8566	babcockr@mi.gov
Mr. Mark Breederland	MI Sea Grant Extension	(810) 989-6323	breederm@msue.msu.edu
CDR Mark Burrows	Intl. Joint Commission	(313) 226-2170	burrowsm@windsor.ijc.org
Mr. Steve Carrothers	Gaelic Tugboat Company	(313) 841-9440	steve@gaelictugboat.com
LCDR Brad Clark	USCG Group Detroit	(313) 568-9521	bclark@grudetroit.uscg.mil
CDR Patrick Gerrity	USCG MSO Detroit	(313) 568-9490	pggerrity@msodetroit.uscg.mil
Mr. Rick Harkins	Lake Carriers Association	(216) 861-0591	harkins@lcsips.com
Dr. John Hartig	Am. Heritage River Initiative	(313) 568-9594	jhartig@msodetroit.uscg.mil
Mr. John Heasel	USCG Auxiliary	(313) 568-9592	jheasel@grudetroit.uscg.mil
LT Matt Hoppe	USCG MSO Detroit	(313) 568-9580	mhoppe@msodetroit.uscg.mil
Capt. Philip Knetchel	Lakes Pilots Association	(810) 982-1762	lpa@bwb.net
Mr. Robert LaFeau	Acheson Ventures	(810) 966-0900	boblafeau@advnet.net
Mr. David Luff	U.S. Army Corps of Engineers	(313) 226-3190	david.b.luff@lre02.usace.army.mil
Mr. Bill Marshall	Windsor Port Authority	(519) 258-5741	bmarshall@portwindsor.com
Capt. Norman Monteiro	Marine Safety Transport Canada	(519) 464-5109	montein@tc.gc.ca
Mr. Steve Nelson	J.W. Westcott Company	(313) 496-0555	captstevenelson@comcast.net
Mr. Steven Olinek	Detroit/Wayne Cty. Port Auth.	(313) 331-3842	olinek@portdetroit.com
Mr. Pierre Papineau	CCG MCTS Sarnia	(519) 337-6572	papineaup@dfo-mpo.gc.ca
LCDR Todd Prestidge	USCGC Bramble	(810) 982-2684	tkprestidge@msn.com
Mr. Gregg Ward	Detroit – Windsor Truck Ferry	(313) 842-2088	greggward@aol.com

Observers	Organization	Phone	Email
MSTC Steve Siler	USCG MSO Detroit	(313) 568-9505	ssiler@msodetroit.uscg.mil

Facilitation Team	Organization	Phone	Email
LTJG Nick Neely	USCG Commandant (G-MWV)	(202) 267-2788	nneely@comdt.uscg.mil
Mr. Jorge Arroyo	USCG Commandant (G-MWV)	(202) 267-6277	jarroyo@comdt.uscg.mil
Mr. Doug Perkins	Potomac Management Group	(703) 836-1037	dperkins@potomacmgmt.com
Ms. Kim Costner Moore	Potomac Management Group	(703) 836-1037	kcostnermoore@potomacmgmt.com
Ms. Leanne Rebuck	Potomac Management Group	(703) 836-1037	lrebuck@potomacmgmt.com

Geographic Area:

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

- Area of coverage by VTS Sarnia from the point of mandatory call-in (half hour north of buoys 11 and 12 in Lake Huron); through the St. Clair River, Lake St. Clair and the Detroit River to Southeast Shoals in Lake Erie, including the River Rouge.

Numerical Results

Book 1 – Team Expertise

In Book 1, the participant teams were asked to assess their level of expertise compared to the other participant teams in the workshop for each of the six categories in the Waterway Risk Model. Overall, 50% of the participant teams placed themselves in the upper third, 35% in the middle third, and 15% in the lower third of all teams.

Book 2 – Risk Factor Rating Scales

Risk Factor	A Value	B Value	C Value	D Value
Vessel Quality	1.0	2.8	5.3	9.0
Deep Draft Mariner Proficiency	1.0	2.8	5.5	9.0
Shallow Draft Mariner Proficiency	1.0	2.9	5.6	9.0
Recreational Boater Proficiency	1.0	2.9	5.6	9.0
Volume of Commercial Traffic	1.0	2.8	5.1	9.0
Volume of Recreational Traffic	1.0	2.7	5.9	9.0
Traffic Mix	1.0	2.2	4.7	9.0
Congestion	1.0	2.7	5.0	9.0
Winds	1.0	2.4	5.1	9.0
Currents	1.0	2.6	5.0	9.0
Visibility Restrictions	1.0	2.9	5.7	9.0
Obstructions	1.0	1.8	4.4	9.0
Visibility Impediments	1.0	3.0	5.5	9.0
Dimensions	1.0	3.0	5.5	9.0
Bottom Type	1.0	2.4	5.3	9.0
Configuration	1.0	2.7	5.2	9.0
Personal Injuries	1.0	3.0	5.5	9.0
Petroleum Discharge	1.0	3.3	6.1	9.0
Hazardous Materials Release	1.0	3.3	6.0	9.0
Mobility	1.0	3.1	5.2	9.0

Risk Factor	A Value	B Value	C Value	D Value
Health and Safety	1.0	2.8	5.4	9.0
Environmental	1.0	3.1	5.9	9.0
Aquatic Resources	1.0	2.9	5.5	9.0
Economic	1.0	3.1	5.8	9.0

Analysis:

The purpose of Book 2 is for the participants to provide input to the national risk assessment scales for the 24 risk factors in the world. For each risk factor there is a low (Port Heaven) and a high (Port Hell) severity limit, which are assigned values of 1.0 and 9.0 respectively. The participants determined numerical values for two intermediate qualitative descriptions (the B and C values shown above) between those two extreme limits. On average, participants from this waterway evaluated the difference in risk between the lower limit (Port Heaven, A value) and the first intermediate scale point (B value) as being equal to 1.7; the difference in risk between the first and second intermediate scale points (C value) was equal to 2.6; and the difference in risk between the second intermediate scale point and the upper risk limit (Port Hell, D value) was 3.6.

Book 3 – Risk Assessment

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
3.3	4.8	2.0	1.8	6.7	8.4
Deep Draft Mariner Proficiency	Volume of Recreational Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
1.4	5.9	3.6	6.8	9.0	7.0
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
2.6	6.6	1.3	5.8	5.4	5.5
Recreational Boater Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic
9.0	3.9	4.7	8.5	6.6	6.9

Legend:

A green highlight indicates that participants rated the factor risk less than 2.3. A red highlight indicates that participants rated the factor risk more than 7.7.

Analysis:

The participants evaluated the absolute risk level in the waterway by selecting a qualitative descriptor for each risk factor that best described conditions in the Detroit area. Those qualitative descriptors were converted to numerical values using the scales from the Book 2 results. On those scales, 1.0 represents low risk (Port Heaven) and 9.0 represents high risk (Port Hell), with 5.0 being the mid-risk value. In the Detroit area, 14 of the 24 risk factors were scored at or above the mid-risk value. They were (in descending order):

- Recreational Boater Proficiency (9.0)
- Petroleum Discharge (9.0)
- Configuration (8.5)
- Health and Safety (8.4)
- Environmental (7.0)
- Economic (6.9)
- Dimensions (6.8)
- Personal Injuries (6.7)
- Traffic Mix (6.6)
- Mobility (6.6)
- Volume of Recreational Traffic (5.9)
- Bottom Type (5.8)
- Aquatic Resources (5.5)
- Hazardous Materials Release (5.4)

Book 4 – VTM Tool Effectiveness

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
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Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
3.3 2.5	4.8 2.5	2.0 1.8	1.8 1.4	6.7 3.3	8.4 5.1
OK	OK	OK	OK	OK	Maybe
Deep Draft Mariner Proficiency	Volume of Recreational Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
1.4 1.2	5.9 5.4	3.6 3.0	6.8 3.2	9.0 3.8	7.0 5.0
OK	NO	Maybe	OK	OK	Maybe
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
2.6 2.6	6.6 5.0	1.3 1.4	5.8 3.3	5.4 4.4	5.5 4.3
Maybe	OK	OK	OK	NO	OK
Recreational Boater Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic
9.0 7.6	3.9 3.6	4.7 3.1	8.5 3.5	6.6 5.3	6.9 5.4
NO	Maybe	OK	OK	Maybe	OK

KEY		Book 3	Absolute level of risk
Risk Factor		Book 4	Level of risk taking into account existing mitigations
		OK	Consensus that risks are well balanced by existing mitigations
		Maybe	No consensus that risks are adequately balanced by existing mitigations
Book 3	Book 4	NO	Consensus that existing mitigations do NOT adequately Balance risk
Consensus			

Analysis:

The participants examined all risk factors and the effects of existing mitigations on those risks in the Detroit area. For 15 risk factors, the participants were in consensus that the risk was well balanced by existing mitigations. Consensus is defined as 2/3 of the participant teams being in agreement. For 3 risk factors, the participants were in consensus that risks were NOT adequately

balanced by existing mitigations. For the other 6 risk factors, there was not good consensus on whether existing mitigations adequately reduced risk.

Book 5 – Intervention Effectiveness

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personal Injuries	Health and Safety
OK	OK	OK	OK	OK	Coordination/Planning
					1.3
Deep Draft Mariner Proficiency	Volume of Recreational Traffic	Currents	Dimensions	Petroleum Discharge	Environmental
OK	Rules & Procedures	Coordination/Planning	OK	OK	Coordination/Planning
	2.4	0.8			0.9
Shallow Draft Mariner Proficiency	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Enforcement	OK	OK	OK	Coordination/Planning	OK
0.6				1.2	
Recreational Boater Proficiency	Congestion	Obstructions	Configuration	Mobility	Economic
Rules & Procedures	Coordination/Planning	OK	OK	Coordination/Planning	OK
3.0	0.6	Caution		1.4	

KEY

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

Legend:

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

Coordination / Planning	Improve long-range and/or contingency planning and better coordinate activities / improve dialogue between port stakeholders
Rules & Procedures	Improve rules, regulations, policies, or procedures (nav rules, pilot rules, standard operating procedures, licensing, RNAs, etc.)
Enforcement	More actively enforce existing rules / policies (navigation rules, vessel inspection regulations, standards of care, etc.)
Nav / Hydro Info	Improve navigation and hydrographic information (PORTS, BNTM, charts, coast pilots, AIS, tides & current tables, etc.)
Communications	Improve communications (radio reception coverage, signal strength, reduce interference & congestion, etc.)
Active Traffic Mgmt	Establish/improve a Vessel Traffic Service (info, advice & control) or Vessel Traffic Information Service (information & advice only)
Waterway Changes	Widen / deepen / straighten the channel and/or improve the aids to navigation (buoys, ranges, lights, LORAN C, DGPS, etc.)
Other Actions	Risk mitigation measures needed do NOT fall under any of the above strategy categories

Analysis:

For 8 of the 9 risk factors needing additional risk reduction action, the most selected intervention category had the largest risk improvement:

- Shallow Draft Mariner Proficiency – Enforcement
- Recreational Boater Proficiency – Rules & Procedures
- Volume of Recreational Traffic – Rules & Procedures
- Currents – Coordination / Planning
- Hazardous Materials Release – Coordination / Planning
- Mobility – Coordination / Planning
- Health and Safety – Coordination / Planning
- Environmental – Coordination / Planning

One consensus alert occurred because the most selected category was not the most effective category. No consensus was reached, but the intervention category selected possibly offering the most risk improvement was:

- Congestion – Coordination / Planning

RISKS	RISK MITIGATION STRATEGIES
Vessel Conditions: Vessel Quality	
Today: • 90% of deep draft vessels are of high quality. • Great Lakes vessels are equipped with electronic charts; oceangoing vessels are not. Great Lakes vessels have highest use of electronic navigation aids in the world. • 85% of waterway movements are done by Great Lakes vessels; the other 15%, by oceangoing vessels. • Most foreign flag deep draft vessels are of good quality. 90% are new. Few are targeted for Port State Control (PSC) boardings (less than 1%). Some are cited for deficiencies; but few are detained. Bad actors are generally caught before they enter the Great Lakes. • The domestic deep draft fleet is generally older than the foreign flag fleet, but still in good material condition. • Shallow draft vessel quality is poorer, but still relatively good due to fresh water operations (vs. salt water). Many uninspected vessels. • 20% of recreational vessels are new. 85% of recreational vessels that undergo voluntary inspection are materially sound. Very few recreational vessel boardings result in the identification of material deficiencies. Trends: • Over the past 25 years, recreational boater inexperience has adversely affected vessel maintenance quality. Conversely, there is less quality degradation because of the increasing number of boats stored on shore (vs. in the water). • Industry is converting ships to integrated tank barge units (ITBs) due to lower compliance costs. Fewer U.S. regulations /oversight on these vessels.	Existing Mitigations: • Commercial Vessels: - o Oceangoing vessels are largely new build construction. - o Regulatory inspections for some commercial vessels. - o Classification society standards for commercial vessels. Annual re-certification. - o PSC examinations. - o Stringent inspections at St. Lawrence Seaway. - o Periodic port security and safety inspections. - o ISO 9000 standards for commercial vessels. • Recreational Vessels: - o High number of new build recreational fleet. - o Courtesy examinations for recreational vessels conducted by USCG Auxiliary. - o U.S. construction standards for recreational vessels. Random U.S. Coast Guard factory inspections. New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Vessel Conditions: Deep Draft Mariner Proficiency	
Today: - Typically, 2-3 masters are on board domestic lake carriers. Most U.S. and Canadian masters are harbor pilots and docking pilots with 20+ years of experience. 95% of foreign oceangoing vessels are repeat visitors to the U.S. Most crews are proficient. Trends: - No trends discussed.	Existing Mitigations: - Great Lakes are pilotage waters. - All foreign flag vessels are required to have a U.S. or Canadian pilot. - Continued proficiency programs (U.S. and Canada). New Ideas: - No new ideas discussed.
Vessel Conditions: Shallow Draft Mariner Proficiency	
Today: - Tug drivers are of good quality and experience; however, passenger vessel personnel proficiency is more problematic. - High personnel turnover degrades overall mariner proficiency levels. - Chronic fatigue seems to be a problem, but is not documented. Trends: - Increasing number of inexperienced licensed personnel due to low standards / poor enforcement of sea service experience requirements.	Existing Mitigations: - Uninspected towing vessel boarding programs. - More stringent U.S. regulations for towing vessel endorsements. - Continued proficiency program (U.S. and Canada). - Radar endorsement requirement for operators. New Ideas: - Increase sea service experience standards for towing vessel licenses. - Increase Canadian standards for tanker endorsements. - Increase standards for schools which have 100-ton license courses.

RISKS	RISK MITIGATION STRATEGIES
Vessel Conditions: Recreational Boater Proficiency	
Today: • A number of recreational boaters have poor boat handling skills, high alcohol usage, poor knowledge of vessel maintenance and/or poor understanding of Rules of the Road. • Recreational boats routinely operate in navigation channels and create close call situations with commercial traffic. Particularly problematic with windsurfers and personal water craft (PWC). • Problem areas are north of Belle Isle (near Coast Guard station) and under Blue Water Bridge. • Less than 10% of recreational vessels undergo voluntary inspections. Rate of inspection and training is not keeping current with the increasing number of recreational boating population. • A number of recreational boaters have been observed violating laws (violations of requirements for no wake zones and boating under the influence, etc.). Deters stringent law enforcement by federal and state officials. Trends: • Increasing number of personal water craft (PWCs) and recreational divers. • First time recreational boat owners are purchasing larger boats. Average first boat is 20-24 ft. (previously 10-16 ft.). • Data shows that accident rate is decreasing, but does not capture close calls / incidents that do not result in casualties.	Existing Mitigations: • Insurance requirements. • Power Squadron and Coast Guard Auxiliary safe boating courses. • Canadian mandatory certification / training program for all recreational boat operators. Minimum age requirement of 16 years. Program's 10 year phase-in ends in 2009. • Michigan requirements for 8-hour course for minors (under 16). Horse-power requirements. PWC restrictions. • St. Clair county boater education program for middle school students. • Federal and state law enforcement presence. • Recent changes to U.S. and Michigan laws to enforce and prosecute boating under the influence. • Lake Carriers Association captures data for incidents / encounters with recreational boaters and submits them to the Coast Guard weekly. New Ideas: • Increase regulation / enforcement of recreational boaters at both the federal and state levels. • Establish federal requirements for state certification programs for recreational boaters. • Increase boating education in schools. Integrate with driver education. • Establish incentive programs with insurance companies for boater education. • Increase public awareness of boating dangers and need for safe boating practices through advertising at boat shows, boating clubs, and on television, radio, internet. Develop pamphlets, videos, etc. Better identify target audience and develop specific methods to reach them. • Require marinas to distribute boating regulations and safe boating materials to users.

RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions: Volume of Commercial Traffic	
Today: - Commercial traffic volume is not a problem. - During the 9-month navigation season: 10,000 deep draft vessel transits 3,330 shallow draft vessel movements (1,200 vessel movements on the St. Clair River; 2,100 vessel movements on the Detroit River). - Limited number of anchorages down bound after Blue Water Bridge. Trends: - Flat trend for traffic congestion. - Slight increase in the number of transits during low water levels (1999-2000).	Existing Mitigations: - Vessel Traffic Service (VTS) Sarnia and interconnectedness with other VTS and communication systems. - Required equipment. - Notices to mariners / shipping. - Harbor Safety Committees (Detroit - St. Clair workgroup) facilitates communication among industry, government, and other stakeholders. New Ideas: - No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions: Volume of Recreational Traffic	
Today: • Volume of recreational traffic is too high, particularly during boating season (Feb. – Nov.). • 900,000 registered recreational vessels in Michigan—highest per capita in the U.S. • Gross Ile to Port Huron has largest number of registered recreational vessels in U.S. • 700,000 recreational boats in Ontario. • Approximately 1,000 marine events annually on the waterway. • Lack of interagency coordination regarding establishment of recreational boater access points. Current permitting process does not address impacts of increased recreational boater volume. Trends: • Increasing number of recreational vessels.	Existing Mitigations: • Fewer recreational boats on the water due to recent low water levels, bad weather, increasing petroleum prices, and poor U.S. economy. • Law enforcement. • Limited access points for egress into waterways. • Marine event permitting process / coordination. One-stop shopping for approval of marine events in Group Detroit area of responsibility. New Ideas: • Limit public access sites for recreational boats. • Hot wash after major marine events with Coast Guard, event sponsor, and other stakeholders. • Review current Coast Guard standards for approving marine events—ensure they do not have adverse impacts on safety. Address both boater behavior and volume. May need to limit size of spectator zones, regattas, races, etc. • Establish separate traffic channel for recreational vessels in areas of high commercial traffic, particularly under Blue Water Bridge.
Traffic Conditions: Traffic Mix	
Today: • Multiuse waterway. • Recreational boats regularly cross commercial traffic lanes. • Divers in traffic lanes. • Waterways generally open to commercial traffic during marine events. Trends: • No trends discussed.	Existing Mitigations: • Coast Guard Auxiliary and Power Squadron education of recreational boaters. • Enforcement of rules of the road. • COTP regulatory authority to stop any activity that adversely impacts safety. New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions: Congestion	
Today: • Deep draft traffic congestion fluctuates and is not predictable. Waterway is a transit area, not a destination port. • High recreational boat congestion, particularly during marine events in the following areas: ○ North side of Belle Isle. ○ Below Belle Island—International Freedom Festival. ○ Port Huron and Upper St. Clair River—power boat races. ○ Bottom of Lake Huron / head of St. Clair River. • No permits required for marine events in Canada with the exception of Windsor area events. Trends: • No trends discussed.	Existing Mitigations: • HSC serves as forum for resolving multi-use waterway issues, particularly for marine events. Deconflicts waterway joint usage and ensures safety. • All marine events permitted since 9/11. New Ideas: • Advance warning system (visual or auditory) announcing oncoming commercial traffic to recreational boaters in vicinity of Blue Water Bridge. • 24-hour patrols in areas of high commercial and recreational traffic mix. • Impose limitations for marine events regarding proximity to wildlife preserves and sensitive areas.

RISKS	RISK MITIGATION STRATEGIES
Navigational Conditions: Winds	
Today: • Prevailing winds from west and southwest. Average wind 12kt. Wind is seasonal and predictable. 32 thunderstorms annually. • Detroit and St. Clair Rivers cross winds challenge navigation. Stronger winds on Lake Huron and Lake Erie. • Wind poses challenge to position holding. • Problem areas: ○ Low end of Detroit River at Lake Erie. ○ Ojibway anchorage south of Belle Isle. Trends: • No trends discussed.	Existing Mitigations: • Vessels rely on buoys at lower end of Detroit River at Lake Erie for position holding. • Most ships can access weather information from University of Michigan and National Oceanographic and Atmospheric Administration (NOAA) websites (updated every 4 hrs.). New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Navigational Conditions: Currents	
Today: • Currents are generally predictable and constant. Maximum current is typically less than 2 knots. • Strong down bound current at Blue Water Bridge. Limits master's discretion for action. At Blue Water Bridge, current is in excess of 3 knots at maximum water flow. • Cross currents at Amherstburg Channel and Livingstone Channel convergence and Hole in the Wall. • Slow speed limits. • At Blue Water Bridge, large freighters ride currents downstream and have very limited maneuverability. Trends: • Two incidents in past 18 months with tug barges losing control.	Existing Mitigations: • One-way traffic scheme at Blue Water Bridge. • Local knowledge and experience of pilots and masters. • Deconfliction of waterways by law enforcement to ensure safe passage of large vessels restricted by currents on individual basis. • St. Clair current meter. • Lake carriers equipped with bow and stern thrusters. Some oceangoing vessels equipped with bow thrusters. New Ideas: • Post signs. • Install USACE current meters on Detroit and St. Clair Rivers. • Shore-side signage of rules / reminders for recreational boaters / windsurfers near the Blue Water Bridge. • Restricting recreational usage of waterways to deconflict waterway usage. • Notify recreational boaters of commercial vessels' limited maneuverability when transiting down bound through the Blue Water Bridge.

RISKS	RISK MITIGATION STRATEGIES
Navigational Conditions: Visibility Restrictions	
Today: • Visibility drops below 2 miles only 2% of the time. • Fog problematic only 5 days / year. Fog in open lake, not in river. Morning fog. • More visibility restrictions due to squalls, not fog. Trends: • Detroit and St. Clair Rivers have never been closed due to fog.	Existing Mitigations: • Many vessels have precision electronic navigation equipment. New Ideas: • No new ideas discussed.
Navigational Conditions: Obstructions	
Today: • Ice restricts navigation from Nov-March. Fewer vessel transits, varies by year. In 2003, 90 transits in Jan. and 40 in Feb. ○ Occasional extraordinary icebreaking assistance needed. Problems only with vessels that are not ice capable. ○ HAZMAT truck barge does not get necessary icebreaking assistance. ○ Ice moves buoys off station in winter—buoys on U.S. side become a hazard to navigation. • Spring thaw causes trees and other natural and man-made debris to temporarily accumulate in Lake St. Clair. • Detroit-Windsor tunnel and high pressure gas lines west of Ambassador Bridge cause some obstructions for anchoring. Trends: • No trends discussed.	Existing Mitigations: • Canadian and U.S. Coast Guard icebreaking. Highly coordinated ice navigation / icebreaking. All key stakeholders communicate daily regarding icebreaker needs and resources. • Operation Coal Shovel. • Local notice to mariner / shipping broadcasts of obstructions. New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Waterway Conditions: Visibility Impediments	
Today: • Background lighting from Detroit affects visibility from Ambassador Bridge to Belle Isle. • Local practices (U.S. and Canadian) of lighting entire vessels can cause confusion. Trends: • No trends discussed.	Existing Mitigations: • HSC promptly addresses lighting problems. New Ideas: • No new ideas discussed.
Waterway Conditions: Dimensions	
Today: • Dredged channels are 700-1000 ft. wide. • Width restricts navigation throughout system. • Shoaling is problematic at bottom of Livingstone Channel. • Mouth of Black River silts annually. U.S. Army Core of Engineers (USACE) addresses promptly. Trends: • Several large ships (1,000 ft long) built in 1970's. Future increase in size for domestic shipping is unlikely—not economical due to 105 ft. width restriction in the Soo Locks. International trade restricted to Seaway sized vessels, that is vessel beams no greater than 78 feet.	Existing Mitigations: • One way traffic schemes. • VTS shares water level data for any waterway. 16 waterway sensors along Detroit and St. Clair Rivers. • Lake Carriers Association captures water level depth data every 6 minutes. Information shared among mariners. • Coordination between masters and VTS for vessel passage. Masters elect not to pass in Lake St. Clair due to low water depth. • Speed limits. • USACE harbor lines include entire waterway (on U.S. side) which means all construction requires USACE permit. • USACE resources: contracted dredging program (good), obstruction/ shoal removal (adequate) survey vessels, upgrading hardware and software, dedicated crane barge for Livingstone Channel; dive team activities, published depth information, notice to navigation interests. • VTS Sarnia provided 29,000 traffic advisories to vessels in 2000. New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Waterway Conditions: Bottom Type	
Today: • Hard bottom at Livingstone and Amherstburg Channels. More problematic when high westerly winds lower water levels. • 2-3 groundings in past 2 years. • Lake Huron Cut—gravel and boulders. Trends: • No trends discussed.	Existing Mitigations: • Local knowledge and experience. • See Existing Mitigations in Dimensions Category. New Ideas: • No new ideas discussed.
Waterway Conditions: Configuration	
Today: • Significant number of bends in waterway. • Many convergences. • Cross traffic from 4 ferry operations: - o Amherstburg to Bois Blanc Island. - o Above River Rouge. - o Walpole Island. - o Marine City. Trends: • No trends discussed.	Existing Mitigations: • Situational awareness provided by VTS and mariners. • Ferries monitor radio traffic. Ferries contact VTS during bad weather. • Electronic charting. • Radars. • High level of local knowledge and experience regarding vessel transit routes and schedules due to repetitive nature of commercial vessels transits. • USACE and Canadian and U.S. Coast Guard respond quickly to situations limiting navigation capabilities (e.g., ATON outage, vegetation overgrowth, etc.). • Local U.S. Coast Guard ATON team. New Ideas: • Implement Automatic Identification System (AIS).

RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences: Personal Injuries	
Today: • Great Lakes foreign cruise ships—maximum capacity 600 persons. Average 250 passengers. • Dinner cruise ships—maximum capacity 250 passengers. • Ferry boats—average capacity 12 persons / 8-10 automobiles. • Hypothermia concerns due to cold water. Trends: • No trends addressed.	Existing Mitigations: • Shallow river depths and close to shore proximity. • Coast Guard regulatory requirements including exercises, drills, and required equipment (including Emergency Position Indicating Radio Beacons). Currently planning for mass rescue operation exercise. • Sarnia shore based emergency response exercises. • Coordination / exercises with fire departments for marine fire preparedness. • Quick response of SAR assets. Including Coast Guard air station resources. • Detroit Police Department dive team. New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences: Petroleum Discharge	
Today: • Some petroleum bulk carriage. Maximum load 75,000 bbls. Tankers carry lighter oil / gasoline. Tank barges carry heavier oil. • In 2002, 693 transits of tankers less than 50,000 DWT. • In 2002, 12 transits (2 or 3 vessels) of vessels greater than 50,000 DWT. • Low tolerance among residents to oil spills— heavy recreational use of waterways, high number of residential waterfronts. • Detroit currently has pollution response capability for a major oil spill. Trends: • Few oil spills on the Great Lakes from vessels. Most spills are non-point source discharges.	Existing Mitigations: • By 2004, all vessels transiting waterways will fulfill Oil Pollution Act of 1990 (OPA 90) requirements for single hull phase out / implementation of double hull requirements. • All Lake Carrier Association vessels have double hull fuel and ballast tanks. • Regulatory requirements for pollution response equipment for vessels and shore side. • Pollution Response Exercise Program (PREP) requirements. • International drills. • Pre-designation of sensitive areas. • International Safety Organization (ISO) 14000 certification for pollution preparedness. • Marine Pollution Control (a premier oil spill recovery organization) is located in Detroit. New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences: Hazardous Materials Release	
Today: • Very few transits of HAZMAT carriers. • Tankships less than 40,000 DWT carry HAZMATS (hydrochloric acid, chlorine, Benzene, etc.) to Chemical Alley. Typical cargo is less than 3,000-5,000 gallons. • Canadian vessels permitted innocent passage through U.S. waters—cargoes unknown to the U.S. Coast Guard. Trends: • Forthcoming implementation of International Port Security Code (ISPS) requirements for reporting of vessel position, destination, and cargo type for HAZMAT carriage.	Existing Mitigations: • Most HAZMAT is shipped via rail or truck with very little carried in containers or compartments onboard vessels. Those vessels that do carry HAZMAT are bound for Ports in Canada. • Area Contingency Plan (ACP) appendix for HAZMAT (focus on personnel protection and community notification). • Ontario laws for criminal liability for corporate officers for negligent handling of HAZMAT. New Ideas: • Require tug escorts for HAZMAT carriers. • Establish requirements for declaration of HAZMAT cargo types and amounts to Canadian and U.S. agencies. • More public outreach / education. • Continued coordination of local, state, and federal emergency service agencies.

RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences: Mobility	
Today: • Large vessel collision or sinking could necessitate waterway closure and stop transits to / from upper Great Lakes. • Inadequate resources immediately available for heavy salvage / removal. Response could take days or weeks. Would require high powered tugs from upper Great Lakes and salvage equipment shipped from the east coast. • History of previous waterway closures due to marine casualties and shore side incidents: ○ 9/11 bomb threat on Blue Water Bridge. ○ River Rouge oil spill. ○ River Rouge dock collapse (affected Rouge Steele receiving product; navigation resumed within 3 days). ○ Canadian HAZMAT shore side spill. • River Rouge bridges vulnerable to allision. • Wall south of Blue Water Bridge (Michigan side) vulnerable to allision. Trends: • No trends discussed.	Existing Mitigations: • Ambassador Bridge and Blue Water Bridge pylon locations protected from allision (on shore or inside curve). • Livingstone and Amherstburg Channels provide alternate routes for transit in case of grounding on hard bottom. • Design of Great Lakes carriers mitigates breaking and sinking. Inherent stability in design. • Salvage plans submitted for review by the Marine Safety Center. New Ideas: • Establish interagency network / regional response team for strategy development / implementation plan for salvage operation. Identify necessary salvage equipment in advance. • Conduct drill of large salvage operation. •

RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences: Health and Safety	
Today: • Waterway is located near high population centers. Detroit and St. Clair Rivers heavily lined with waterside residences. • Approximately 15 drinking and industrial water intakes: ○ 2 drinking water intakes in Lake Huron. ○ 2 drinking water intakes in Detroit River (N. Belle Island and Fighting Island). ○ Windsor drinking water intake S. Belle Island. ○ Walpole Island drinking water intake. ○ Several small cities in St. Clair River have drinking water intakes. ○ Several industrial water intakes. Trends: • No trends discussed.	Existing Mitigations: • Natural environmental mitigations for HAZMAT spills (dissolution, currents, etc.). • Shipped HAZMAT products are non-gases and will stay on / in water. Several hydrophobic products. • Good communication network among local emergency services and Coast Guard for emergency response. • ACP provides for public notification protocol. • Michigan's Pollution emergency alerting system (PEAS) to notify emergency service agencies. • Alternate drinking water intakes are available as necessary. New Ideas: • Implement emergency broadcast system or wide-area notification system (e.g., automatic telephone notification). • Implement additional planning, exercises, drills, and networking with local waterside and shore-side emergency service personnel (including hospitals). • Annually review plans to ensure updated contact information. • Establish cooperative agreements with public and private sector emergency service providers. • Establish single, integrated center for emergency response operations in Detroit.

RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences: Environmental	
Today: • Spawning, resting, nursery grounds for protected species including sturgeon, mussel, and other fish. • Sensitive areas include: Blue Water Bridge, Detroit River, head of Anchor Bay, Walpole Island, Detroit International Wildlife Area, and Turkey Island. • Native American ownership of environmentally sensitive areas complicates coordination / action for environmental protection and response. Trends: • No trends discussed.	Existing Mitigations: • ACP identification of sensitive areas. • Exercises for natural resource pollution response. • Established agency and media notification system to public regarding safety of drinking waters. • Several towns have reserve water supplies. • Natural resource damage assessment (NRDA) requirements for corporations. New Ideas: • Leverage technologies including geographic display systems (GIS) to disseminate updated information on environmentally sensitive areas. Will require integration of data sources from multiple agencies including Great Lakes Commission, Environment Canada, etc. Identify lead organization to maintain comprehensive database or develop standards for integrated database to which multiple agencies can support.
Subsequent Consequences: Aquatic Resources	
Today: • There is heavy recreational fishing and little commercial harvesting. Some commercial harvesting in near Lake Erie Southeast Shoal. Trends: • No trends discussed.	Existing Mitigations: • Arrangements in place to use local news media resources to notify public of pollution incidents. • Good public education / outreach regarding safe consumption / interactions with aquatic resources. New Ideas: • No new ideas discussed.

RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences: Economic	
Today: • Waterway is chokepoint for entire Great Lakes system. Closure would have national impact (Canada and U.S.). Automotive plants throughout U.S. depend on motors built in Detroit. • Waterway closure also would have economic impacts for Detroit metropolitan area particularly during certain seasons / events (e.g., recreation). • Waterway closure would have huge economic impact on shippers. A lake carrier's income loss could be \$20K/day. Previous 2 week closure (due to ice) resulted in \$25M economic loss to shippers. • No alternate modes of transportation for movement of materials and products. Trends: • No trends discussed.	Existing Mitigations: • Industries stockpile raw materials for use during winter seasons. During navigation season, inventory for steel company is 4 days; cement, 2-3 days. • Third party claims for economic damages / recovery. • Waterway closure would bring to bear strong industry / politic pressure and resources to reopen waterway. New Ideas: • No new ideas discussed.