Ports and Waterways Safety Assessment
Workshop Report
Long Island Sound

Introduction

Risk identification and mitigation are and have been ongoing activities within the Long Island Sound area. As a step toward standardizing methodology, a formal Ports and Waterways Safety Assessment (PAWSA) for Long Island Sound was conducted in Port Jefferson, New York on 3-4 May 2005. The results of that workshop are provided in this report and include 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

Assessment Process

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

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

The first step in the process is for the participants to assess their expertise with respect to the six risk categories in the model. Those self assessments are used to weigh inputs during all subsequent steps. The second step is for the participants to provide input for the rating scales used to assess risk in the next step. The third step is to discuss and then numerically evaluate the absolute risk levels in the waterway using pre-defined qualitative risk descriptors. In the fourth step, the participants discuss and then evaluate the effectiveness of existing mitigation strategies

in reducing risk. Next, the participants are asked to offer new ideas for further reducing risk, for those factors where risk is not well balanced with existing mitigations. Finally, the effectiveness of various intervention actions in reducing unmitigated risk is evaluated.

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

Participants

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

Participants	Organization
Mr. Chris Anglin	Cross Sound Ferry Services, Inc.
CDR Andrew Beaver	NOAA
Capt. Alan Bish	Reinauer Transportation Companies
LCDR Alan Blume	USCG Group/Marine Safety Office Long Island Sound
CAPT Peter Boynton	USCG Group/Marine Safety Office Long Island Sound
Mr. Dennis Butts	Shell
Capt. Vincent Cashin	Connecticut State Marine Pilots
Mr. Nick Crismale	Connecticut Lobsterman's Association
Mr. Robert DeMoustes	Keyspan Energy
Mr. James Divan	Riverhead Police Department
Ms. Maureen Dolan	Citizen's Campaign for the Environment
Capt. Donald Fromm	Bridgeport – Port Jefferson Steamboat Co.
Mr. Tommy George	Reinauer Transportation Companies
Mr. Richard Gimbl	Suffolk County Fire Rescue and Emergency Services
Capt. Brad Glas	Hel-Cat II & National Party Boat Owner's Alliance
Chief Michael Grant	City of New Haven Fire Department
Mr. Michael Griffin	Connecticut Harbor Management Association
Mr. Bruce Johnson	Riverhead Town Fire Marshall
Mr. Peter Koutrakos	Town of Brookhaven Harbor Master
LT Andrea Logman	USCG Group/Marine Safety Office Long Island Sound
Ms. Leah Lopez Schmalz	Save the Sound
Col. Eric Nelson	Connecticut State Environmental Conservation Police
SCPO James Nolda	USCG Aids to Navigation Team
Mr. Lance Savaria	Bouchard Transportation Corporation, Inc.

Participants	Organization
Mr. James J. Schwartz	New Haven Fire Department
Mr. Ed Springer	Suffolk County Fire Rescue and Emergency Services
Capt. David Thomson	Shell Trading (US) Co.
Mr. Larry Williams	Connecticut Shellfisherman's Association
LT Michael D. Woods	U.S. Navy
Dr. Joel Ziev	EPA LIS Study – Citizen's Advisory Committee: Town of North Hempstead

Observers	Organization
Mr. Kenneth Bergquist	Sea Secure
Ms. Froydis Cameron	Broadwater
Sgt. Ed Frost	Riverhead Police Department
Mr. Bill Gash	Connecticut Pilot Commission
Mr. Nick Guerra	Potomac Management Group, Inc.
Mr. Frederick Hall	Bridgeport – Port Jefferson Steamboat Co.
PA1 Mike Hvozda	USCG Public Affairs
Ms. Susan Jacobson	Connecticut DEP Office of Long Island Sound Programs
ENS Vanessa L. Looney	USCG Group/Marine Safety Office Long Island Sound
Mr. Bart Mansi	Connecticut Commercial Lobsterman's Association
Mr. James Miller, Jr.	Miller Marine
Mr. David Pohorylo	Connecticut Pilot Commission
Mr. Robert H. Pouch	Board of Commissioners of Pilots (New York State)
Mr. Bill Staeger	Entrix Environmental Consultants
Mr. Alan Stevens	Connecticut Department of Transportation: Aviation & Ports
Mr. Terry Turpin	Federal Energy Regulatory Commission
Mr. Grant Westerson	Connecticut Marine Trades Association
Mr. David Williams	New York State Department of Transportation
LTJG Nikki Wood	USCG Headquarters (G-MWV): Office of Vessel Traffic Management

Facilitation Team	Organization	Email
LT Nick Neely	Office of Vessel Traffic Management (G-MWV) USCG Headquarters	Transferred
Mr. Doug Perkins	Potomac Management Group, Inc.	dperkins@potomacmgmt.com
Mr. Paul Barger	Potomac Management Group, Inc.	pbarger@potomacmgmt.com
Ms. Kristine Higman	Potomac Management Group, Inc.	khigman@potomacmgmt.com

Geographic Area:

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

- Long Island Sound westward from The Race to the Throgs Neck Bridge, including the ports of New London (to Allyns Point), and to the I-95 bridges at New Haven, Bridgeport, and Norwalk; Port Jefferson Harbor; Fishers Island Sound; Block Island Sound from Watch Hill south to Montauk Point westward to The Race, excluding Gardners Bay.

Numerical Results

Book 1 – Team Expertise

In *Book 1,* the workshop participants 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, 42% of the participant teams placed themselves in the upper third, 29% in the middle third, and 29% in the lower third of all teams. This distribution is fairly typical because the participants were chosen for their acknowledged expertise.

Book 2 – Risk Factor Rating Scales

Book 2 Results:

Risk Factor	A Value	B Value	C Value	D Value
Deep Draft Vessel Quality	1.0	3.0	5.7	9.0
Shallow Draft Vessel Quality	1.0	3.0	5.6	9.0
Commercial Fishing Vessel Quality	1.0	3.1	5.7	9.0
Small Craft Quality	1.0	3.0	5.7	9.0
Volume of Commercial Traffic	1.0	3.0	5.3	9.0
Volume of Small Craft Traffic	1.0	2.8	5.8	9.0
Traffic Mix	1.0	2.4	4.8	9.0
Congestion	1.0	2.8	5.0	9.0
Winds	1.0	2.5	5.2	9.0
Water Movement	1.0	2.9	5.1	9.0
Visibility Restrictions	1.0	2.9	5.7	9.0
Obstructions	1.0	2.1	4.5	9.0
Visibility Impediments	1.0	3.1	5.6	9.0
Dimensions	1.0	3.0	5.5	9.0
Bottom Type	1.0	2.4	5.1	9.0
Configuration	1.0	2.8	5.4	9.0
Personnel Injuries	1.0	3.1	5.6	9.0
Petroleum Discharge	1.0	3.7	6.2	9.0
Hazardous Materials Release	1.0	3.6	6.1	9.0
Mobility	1.0	3.0	5.3	9.0
Health and Safety	1.0	3.0	5.6	9.0
Environmental	1.0	3.1	5.9	9.0
Aquatic Resources	1.0	2.8	5.5	9.0
Economic	1.0	3.1	5.7	9.0

Book 2 Analysis:

Book 2 is technically essential to the mathematical process used in the PAWSA model. The PAWSA risk assessment process uses an arbitrary 1 to 9 scale, where 1 represents very low risk and 9 represents extremely high risk. Participants calibrated intermediate points on the risk assessment scale for each risk factor, referred to as the "B" and "C" values in the table above. On average, participants from this waterway calculated the intermediate risk points as 2.7 and 5.3, which are very close to the national values (2.9 and 5.4) established by prior PAWSA workshop participants.

Book 3 – Absolute Risk Levels

Book 3 Results:

Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
4.9	5.2	2.7	5.1	9.0	6.6
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
3.7	5.9	3.8	4.6	9.0	9.0
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
5.9	6.6	5.0	6.9	8.8	8.8
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
8.8	7.1	4.5	8.2	8.7	5.9

Risk values highlighted in red (values at or above 7.7) denote very high absolute risk levels. Although there are none here, risk values at or below 2.3 would be highlighted in green denoting very low absolute risk levels.

Book 3 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 Long Island Sound area. Those qualitative descriptors were converted to numerical values using the scales from the *Book 2* results. On those scales, 1.0 represents low risk (best case) and 9.0 represents high risk (worst case), with 5.0 being the mid-risk value.

In the Long Island Sound area, 18 risk factors were scored at or above the mid-risk value. They were (in descending order):

- Personnel Injuries / Petroleum Discharge / Environmental (9.0)
- Small Craft Quality / Hazardous Materials Release / Aquatic Resources (8.8)
- Mobility (8.7)

- Configuration (8.2)
- Congestion (7.1)
- Bottom Type (6.9)
- Traffic Mix / Health and Safety (6.6)
- Commercial Fishing Vessel Quality / Volume of Small Craft Traffic / Economic (5.9)
- Volume of Commercial Traffic (5.2)
- Visibility Impediments (5.1)
- Visibility Restrictions (5.0)

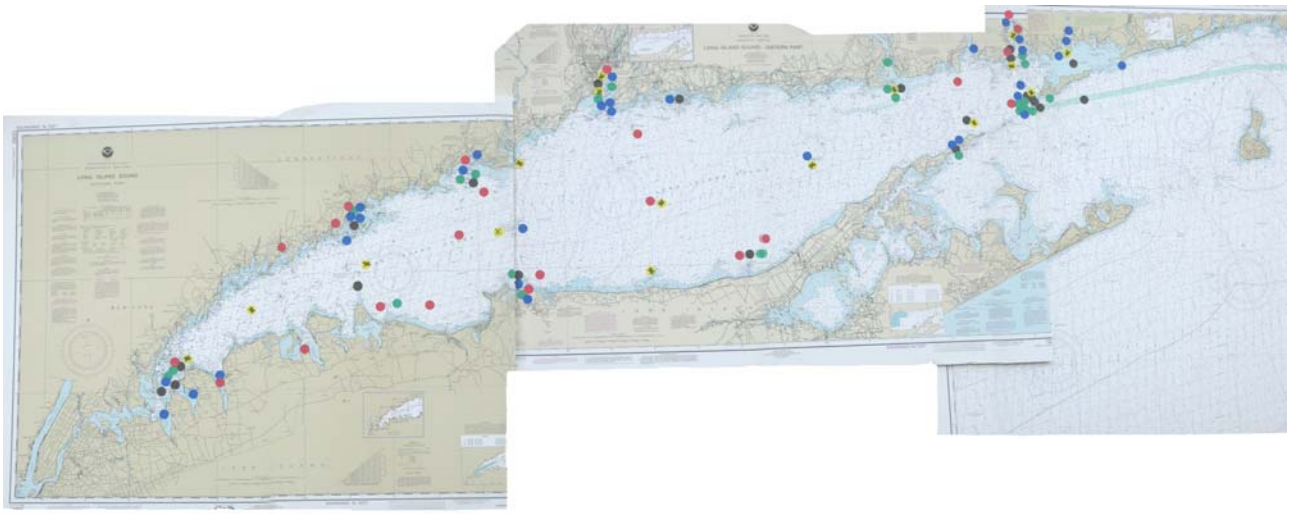
Photo of Waterway:

As participants identified specific locations associated with particular risks, a nautical chart of the area was annotated with colored dots corresponding to the risk category being discussed, as follows:

Brown	Vessel Conditions
Yellow	Traffic Conditions
Green	Navigation Conditions
Blue	Waterway Conditions
Red	Consequences

The completed chart is shown below. Note the concentrations of dots in seven locations:

- The Race
- New London Harbor
- New Haven Harbor
- Bridgeport Harbor
- Norwalk Harbor
- Execution Rocks
- Port Jefferson Harbor



Book 4 – Present Risk Levels

Book 4 Results:

Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
Deep Draft Vessel Quality		Volume of Commercial Traffic		Winds		Visibility Impediments		Personnel Injuries		Health and Safety	
4.9	3.2	5.2	3.7	2.7	2.2	5.1	3.8	9.0	7.6	6.6	5.8
Balanced		Balanced		Balanced		Maybe		NO		Maybe	
Shallow Draft Vessel Quality		Volume of Small Craft Traffic		Water Movement		Dimensions		Petroleum Discharge		Environmental	
3.7	2.6	5.9	5.3	3.8	2.6	4.6	3.9	9.0	7.4	9.0	7.4
Balanced		NO		Balanced		Maybe		NO		Maybe	
Commercial Fishing Vessel Quality		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
5.9	5.7	6.6	5.7	5.0	4.0	6.9	5.2	8.8	7.4	8.8	7.4
NO		NO		Maybe		Maybe		Maybe		Maybe	
Small Craft Quality		Congestion		Obstructions		Configuration		Mobility		Economic	
8.8	7.8	7.1	5.9	4.5	3.9	8.2	5.4	8.7	6.5	5.9	4.5
NO		NO		Maybe		Maybe		Maybe		Balanced	

KEY	
Risk Factor	
Book 3	Book 4
Consensus	

	EXPLANATION
Book 3	Absolute 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
NO	Consensus that existing mitigations do NOT adequately balance risk

Book 4 Analysis:

The participants examined all risk factors and the effects of existing mitigations on those risks in the Long Island Sound area.

For 6 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 7 risk factors, the participants were in consensus that risks were NOT adequately balanced by existing mitigations. For the other 11 risk factors, there was no consensus on whether existing mitigations adequately reduced risk.

Book 5 – Intervention Effectiveness

Book 5 Results:

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	Coordination / Planning	Coordination / Planning	Coordination / Planning
			1.5	3.2	1.8
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
Balanced	Rules & Procedures	Balanced	Waterway Changes	Coordination / Planning	Coordination / Planning
	1.9		2.0	4.4	3.1
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
Rules & Procedures	Coordination / Planning	Rules & Procedures	Nav / Hydro Info	Coordination / Planning	Coordination / Planning
2.9	2.6 Caution	1.6	2.7	2.9	1.6
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
Rules & Procedures	Coordination / Planning	Other Actions	Rules & Procedures	Coordination / Planning	Balanced
3.7	2.9	1.7	2.4	1.9	

KEY			EXPLANATION
Risk Factor		Intervention	Intervention category 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

Legend:

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

Intervention Category Definitions:

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

Book 5 Analysis:

The 18 risk factors needing additional risk reduction action are shown below ordered from highest to lowest possible risk improvement.

- Petroleum Discharge – Coordination/Planning (4.4)
- Small Craft Quality – Rules & Procedures (3.7)
- Personnel Injuries – Coordination/Planning (3.2)
- Environmental – Coordination/Planning (3.1)
- Commercial Fishing Vessel Quality – Rules & Procedures (2.9)
- Congestion – Coordination/Planning (2.9)
- Hazardous Materials Release – Coordination/Planning (2.9)
- Bottom Type – Nav/Hydro Info (2.7)

- Traffic Mix – Coordination/Planning (2.6)
- Configuration – Rules & Procedures (2.4)
- Dimensions – Waterway Changes (2.0)
- Volume of Small Craft Traffic – Rules & Procedures (1.9)
- Mobility – Coordination/Planning (1.9)
- Health and Safety – Coordination/Planning (1.8)
- Obstructions – Other Actions (1.7)
- Visibility Restrictions – Rules & Procedures (1.6)
- Aquatic Resources – Coordination/Planning (1.6)
- Visibility Impediments – Coordination/Planning (1.5)

One consensus alert occurred because there were two popular risk mitigation categories chosen by the participants. The second possibility is shown below:

- Traffic Mix – Rules & Procedures (2.6)

Planned Actions

The catalog of risks and possible mitigation strategies derived from the Long Island Sound PAWSA workshop is set forth at the end of this report. This provides an excellent foundation from which a future harbor safety organization can further examine and take appropriate risk mitigation actions for both near-term action and for future risk mitigation planning.

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

Vessel Conditions: Deep Draft Vessel Quality

Today:

- Most deep draft ships are foreign flag
  - Engineering is usually good.
  - Port State Control (PSC) Priority I and II vessels are 20% of the total.
  - 140-160 PSC boardings per year.
  - Few detainable issues; usually firefighting and lifesaving equipment problems.
- Ships carrying low-value cargoes (coal, scrap metal, salt, cement, etc.) tend to be poorer quality.
  - Average 2 ships carrying low-sulfur coal from Indonesia monthly; anchor in Sound and offload to barges via purpose-built ship.
- Tank vessels tend to be better than bulk cargo ships because of the standards tankers meet.
- Less-safe deep draft ships are usually going to New Haven; some to New London; all transit The Race.
- Foreign crews are a mix of European and Asian... good mariners but require watching.

Trends:

- Overall vessel quality improving.
- Shortage of mariners may be impacting level of training.

Existing Mitigations:

- Zone-wide Regulated Navigation Area (RNA) requiring positive approval to enter Long Island Sound.
- Compulsory pilotage.
  - New training for pilots; simulator training.
- PSC exams to ensure compliance with STCW, SOLAS, International Safety Management (ISM) Code, and MARPOL standards.
- IMO regulations, International Safety Management (ISM) Code, double-hulls, and company vetting regimes using the OCIMF SIRE program.
- Navigation safety equipment (ECDIS, GPS, radar, AIS, etc.).

Broadwater Proposal Information

- Safety and security zones will enhance safety.
- LNG carriers are expensive, high-quality.
  - High initial cost and long-term charter agreements pressures companies to operate and maintain them at high standards.
  - Have double hulls; all major systems have redundancies.
- High level of crew training required (gas certificate).
- Current excess LNG carrier tonnage is reducing cargo rates and could have negative impact on regular maintenance; is expected to be short-term.

New Ideas:

- Risk level judged to be well balanced with existing mitigations, so no new ideas were discussed.

Vessel Conditions: Shallow Draft Vessel Quality

Today:

- Overall good and improving: 15% of shallow draft vessels have some safety concerns.
- Licensing now often obtained through schooling vs. real experience, resulting in less qualified crews.
- Uninspected vessels not so competent.
- Subchapter T and K licensed captains, unlicensed crews who are hired for the season; high crew turnover and retraining; 20% of these vessels are less proficient.
- Subchapter H boat crews are all licensed or documented by the Coast Guard; vessels are inspected and are in good shape.
- Some crews have the technology equipment but don't know how to use it fully; not using good coastwise piloting.
- Crewing of small passenger vessels could be improved.
- Commercial tug fleet crews are knowledgeable / experienced.

Trends:

- Responsible Carrier Program (RCP) has improved the tug/barge fleet.

Existing Mitigations:

- U.S. licensing requirements.
- USCG vessel inspections of shallow draft fleet, but does not include uninspected passenger vessels.
- Barge operating companies vetting schemes using the Oil Companies International Marine Forum (OCIMF) / SIRE program.
- Double-hull barge phase-in / single-hull barge phase-out schedule.
- Small Passenger Vessels (T and K Boats):
  - Are USCG inspected.
  - Carry USCG licensed captains.
  - Operators have extensive local knowledge.
  - Are being replaced with more capable, modern vessels.
- Tug and Barge Industry:
  - The American Waterway Operators (AWO) RCP, providing standards of care for vessel operations, training and certification of vessel operators and crew, that meet / exceed Federal and international standards. AWO / CG studying ways to reduce fatigue factors; 2/3 done. To be incorporated into RCP.
  - Sweeping changes in licensing…proficiency demonstration requirements. More detailed and practical factor oriented. Check rides from designated examiners.
  - Petroleum barge crews are subject to Crew Endurance Management System (CEMS).
  - Bridge management training.

New Ideas:

- Risk level judged to be well balanced with existing mitigations, so no new ideas were discussed.

Vessel Conditions: Commercial Fishing Vessel Quality

Today:

- F/V maintenance is sensitive to economic conditions. Generally good.
  - Adapting the vessel to other fisheries sometimes leads to stability and structural issues.
- Not AIS equipped.
- Area knowledge is high; very few F/V from outside the area.
- Fatigue:
  - Mostly day trips.
  - East of The Race: operators are tired; boats on autopilot; 90% are a problem.
- VHF: some F/V operators don't respond or are unintelligible.
- Trouble with communications to other commercial vessels.
- Lack of required certification, cold water immersion, navigation, licensing.

Trends:

- Casualty investigations show that crews involved had limited knowledge of Navigation Rules.

Existing Mitigations:

- Voluntary crew training programs.
- Voluntary fishing vessel inspection program.
  - Many repeat inspections, but not a significant percentage of the fleet.

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

Require licensing (15) [COMDT (G-MSO), State Legislatures]
Require inspections (8) [COMDT (G-MSO), State Legislatures]
Require training (8) [COMDT (G-MSO), State Legislatures]
More enforcement of existing regulations (6) [Sector LIS, Harbor Masters, CT/NY LE]
Increase enforcement staff (3) [COMDT (G-M & G-O), State Legislatures]
Mandatory formal radio telephone training (2) [COMDT (G-MSO)]
More voluntary USCG commercial fishing vessel safety exams [Sector LIS, CG AUX]
Regulate new entries into the industry [State Fisheries Managers]
Better coordination between NY/CT/Federal Agencies [Sector LIS, Harbor Masters, CT/NY LE/DEM]
Require radio reporting/check-in [Sector LIS]
Increase in voluntary training options [Sector LIS, CG AUX]

Vessel Conditions: Small Craft Quality

Today:

- Boat operator intoxication is perceived by some users to be a problem.
- Connecticut state boating statistics show BUI has been decreasing
- Easy financial credit allows individuals with little boating knowledge to get into the sport. Trailered boats more a problem.
- Rule 9 often ignored.
- Over-reliance on GPS, especially in low visibility conditions.
- Suffolk County had its first non-fatality year in 2004.
- Recent low interest rates have spawned influx of new boat purchases.
- Existing State enforcement resources are at maximum enforcement effort.

Trends:

- No trends discussed.

Existing Mitigations:

- Power Squadron / CGAUX conducting training courses and voluntary safety checks.
  - Small numbers of people being trained.
- Increased USCG security presence also increases safety.
- Connecticut began certifying boat operators in 1987:
  - Can't operate a boat if under 12 years old unless certified and with adult.
  - Requires PWC operator certification.
- New York:
  - PWC training certificate required.
  - Operators over 18 can drive anything without certification / licensing.
- Targeted weekend enforcement presences: Thames River, Connecticut River, Bridgeport and New Haven Harbor locations.
- Voluntary canoe and kayak training courses offered by the Connecticut Boating Safety Division.
- Pilots inform local groups of the nature of commercial vessel operations.
- USCG stations' coordination with state, county, and local response mechanisms.
- People are buying newer (safer) boats.

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

Require licensing (12) [NY State Legislature]
Require training (11) [NY State Legislature]
More enforcement of existing regulations (6) [Sector LIS, Harbor Masters, CT/NY LE]
Insurance reductions with additional training (4) [State Legislatures]
Increase enforcement staff (3) [COMDT (G-M & G-O), State Legislatures]
Increase participation in voluntary training programs (3) [Sector LIS, CG AUX, Proposed HSC]
Mandatory radio carriage (2) [State Legislatures]
Voluntary radio telephone training (2) [Sector LIS, CG AUX, Proposed HSC]
Require radio reporting/check-in [Sector LIS]
Mandatory formal radio telephone training [State Legislatures]
Require inspection [State Legislatures]
Require insurance [State Legislatures]

Traffic Conditions: Volume of Commercial Traffic

Today:

- Notice of arrivals to USCG:
  - 700 foreign flag.
  - 1200 tug and barge.
  - Volume of through-Sound traffic is not well documented.
- Ferry transits:
  - New London-Orient Pt – Block Island: 70/day.
  - Bridgeport-Port Jefferson: 36/day.
- Volume of traffic is focused at The Race and New London, New Haven, and Port Jefferson.
- 8 – 15 Naval vessels transit The Race weekly; protected by a security zone. The Race is not closed to other traffic during their transit.

Trends:

- Volume is generally going up; some due to an effort to decrease trucking on the I-95 corridor.
  - Hoping for imported steel cargos to increase in 2006.
  - Increased oil deliveries for electricity.
  - Adding a ferry between Port Jefferson and New Haven is being discussed.
  - Bridgeport-Port Jefferson ferry traffic is increasing slightly.
- Coal transshipments will increase.
- Additional East-West movements expected.
  - Containers on barges and ferries.

Existing Mitigations:

- Well defined patterns of use over a large waterway with multiple destinations.
- Pilots coordinate transits of deep-draft traffic.
- Connecticut has established mandatory pilot areas to mirror New York's.
- Year-round and around-the-clock commercial operations spread out traffic.
- Fuel shipment peak comes in winter when recreational boat use is low.
- Seasonality of ferry transits.
- Rules of the Road.
- Fishery stocks are down, fewer fishing vessels.

Broadwater Proposal Information:

- Expect 2-3 ships per week plus tugs and other support vessels.
- The affect on traffic volume will depend on how transits are handled through bottlenecks (security and safety zones' size and duration, scheduling and awareness). Could freeze traffic at certain places temporarily.
- Transits through The Race and Long Island Sound may be slowed if LNG carriers are required to have tug escorts.
- Increased input of natural gas from LNG might decrease the number of oil shipments.
- Tug escort requirements to be determined.

New Ideas:

- Risk level judged to be well balanced with existing mitigations, so no new ideas were discussed.

Traffic Conditions: Volume of Small Craft Traffic

Today:

- Suffolk County has 80,000 registered boats. CT has 112,000 boats registered statewide.
- 2-4% annual increase in registration.
- More wind and man-powered boats. Kayak use exploding.
- Jet skis also are increasing and are using the near shore waters of the Sound to avoid harbor speed regulations.
- Recreational boats use the Sound seasonally; includes trailered boats, international yachts and regatta boats.
- Major volumes:
  - On Memorial and Labor Day weekends and on the Fourth of July between The Race, Block Island and Watch Hill.
  - Mystic River, Wading River, Housatonic River, and every port just outside harbor entrance channel.
  - Stratford Shoal Middle Ground.
- Marine events focusing volumes:
  - July 4th fireworks displays.
  - Sailboat races.
  - Tall Ship events.
  - Off-Soundings Race ties up The Race.

Trends:

- Numbers of boats are significant, but perhaps lower now than the 1980's.
- Recreation traffic concentrated within 2 – 3 miles of shoreline. Some East-West traffic middle of Sound.

Existing Mitigations:

- Foul weather curbs small craft activity.
- On-the-water enforcement presence.
- High fuel prices deter boating.
- CG Marine event permitting (75 annually), sponsor requirements; State marine event permitting process.
- Seasonality and day-of-week, time-of-day activity.
- Yacht Racing Association publishes a book annually of all races on the Sound.
- Harbormasters clear channels for ferry traffic.
- Recommended Vessel Route in Block Island Sound shows deep draft vessels' routes on charts.

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

Develop/publish recommended vessel routes for deep draft vessels on charts (9) [NOAA, Proposed HSC]
Require licensing (6) [State Legislatures]
Improve/expand voluntary information/education (3) [Sector LIS, CG AUX, Proposed HSC]
Require training (3) [NY State Legislature]
Improve awareness of commercial issues through voluntary programs [Proposed HSC]
Voluntary radio telephone training [Sector LIS, CG AUX, Proposed HSC]
Require boating certificate in NY State [NY State Legislature]
Enforce Rules of the Road [Sector LIS, CT/NY LE, Harbor Masters]
Require radio reporting/check-in [Sector LIS]
Voluntary training for small craft [Sector LIS, CG AUX, Proposed HSC]
Better channel marking [Sector LIS]
Mandatory insurance for small craft [State Legislatures]
Restrict mooring in Town Management plans [Harbor Masters]
Coordinate CG and CT DEP marine event permitting requirements to reduce waterway usage conflicts [Sector LIS; CT DEP]

Traffic Conditions: Traffic Mix

Today:

- Multiple-use waterway.
- Conflicts:
  - Distinguish between those events well planned by professional sponsors vs. those smaller, less-organized yacht club sponsors.
  - Commercial fishing vessels fish in The Race both day and night.
  - Some natural segregation of small craft from commercial vessels east of Cable and Anchor Reef.
  - Heavy interaction between non-commercial and commercial vessels at The Race.
  - All harbors.

Trends:

- No trends discussed.

Existing Mitigations:

- Well-marked channels in harbors show boaters where ships must transit.
- Security Zones around high risk / high-value vessels.
- Dialog between commercial and recreational groups helps de-conflict the waterway.
- Foul weather deters recreational boaters.
- Rules of the Road.
- Escorts clear the way for high-value / Naval unit transits.
- Small craft activity tends to be close to shore.
- Permitted marine events published in NTM.
- Local knowledge of pilots and other commercial operators; and to the extent that recreational boaters are knowledgeable.
- Bridge-to-bridge radio communications.
- Compulsory pilotage; CT recently established mandatory boarding areas similar to NY.

Broadwater Proposal Information:

- AIS provides situational awareness.
- Historic vessel AIS tracks come close to proposed Broadwater location. Need to assess potential impact on historic routes if Floating Storage and Regasification Unit (FSRU) located where proposed.
- Probably around two to three LNG tankers per week plus 3 – 4 tugs to assist each LNG ship.
  - Scheduling will prevent two tankers in Sound at the same time.
- LNG carriers are a new type of vessel to the Sound.
- Typical LNG ship transits are during daylight, but occurs at night at some locations. Submarine transits are only during daylight.
- Safety/security zone will eliminate an area where commercial fishing can occur and will impact other waterway users.
  - Timing LNG carrier transits to avoid F/V gear conflicts, conflicts with other vessel traffic.
- Ship will go to sea if threatened by weather.

To Be Developed (re: Broadwater Proposal):

- Extent of FSRU safety/security zone if no vessel offloading.
- Security zone of outbound (i.e., empty) vessels.
- Two potential safety/security zones: One around LNG carrier while moving; one around the permanently moored FSRU. Need to determine where centered: the FSRU or the mooring tower.
  - A zone centered on the mooring tower may be easier to communicate to other waterway users, but would require larger area.
  - A zone centered on FSRU while it swings creates zone location inconsistency, but if ship is offloading, the zone may not expand much.

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

Better transit scheduling (7) [Proposed HSC]
Publish recommended vessel routes for deep draft vessels (Green Line) on charts (5) [NOAA, Proposed HSC]
Mandatory Rules of the Road training (4) [State Legislatures]
Require radio reporting/check-in (2) [Sector LIS]
Voluntary Rules of the Road training (2) [Sector LIS, CG AUX, Proposed HSC]
Voluntary radio telephone training for small craft (3) [Sector LIS, CG AUX, Proposed HSC]
Establish cross-Sound Harbor Safety Committee [Sector LIS, Stakeholders]
Conduct more voluntary information/education [Sector LIS, CG AUX, Proposed HSC]
Better coordination locally and State to State [Proposed HSC]
Voluntary recreational route [Proposed HSC, Sector LIS, NOAA]
Reevaluate Marine Event permitting and coordination [Sector LIS]
Expand mandatory AIS carriage to ferries and commercial fishing vessels [COMDT (G-MWV), State Legislatures, Sector LIS]
Require licensing [COMDT (G-MSO), State Legislatures]
Mandatory VHF monitoring in high congestion areas [Sector LIS, State Legislatures]
Mandatory training for small craft [NY State Legislature]
Mandatory outside radio telephone speakers for commercial fishing vessels [COMDT (G-MSO), Sector LIS, State Legislatures]
Review AIS historic tracks in regards to proposed Broadwater FSRU location [Proposed HSC]
Enforce “no anchoring” in channels [Sector LIS, CT/NY LE, Harbor Masters]

Traffic Conditions: Congestion

Today:

- Problem areas:
  - The Race concentrating small craft / shallow draft / deep draft vessels.
  - Plum Gut; F/V and ferries.
  - Execution Rocks.
  - Just North of Plum Island.
  - Small passenger fleet located along the coast.
  - Norwalk channel.
  - Fishers Island Sound.
- Congested areas:
  - Entrances to harbors (New London, New Haven, Bridgeport, Port Jefferson).
  - Long Island Sound West of Cable and Anchor Reef.

Trends:

- No trends discussed.

Existing Mitigations:

- Submarine escorts clear channels of traffic during transit.
- Marine event permitting/patrolling/advertising.
- Security radio broadcasts.
- Patrols of marine events to deconflict the waterway.
- Broadness of the Sound.
- ATON marking shoals in Long Island Sound; defining channels in harbors and rivers.

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

Establish alternative route for small traffic in The Race (11) [Proposed HSC, Sector LIS, NOAA]
Establish cross-Sound Harbor Safety Committee (10) [Sector LIS, Stakeholders]
Enforce Rules of the Road (including choke-point areas) (7) [Sector LIS, CT/NY LE, Harbor Masters]
Establish VTS/VTIS (specified areas such as The Race) (4) [COMDT (G-MWV), Sector LIS, Proposed HSC]
Review AIS historic tracks in regards to proposed Broadwater FSRU location (2) [Proposed HSC]
Better enforcement of fishing regulations in channel [Sector LIS, CT/NY LE, Harbor Masters]
Enforce “no anchoring” in The Race [Sector LIS, CT/NY LE]
Change in permit issuing for waterway activities [Sector LIS]
Voluntary training for recreational boaters [Sector LIS, CG AUX, Proposed HSC]
Establish recommended vessel routes for deep draft vessels (Green Line) on charts [NOAA, Proposed HSC]
Mandatory training for small craft [State Legislatures]
Enforce channel speeds [Sector LIS, CT/NY LE, Harbor Masters]

Navigational Conditions: Winds

Today:

- Generally predictable winds.
- Winds over 15 – 20 knots are experienced about 15% of the time. Winds are usually from the SW in the summer and NW in the winter.
- Sustained winds of 15 – 20 knots become problematic, depending upon the direction. Wind from NE or SW directions generates rougher water over the long fetch of water.
- East and West winds create cross-wind difficulty at the harbor approaches and The Race, challenging deeper draft ship transits.
- Small craft generally do have trouble in winds sufficient to set small craft warnings.
- Summer thunderstorms can generate up to 50 – 70 knot winds.

Trends:

- No trends discussed.

Existing Mitigations:

- Accurate NOAA weather forecasts and warnings.
- Vessel-to-vessel radio communications.
- Weather avoidance by small craft.
- Physical Oceanographic Real-Time System (PORTS) in New Haven Harbor with water level, temperature and wind speed data.
- Split of weather forecast for eastern and western portions of Long Island Sound provides more detailed / accurate forecasts.
- University of Connecticut – USCG Research and Development Center weather buoys are located off Bridgeport and in the west end of the Sound. Provide wind speed, direction, current and wave height data that is available online; sampled hourly.
- NOWCOAST available to integrate all wind information.
- Pilots make individual decisions on the equipment required for each transit based upon conditions.

Broadwater Proposal Information:

- LNG operators planning weather criteria into port transit operational decision making simulating vessel movements in all conditions at MSI.

New Ideas:

- Risk level judged to be well balanced with existing mitigations, so no new ideas were discussed.

Navigational Conditions: Water Movement

Today:

- Tide and current tables are good predictors except when there are high-wind conditions or freshets that alter water levels.
- Difficult areas.
  - Cross currents at all harbor entrances, and at oil offloading terminals at Northport and Riverhead.
  - Currents through The Race reach up to 6 knots, often on a diagonal to the channel. Current speeds are enhanced by NW and East winds.
  - Typically a 3 – 4 knot current at Plum Gut.
  - Execution Rocks.

Trends:

- Year-round.

Existing Mitigations:

- Published tide books provide good general information in addition to predictions.
  - Weather conditions greatly affect actual times of tides and slack water, making PORTS data extremely useful.
- Voyage planning to avoid strong currents.
  - Pilots time arrivals to minimize cross-current problems.
- "The Cap'n" program has accurate and current information predictions.

Broadwater Proposal Information:

- FSRU will weathervane easing LNG tanker mooring.

New Ideas:

- Risk level judged to be well balanced with existing mitigations so no new ideas discussed.

Navigational Conditions: Visibility Restrictions

Today:

- Fog causes restricted visibility (less than ½ mile) more than 20% of the year. Seasonal: May and June predominate.
  - Affects harbors and East end throughout the Sound, mainly the north shore; usually burns off by noon.
- Occasionally snow and heavy rain can restrict vessels' movement; only a few days per year.
- Small boats often follow other vessels; often don't slow down in fog, fail to keep lookout. Vast majority of boats under 40 feet do not carry radar.
- Large number of small boats in The Race lessen the effectiveness of ATON equipped with a RACON.

Trends:

- No trends discussed.

Existing Mitigations:

- Radar (some boaters have it but may not be able to use it well).
- GPS units give precise position, but may lead to greater risk of collisions because of operator inattention and over-confidence.
- Fog signals.
- ATON advances. Several aids are equipped with RACONs.
- High speed ferries use night vision equipment.
- Local knowledge of fog patterns allows some to avoid fog.
- Commercial vessels.
  - Are using chart plotting software programs (e.g., ECDIS), but may over-rely upon it.
  - AIS increases awareness, but it is not universally carried.
  - Company restrictions.

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

Mandate ferries and commercial fishing vessels carry AIS (5) [COMDT (G-MWV), State Legislatures, Sector LIS]
Establish VTS/VTIS (4) [COMDT (G-MWV), Sector LIS, Proposed HSC]
Publish recommended vessel routes for deep draft vessels (Green Line) on charts (3) [NOAA, Proposed HSC]
Voluntary radar use training for recreational boats (2) [Sector LIS, CG AUX, Proposed HSC]
Mandate ferries carry AIS (2) [COMDT (G-MWV), State Legislatures, Sector LIS]
Establish secondary channel through The Race for shallow draft and recreational vessels to use [Proposed HSC, Sector LIS, NOAA]
Continued development of better/less expensive navigational equip, radar, and charts [Industry]
Require licensing [State Legislature]
Require training [NY State Legislature]
Recommend monitoring Channel 13 more often [Sector LIS, CG AUX, Proposed HSC]
Mandate recreational boats monitor Channel 13 [State Legislatures, Sector LIS]
Expansion of voluntary training programs [Sector LIS, CG AUX, Proposed HSC, State Legislatures]
Better public awareness [Sector LIS, CG AUX, Proposed HSC]

Navigational Conditions: Obstructions

Today:

- Ice routinely obstructs navigation in harbors. Driven by the winds from shore to shore.
  - Winter 2004 was cold. The major rivers, Norwalk, and Port Jefferson are trouble areas.
- Floating debris during high-water conditions.
  - Connecticut River.
- Abandoned recreational vessels at moorings.
- Fixed lobster traps and trawls not a problem.
- Anchored ships are snagging bottom obstructions.
- High-speed vessel operations are affected by debris and ice.
- Some fishing gear drifts into The Race.
- Old bridge fendering material and moored barges involved in bridge maintenance create obstructions.
- Ice moves buoys off station, can cause groundings if good weather comes before positions can be verified.
- Some buoys are removed for the winter.

Trends:

- No trends discussed.

Existing Mitigations:

- NOAA information is great. New information is updated in ECDIS quickly.
- Ice:
  - USCG breaks ice. Focused on Connecticut River to assist movement of home heating oil; other areas as needed.
  - Broadcast Notice to Mariners warnings.
  - Norwalk's local system to distribute ice navigation information.
- Pilots report dangers for further public distribution.
- Local authorities often remove obstructions.

Broadwater Proposal Information

- FSRU may obstruct radar signals and ability to see other vessels.

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

Increase Army Corp of Engineers, Department of Environmental Management (DEM), and local presence, involvement in hazard removal (10) [ACE]
Establish reporting program (2) [Proposed HSC]
Voluntary training in Electronic Charting System (ECS) use (2) [Sector LIS, CG AUX, Proposed HSC]
Disseminate daily ice reports [Proposed HSC]
Encourage voluntary use of ECS [Sector LIS, CG AUX, Proposed HSC]
Improve charts [NOAA]
Require ECS use/carriage [COMDT (G-MWV), State Legislatures, Sector LIS]
Improve coordination with public entities [Proposed HSC]

Waterway Conditions: Visibility Impediments

Today:

- Vessels moored in Norwalk cause visibility impediments at bridge abutments.
- Vessels moored in Port Jefferson obscure the range light.
- Differentiating between aids and small craft difficult.
- Barges grouped in Hempstead Harbor.
- Background lighting obscures view of navigational aids:
  - Approaching Groton from the Southwest.
  - Electric Boat lights, Pfizer's new complex. Generally, in New London, ATON are hard to see.
  - Norwalk ball field at Peck Ledge Light.
  - New Haven ball field lights on New Haven Reach.
  - Standing into Manhasset Bay.
  - Local zoning requirements often not enforced.

Trends:

- No trends discussed.

Existing Mitigations:

- Radar helps identify traffic.
- VHF security calls and ship sound signals.
- Environmentally sensitive lighting is being installed in some locations.
- GPS, ECDIS and other electronic navigation equipment.
- AIS for situational awareness.
- Local knowledge.

Broadwater Proposal Information

- FSRU will be marked will be marked accordingly with warning lights and sound signals as a Marine Obstruction similar to Floating Production, Storage and Offtake Vessels (FPSO's)
- Other lights will need to be environmentally sensitive.
- USCG will regulate the FSRU as a facility.
- LNG carriers must comply with IMO requirements for the minimum distance the crew is able to see forward of the ship.

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

Convince local communities to manage lighting pollution and enforce zoning regulations regarding light pollution (13) [Proposed HSC, Harbor Masters, Local Government]
Establish cross-Sound Harbor Safety Committee (7) [Sector LIS, Stakeholders]
Establish harbor management plans [Proposed HSC]
Require small craft to monitor Channel 13 [State Legislatures Sector LIS]
Review permit requirements for bridges [ACE, D1(obr)]
Require radio reporting/check-in [State Legislatures, Sector LIS]
Conduct WAMS to address background lighting problem areas [Sector LIS]

Waterway Conditions: Dimensions

Today:

- Harbor entrance channels are very narrow (250 – 450 feet wide).
- Problem areas:
  - Watch Hill Passage.
  - Plum Gut.
  - North reach of Norwalk Harbor for commercial traffic; Stanford is similar.
  - Port Jefferson at the jetty.
- Security zone requirements further limit dimensions.
- Air draft problems:
  - New London railroad bridge just above state pier; about 32-foot clearance when stuck down.
  - Niantic railroad and Highway bridges.
- Orientation and dimension of some of the older railroad (Norwalk) and highway (Mystic US RT 1) bridges..
- The need to dredge harbors is increasing. Barriers to dredging are funding and placement of dredge spoils.
- Army Corp of Engineers is delisting waterways for dredging.

Today (continued):

- Bridgeport unusable to deep water vessels; New London and New Haven are okay.
- Vessels are being under-loaded in order to make transits; more frequent transits.
- Cross-Sound cable in New Haven Harbor is a potential impediment to increasing the depth of the channel in the future.

Trends:

- Getting worse.

Existing Mitigations:

- Buoyage system.
- AMTRAK scheduled to replace the New London railroad bridge in October 2006.
- Dredging though harbors is a problem.
- VHF radio communications; ships arrange passings.
  - Frequency congestion not a problem.
- Precision navigation systems: ECDIS, GPS, etc.
- Pilots use 10% of draft under-keel clearance guideline for vessels unassisted by tugs, otherwise the terminals determine under-keel requirements.
- Pilots time transits for safer passage.

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

Dredge the channels (8) [ACE]
Improve coordination of dredging and funding (6) [ACE, Proposed HSC]
Require under-keel clearance (4) [State Legislatures Sector LIS]
Encourage State advocacy of dredging (2) [Proposed HSC]
Required material management plan (2) [ACE]
Voluntary chart training for public/small craft (2) [Sector LIS, CG AUX, Proposed HSC]
Require bridge dimensions suitable for safe navigation (2) [ACE, COMDT (G-M)]
Reduce harbor speed for deep draft vessels [Sector LIS, Harbor Masters, Proposed HSC]
Ensure dimensions on charts are accurate [NOAA]
Establish VTS/VTIS [COMDT (G-MWV), Sector LIS, Proposed HSC]

Waterway Conditions: Bottom Type

Today:

- Typically hard bottom outside the harbor entrance channels.
- Varied bottom type across Sound:
  - Connecticut side is rocky.
  - Harbors are mud bottom.
  - New York side is mostly sand.
- Hard, rocky grounds:
  - The Race.
  - Valiant Rock.
  - Stepping Stone.
  - New Haven breakwater entrances.
  - Plum Gut.
  - Pecks and Greens Ledges at Norwalk.
  - All of Fishers Island Sound.
  - The Thimbles.
  - Stratford Middle Ground Shoal.
  - East of the "TE" buoy.
  - Long Sand Shoal.
  - Six Mile Reef.

Trends:

- No trends discussed.

Existing Mitigations:

- ATON, charting, Coast Pilot, and hydrological publications.
- Local knowledge.
- Compulsory pilotage for most deep draft vessels.
- Government surveys are identifying more bottom characteristics through full-bottom surveys; should be completed in 3 years.
- Electronic bottom-sounding technology more available to the recreational boater.
- More double-hull vessels being used; mandated single-hull barge phase-out.
- OPA 90-required under-keel clearance requirements be decided between masters and pilots.
- Many ports have soft bottoms.
- Vessel movements timed for high tides.

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

Improved and updated navigation/hydrological/chart information (9) [NOAA]
Expand PORTS system (7) [NOAA, State Legislatures]
Encourage voluntary chart training for recreational boat operators (6) [Sector LIS, CG AUX, Proposed HSC]
Require under-keel clearance (4) [State Legislatures]
Develop consistent under-keel clearance rule between pilots and other stakeholders (2) [Proposed HSC]
Improve coordination with Army Corp of Engineers (2) [Proposed HSC, ACE]
Require terminal to provide current soundings [State Legislatures, Terminal Operators]
Dredge channels [ACE]

Waterway Conditions: Configuration

Today:

- Bends:
  - Problematic course changes in New Haven Harbor (a 35° turn), Mystic River and (90°+ degree turns).
  - Submarine traffic turns at Valiant Rock.
  - Bridgeport to ferry terminal at Plum Point.
- Cross traffic:
  - Tugs to / from the Northville-Riverhead Terminal.
  - Bridgeport to Port Jefferson ferry route.
  - Orient Pt. to New London ferry route.
  - East – West convergences at Cable and Anchor Reef.
  - The Race.
- Traffic convergence points in the Sound:
  - Cable and Anchor Reef.
  - Execution Rocks.
  - At the "TE" buoy.
  - Middle Ground / Stratford Shoal.

Trends:

- No trends discussed.

Existing Mitigations:

- VHF communications and security calls.
- Rules of the Road.
- The Sound is a broad waterway without visibility impediments at areas of commercial traffic convergence.
- Transits are generally spread out over time.

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

Coordinated scheduling (8) [Proposed HSC]
Change/increase regulated navigation areas for choke points (6) [Sector LIS, Proposed HSC]
Publish recommended route (Green Line) on charts (5) [NOAA, Proposed HSC]
Review AIS historic tracks in regard to proposed Broadwater FSRU location (3) [Sector LIS]
Require radio reporting/check-in (2) [State Legislatures, Sector LIS]
Mandatory monitoring of Channel 13 (2) [Sector LIS, Proposed HSC, State Legislatures]
Establish secondary channel through The Race for shallow draft and small craft to use (2) [Proposed HSC, Sector LIS, NOAA]
Create traffic lanes [Proposed HSC, COMDT (G-MWV), NOAA]
Establish VTS/VTIS [COMDT (G-MWV) [State Legislatures, Sector LIS]
Improve navigation/hydrological information at choke points [NOAA]

Immediate Consequences: Personal Injuries

Today:

- Cruise ships – berth at the State Pier in New London (infrequent but local group working to promote additional port calls).
- Hourly cross-Sound ferry operations carry more than 150 passengers per voyage (Subchapter H). Ferry boats also carry about 500 people from New London to Block Island seasonally.
- Dinner cruise boats (Subchapter T).

Trends:

- No trends discussed.

Existing Mitigations:

- There are vessel resources to evacuate passengers (Government, other commercial ferries, other vessels of opportunity).
- Incident Command System (ICS) is well known. Tested during Topoff exercise April 2005. Useful for mass rescue, environmental and security events. Pre-existing port relationships well established and coordinated.
- USCG SAR responses provide framework for other responses.
- Ferry safety equipment carriage requirements.
- USCG emphasizes prevention during inspection of fleet.

Broadwater Proposal Information

- Fewer than 30 people are normally on the FSRU platform; the average crew of an LNG carrier is approximately 20. Crews on tugs and other FSRU support vessels.
- Potential exposure of crews on board commercial or recreational vessels in the vicinity (outside of safety/security zone).

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

Hold mass rescue exercise, across Sound (7) [Proposed HSC, Sector LIS, CT/NY DEM]
Improve inter-agency plans / procedures (responders, hospitals), coordination of resources (5) [Proposed HSC, AMSC]
Establish cross-Sound Harbor Safety Committee (4) [Sector LIS, Stakeholders]
Develop evacuation plan (local, state, federal) (2) [Proposed HSC]
Improve radio communication's interoperability (2) [Sector LIS, Proposed HSC, AMSC]
Use shallow-draft passenger vessels as evacuation platforms [Proposed HSC]
Establish VTS/VTIS [COMDT (G-MWV), State Legislatures, Sector LIS]
Mandate emergency preparedness plan [State Legislatures]
Improve better coordination / planning between NY and CT for catastrophic events [Proposed HSC]
Inventory mass casualty evacuation resources [Proposed HSC]
Increase vessel inspections [Sector LIS]

Immediate Consequences: Petroleum Discharge

Today:

- Petroleum products being transported in bulk include jet fuel, gas, diesel, No. 6 oil, some crude oil.
  - Vessels in excess of 40,000 DWT transit through this area with refined petroleum product.
  - Volume of 60 million barrels per year.
  - Jet fuel is most explosive.
  - A petroleum fire will burn longer than an LNG fire, but at a lower temperature.
- Firefighting needs: Port Jefferson, Bridgeport, Northport and Northville-Riverhead Offshore Terminals, Hempstead Harbor, Oyster Bay, New London, Groton, Norwalk, Stamford, and upriver in the Connecticut River.
- Elevated opportunities for collision-generated fires exist at The Race and Execution Rocks.
- Operations vulnerable to fires:
  - Coal lightering operations off Bridgeport.
  - Many chip scrap metal cargo loading and vessel movements.
  - Barge lightering in designated areas: Niantic and New Haven off dumping grounds, Bridgeport NNW of Stratford Shoal Middle Ground, off Northport, Port Jefferson and Riverhead.
- Specialty synthetic foams required to extinguish some petroleum product fires.

Trends:

- On-water fire mitigation capabilities very weak. Nearest useful firefighting resources – NY Harbor.

Existing Mitigations:

- OPA 90: comprehensive regime for spill response.
- Vessel companies have spill management teams; conduct drills.
- USCG approved / maintained Vessel Response Plans required for vessels over 400 gross tons.
  - Plans meticulously reviewed; constantly updated.
- Stockpiles of equipment by oil companies – available within hours.
- Marine Spill Response Corporation (MSRC) vessel can arrive and be crewed in 48 hours.
- Sophisticated State response systems.
- Shipboard Oil Pollution Emergency Plans (SOPEP).
- Mandatory double-hull barge phase in and single-hull barge phase out schedules.
- DEP hazardous materials response teams and resources can also be used for oil spills.
- Multiple mobilization and deployment points for response.
- Some New London tugboats have firefighting capabilities.

Broadwater Proposal Information

- LNG tugs have significant firefighting capabilities and may be available to assist in incidents within LIS; recognized that first priority would be supporting FSRU operations.
- FSRU would have fire suppression/deluge system.

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

Obtain more firefighting and response assets (9) [State Legislature, Proposed HSC]
Improve coordination efforts towards spill and fire response (6) [Proposed HSC]
Assess firefighting capability on water (4) [Proposed HSC]
Update Area Contingency Plan (2) [Proposed HSC]
Install PORTS system for spill tracking (2) [NOAA, State Legislatures]
Improve coordination / planning between NY and CT for catastrophic event [Proposed HSC]
Hold annual spill response drills [Proposed HSC, Involved Response Agencies]

Immediate Consequences: Hazardous Materials Release

Today:

- No cargos of particular hazard known to be transported on Sound.
- Styrene (other cargoes on board chemical tankers – through transit) going to New Haven and Allyn Pt. in New London Harbor. Vessels over 40,000 DWT. Average of 1 vessel per month.
- Chemical parcel tankers may have other cargoes on board in addition to those being discharged at ports on the Sound.

Trends:

- No trends discussed.

Existing Mitigations:

- [See Petroleum Discharge Existing Mitigations.]
- Software dealing with identification and dispersion models.
- Very regulated industry: International conventions for storage requirements and cleanup. Anticipated requirement for HAZMAT carriers to develop Vessel Response Plans.
- USCG National Strike Team.
- Response tested in Topoff Exercise (April 2005), but not as a marine release.
- Connecticut has a robust response capability.

Existing Mitigations (continued):

- USCG – EPA have level A response available within hours. Unified command structure in place.
- Long Island has 6 response teams trained in all releases. Marine transportation required.
- New Haven has 90 technicians trained at level A with equipment.
- NOAA has scientific support coordinator.

Broadwater Proposal Information

- Increases the frequency of HAZMAT ship arrivals, but LNG has different environmental consequences than styrene.
- FSRU has self-contained ability to fight fire.
- LNG carrier also has extensive firefighting capability. Could be enhanced by tug escort with firefighting capabilities.
- FSRU must have primary self-sufficient capability. Extensive onboard response systems required.
- LNG response plans to be established to deal with credible release scenarios. Problem is if pool ignites either in water or on ship. LNG transfer features a linked Emergency Shutdown system (between LNGC and FSRU) to minimize spill volumes during discharge operations. Study funded to investigate LNG / LPG emergency responses to be completed by next year.
- Proposed LNG carrier deliveries of 2 – 3 per week; 3 – 4 hours per one-way transit; 24-hour offload time.

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

Obtain more firefighting and response assets (5) [Proposed HSC, State Legislatures]
Improve planning for fire / hazmat response, ACP (4) [Proposed HSC]
Assess firefighting capability (3) [Proposed HSC]
Improve coordination efforts towards spill and fire response (3) [Proposed HSC]
Install PORTS system for spill tracking (3) [NOAA, State Legislatures]
Establish cross-Sound Harbor Safety Committee (2) [Sector LIS, Stakeholders]
Assess firefighting capabilities in regards to Broadwater for vessels in transit [Proposed HSC, Shell, FERC]
Develop plan for addressing hazmat release [Proposed HSC]
Coordinate moving onshore response resources offshore [Proposed HSC]

Immediate Consequences: Mobility

Today:

- Obstruction of strategic points of The Race, Plum Gut, and Execution Rocks might close the Sound to deep draft through-traffic.
- Any of the harbors could be closed with an accident.
  - Closure of Bridgeport or Port Jefferson would eliminate a major evacuation route from Long Island.
- Closest major salvage gear is in NY.

Trends:

- No trends discussed.

Existing Mitigations:

- Salvage equipment is available from NY up to a 20,000 hp tug.
- NOAA regional navigation response team available within 24 – 48 hours to quickly survey an area.
- Alternative routes into / through the Sound where the water is generally deep.
- Some through traffic may be able to transit the Atlantic Ocean off South shore of Long Island.
- Closure of The Race does not prevent tug / barge traffic from Port NY / NJ from entering the Sound from the West.

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

Identify local salvage resources (2) [Proposed HSC]
Improve salvage section in the Area Contingency Plan (2) [Proposed HSC, Sector LIS]
Locate salvage planning companies (2) [Proposed HSC]
Obtain more salvage assets (2) [State Legislatures]
Improved contingency training [Proposed HSC]
Develop an evacuation plan (local, State, Federal) [Proposed HSC]

Subsequent Consequences: Health and Safety

Today:

- New Haven (worst case) 50,000 – 100,000 people of a 175,000 person population could be affected by a marine casualty.
- Drinking water comes from wells and inland sources so water supplies will not be affected.
- Several power plants, including Millstone Nuclear, draw cooling water from the Sound.
- Cooling water intakes for power plants could be affected.
- Port Jefferson and Northport could be affected.
- No fire boats in area.

Trends:

- No trends discussed.

Existing Mitigations:

- Community emergency response plans, including evacuation plans that have been table-top exercised and modeled.
- Highway signs can be used to advise the general community of trouble.
- Media broadcasts.
- Vessel Response Plans also have an element requiring health and safety environmental monitoring.
- Authorities test and close beaches and shellfish beds pursuant to public health requirements. Well developed notification plans are in place.
- Public health agencies are available to react to air releases; extensive EPA air monitoring. These capabilities are drilled and exercised.
- Emergency Management Agency.
- The ICS concept is imbedded at both local and regional levels.
- Suffolk County has evacuation plans.
- Millstone Power Plant has thoroughly examined the possibilities.
- Power plants can move quickly to protect cooling water intakes. Timely notification required. Annual drills.

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

Establish cross-Sound Harbor Safety Committee (3) [Sector LIS, Stakeholders]
Coordinate public evacuation plan (3) [Proposed HSC]
Coordinate emergency preparedness plans (2) [Proposed HSC]
Establish / review procedures for early notification and dissemination of information to stakeholders (2) [Sector LIS, Proposed HSC]
Require evacuation plans [State Legislatures]
Create firefighting plan [Proposed HSC]
More meetings on contingency plan [Proposed HSC]

Subsequent Consequences: Environmental

Today:

- Long Island Sound is a designated Estuary of National Significance.
  - Fragile ecosystem with a surrounding population that is highly sensitive to environmental quality.
- All waters of the area are sensitive
  - Noted that urban harbors are more heavily impacted but that they do influence water quality in the Sound.
- Long Island Sound is a stressed ecosystem
  - Shellfish beds all along the coastline.
  - Lobster fishery declining but active.

Trends:

- No trends discussed.

Existing Mitigations:

- Extensive knowledge of species and locations that might be impacted.
- No discharge zones have been established.
- Good ability to muster teams: National NOAA scientific response team (chemical analysis); USCG, Federal and State Environmental Protection Agencies.
- Many scientific resources available to assist with monitoring and mitigating effects of discharges.
- Notification infrastructure well established.

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

Establish cross-Sound Harbor Safety Committee (5) [Sector LIS, Stakeholders]
Improve spill / response coordination / planning / preparedness (4) [Proposed HSC]
Increase awareness of existing plans / ACP (4) [Proposed HSC]
Require better communication between government (CT, NY, federal) agencies/responders (3) [State Legislatures, AMSC, Proposed HSC]
Establish / review procedures for early notification and dissemination of information to stakeholders (3) [Sector LIS, Proposed HSC]
Obtain clean-up / containment assets that are closer at hand [State Legislatures, Sector LIS]
Review adequacy of resources on both sides of Sound to respond to spill [Sector LIS, Proposed HSC]

Subsequent Consequences: Aquatic Resources

Today:

- Long Island Sound is a designated Estuary of National Significance.
  - The Sound provides a spawning and breeding area.
  - Commercial fishing industry for oysters, lobsters, stripers, clams. Year round fishery. All use the same area and are extremely sensitive to water quality.
  - Recreational fishing is very active.

Trends:

- No trends discussed.

Existing Mitigations:

- Existing authorities to close shellfish beds.
- Connecticut DEP maps aquatic resources.
- [See Environmental Existing Mitigations.]

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

Update sensitive areas / mapping of aquatic resources (5) [CT/NY DEM, NOAA, Environmental Groups]
Update the ACP [Sector LIS, Proposed HSC]
Establish cross-Sound Harbor Safety Committee [Sector LIS, Stakeholders]
Conduct more research into fish / lobster kills currently happening in order to prevent future incidents [CT/NY DEM, Environmental Groups, Private Research, Local Universities]
Conduct baseline assessment of water quality and aquatic resources [CT/NY DEM]
Clean-up / containment assets that are closer to hand [State Legislatures, Sector LIS]
Improve spill / response coordination / planning / preparedness [Proposed HSC]

Subsequent Consequences: Economic

Today:

- Closure of the waterway through the Sound could have a multifaceted affect on the regional area, especially for oil transshipments.
- Just-in-time inventory management means industry has about a week before there is an economic impact.
- Heavily populated throughout the entire Sound area.
- Long Island Sound contributes at least $5.5 billion to the regional economy each year.

Trends:

- No trends discussed.

Existing Mitigations:

- OPA 90 framework for response and economic compensation.
- More than one port in the waterway.
- Alternate channel available for some parts of the waterway for some traffic. Some shippers would probably divert to other ports.
- Lightering possible and shore-side storage capability is available.
- Fishing closures are economic events, with mitigation through the courts.
- Truck transit of some oil possible.

Broadwater Proposal Information

- No alternative route for LNG carrier traffic if The Race is closed.
  - Result would be reduction of LNG supply to New York City and region.

New Ideas:

- Risk level judged to be well balanced with existing mitigations, so no new ideas were discussed.