Port and Waterways Safety Assessment
Workshop Report
San Francisco

Executive Summary

Risk identification and mitigation are and have been ongoing activities within the United States Coast Guard Sector San Francisco area of responsibility. In support of that overall safety improvement activity, a formal Port and Waterways Safety Assessment (PAWSA) for the San Francisco Bay area and significant tributaries was conducted in Oakland, California on 12 – 13 August 2008, sponsored by the Coast Guard. The workshop was attended by twenty-three participants representing waterway users, regulatory authorities, and stakeholders (i.e., organizations with an interest in the safe and efficient use of San Francisco waterways for commercial and recreational purposes). A previous PAWSA for San Francisco, conducted in November 1999, included a portion of the waterway addressed by this report.

A Waterway Risk Model, incorporating 24 risk factors associated with both the causes and the effects of waterway casualties, was used throughout the workshop to guide discussions and numerical assessments. That model was originally conceived by a United States Dialog Group on National Needs for Vessel Traffic Services and subsequently has been refined based on experience gained during the 40+ PAWSA workshops that preceded this San Francisco session.

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

The PAWSA process uses a structured approach for obtaining expert judgments on the level of waterway risk for each factor in the Waterway Risk Model. The process also addresses the effectiveness of existing and possible future intervention actions for reducing risk in the waterway. The first step in the PAWSA process is for the participants to discuss and then numerically evaluate the baseline risk levels in the waterway using pre-defined qualitative risk

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descriptions. The second step is for the participants to assess the expertise of each other with respect to the risk categories in the model. Those expertise assessments are used to weight inputs obtained during the other steps in the process. In the third step, the participants discuss and then evaluate the risk reducing effectiveness of existing mitigation strategies. Next, the participants offer new ideas for further reducing risk, for those factors where risk is judged to be not well balanced with existing mitigations. Finally, the potential effectiveness of those new intervention ideas is evaluated. The PAWSA process produces a consensus view of risks in the waterway and has proven to be an excellent tool for focusing follow-on risk mitigation efforts.

Based on extensive discussions during the workshop, concentrations of risks were noted by the participants in five locations:

- San Francisco City Front
- Port of Richmond
- Port of Oakland
- Port of Benecia through Carquinez Straits
- The Delta, including the convergence of the Sacramento and San Joaquin Rivers, Mandeville Island, and the ports of Sacramento and Stockton

The PAWSA San Francisco participants judged that additional risk reduction actions were needed with respect to ten of the twenty-four risk factors in the Waterway Risk Model. The table below summarizes that information and is ordered from highest to lowest possible risk improvement. The specific action(s) listed is (are) the one(s) recommended within the general strategy recommended by the most participant teams; see the detailed information at the end of this report for a full list of alternatives suggested during the workshop.

Risk Factor Name	**General Strategy**	**Specific Action(s)**
Economic	Coordination / Planning	Establish MOA for use of Federal salvage assets Better coordinate MTS Recovery Plans
Health and Safety	Coordination / Planning	Establish warning system for hazmat release
Hazardous Materials Release	Coordination / Planning	Improve USCG continuity of operations capabilities
Shallow Draft Vessel Quality	Rules & Procedures	Require USCG inspections of uninspected passenger vessels and towing vessels
Commercial Fishing Vessel Quality	Rules & Procedures	Require USCG inspections of commercial fishing vessels modeled on other nations
Congestion	Radio Communications	Establish an additional VTS radio frequency
Small Craft Quality	Rules & Procedures	Increase punishments for violations Require Federal boat operator license Require State boat operator license
Mobility	Waterway Changes	Improve bridge fendering
Deep Draft Vessel Quality	Enforcement	Better enforcement of current rules and regulations / more self-policing of existing rules
Dimensions	Nav \ Hydro	More frequent depth surveys by USACE

Report Contents

This PAWSA San Francisco workshop report includes the following information:

- List of attendees
- Geographic bounds of the area included in the PAWSA
- Numerical results from the following activities:
  Book 1 – Baseline Risk Levels
  Book 2 – Team Expertise Cross Assessment
  Book 3 – Mitigation Effectiveness
  Book 4 – Additional Interventions
- Summary of risks and mitigations discussion

Attendees

The following waterway users and stakeholders attended this PAWSA workshop:

Participant	Organization	Email Address
Mr. Richard Allard	Hornblower Dining Yachts	rallard@hornblower.com
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Facilitation Team	Organization	Email Address
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Geographic Area

The geographic bounds of the waterway area were defined as:

- Pacific Ocean approaches to San Francisco Bay within a 38-mile radius of Mt. Tamalpais
- San Francisco Bay including the South Bay down to Redwood City and the Central Bay north into San Pablo and Suisun Bays including Mare Island Straits and Carquinez Straits
- The navigable portions of the Sacramento and San Joaquin Rivers in The Delta, including the Ports of Sacramento and Stockton

Numerical Results

Book 1 – Baseline Risk Levels:

Baseline Risk Levels					
Vessel Conditions	Traffic Conditions	Navigational Conditions	Waterway Conditions	Immediate Consequences	Subsequent Consequences
Deep Draft Vessel Quality	Volume of Commercial Traffic	Winds	Visibility Impediments	Personnel Injuries	Health and Safety
3.9	8.5	2.6	8.6	9.0	9.0
Shallow Draft Vessel Quality	Volume of Small Craft Traffic	Water Movement	Dimensions	Petroleum Discharge	Environmental
4.8	8.0	7.8	7.8	8.8	9.0
Commercial Fishing Vessel Quality	Traffic Mix	Visibility Restrictions	Bottom Type	Hazardous Materials Release	Aquatic Resources
7.3	5.8	4.4	5.9	6.7	7.5
Small Craft Quality	Congestion	Obstructions	Configuration	Mobility	Economic
7.6	6.8	4.3	9.0	8.7	8.7

Risk values highlighted red (values at or above 7.7) denote very high baseline risk levels.

Book 1 Analysis:

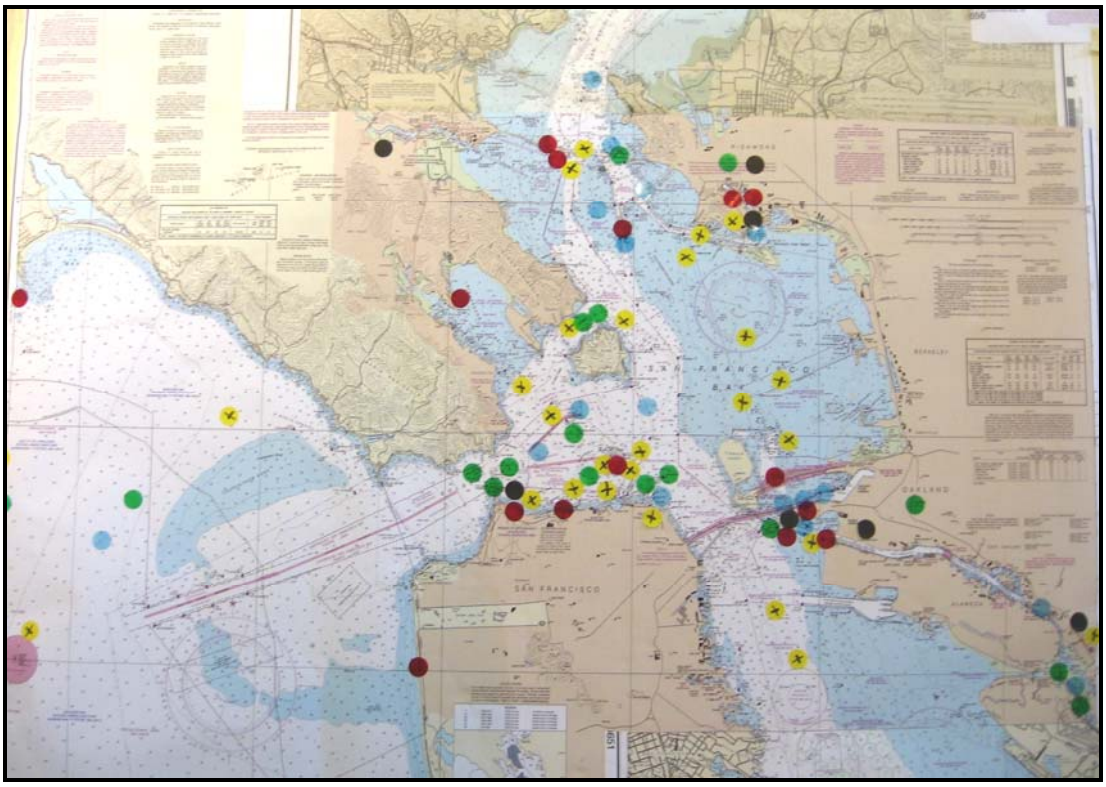
The participants evaluated the baseline risk levels in the waterway by selecting a qualitative description for each risk factor that best described conditions in the San Francisco area. Those qualitative descriptions were converted to discrete values using numerical scales that were developed during ten earlier PAWSAs. On those scales, 1.0 represents low risk (best case) and 9.0 represents high risk (worst case), with 5.0 being the mid-risk value.

In the San Francisco area, nineteen of the twenty-four risk factors were scored at or above the mid-risk value. They were (in descending order):

- Configuration (9.0)
- Personnel Injuries (9.0)
- Health and Safety (9.0)
- Environmental (9.0)
- Petroleum Discharge (8.8)
- Mobility (8.7)
- Economic (8.7)
- Visibility Impediments (8.6)
- Volume of Commercial Traffic (8.5)
- Volume of Small Craft Traffic (8.0)
- Water Movement (7.8)
- Dimensions (7.8)
- Small Craft Quality (7.6)
- Aquatic Resources (7.5)
- Commercial Fishing Vessel Quality (7.3)
- Congestion (6.8)
- Hazardous Materials Release (6.7)
- Bottom Type (5.9)
- Traffic Mix (5.8)

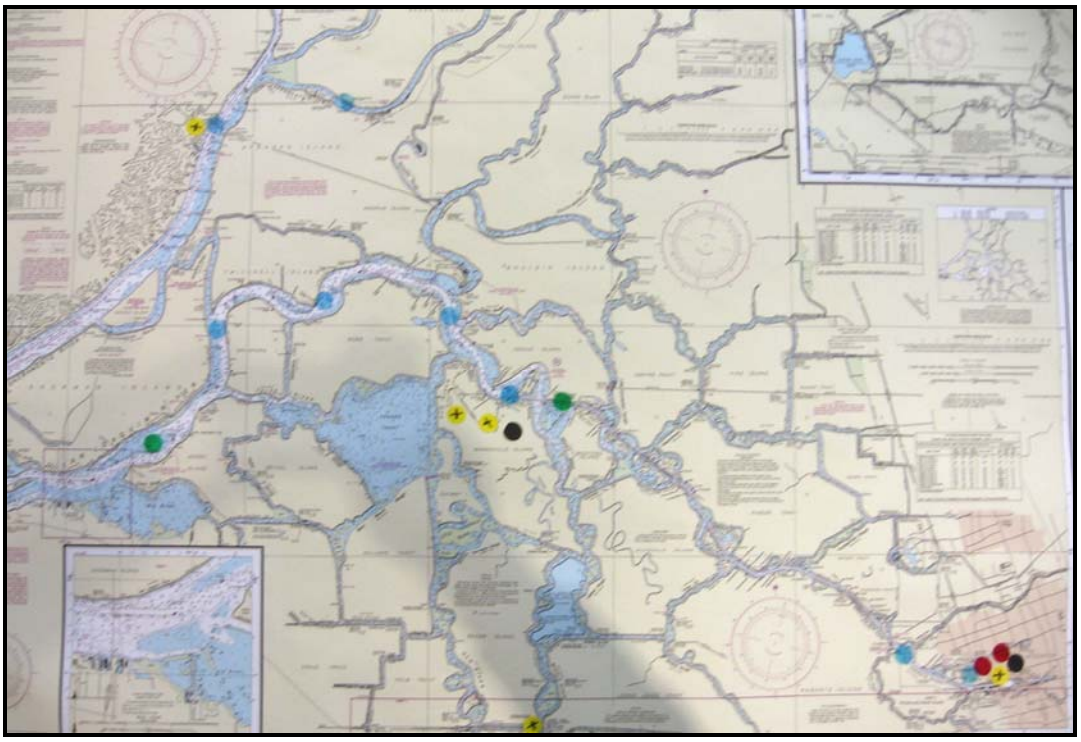
Photos of Waterway Charts:

Central Bay:



Carquinez Straits and Suisun Bay:

The Delta:



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

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

Note the concentrations of dots in five locations:

- San Francisco City Front
- Port of Richmond
- Port of Oakland
- Port of Benecia through Carquinez Straits
- The Delta, including the convergence of the Sacramento and San Joaquin Rivers, Mandeville Island, and the ports of Sacramento (not shown) and Stockton

Book 2 – Team Expertise Cross Assessment

The workshop participants assessed their own and all the other participant teams' level of expertise for each of the six categories in the Waterway Risk Model. Overall, 34% of the participant teams were placed in the upper third, 38% in the middle third, and 28% in the lower third of all teams. This result was very close to the "ideal" 33% / 33% / 33% distribution. The expertise ranking for each team was used to weight the inputs that each team provided in the other three books used during the PAWSA workshop.

Book 3 – Mitigation Effectiveness

Mitigation Effectiveness												
Vessel Conditions		Traffic Conditions		Navigational Conditions		Waterway Conditions		Immediate Consequences		Subsequent Consequences	
Deep Draft Vessel Quality		Volume of Commercial Traffic		Winds		Visibility Impediments		Personnel Injuries		Health and Safety	
3.9	3.1	8.5	6.5	2.6	2.3	8.6	5.1	9.0	5.8	9.0	6.0
Maybe		Balanced		Balanced		Balanced		Balanced		Rising	
Shallow Draft Vessel Quality		Volume of Small Craft Traffic		Water Movement		Dimensions		Petroleum Discharge		Environmental	
4.8	3.8	8.0	7.3	7.8	5.0	7.8	5.3	8.8	5.3	9.0	5.4
Maybe		Balanced		Balanced		Maybe		Balanced		Balanced	
Commercial Fishing Vessel Quality		Traffic Mix		Visibility Restrictions		Bottom Type		Hazardous Materials Release		Aquatic Resources	
7.3	6.6	5.8	4.6	4.4	4.0	5.9	4.1	6.7	5.6	7.5	5.5
NO		Balanced		Balanced		Balanced		Rising		Balanced	
Small Craft Quality		Congestion		Obstructions		Configuration		Mobility		Economic	
7.6	6.5	6.8	5.1	4.3	3.5	9.0	4.7	8.7	6.5	8.7	7.7
NO		Maybe		Balanced		Balanced		Maybe		NO	

See explanation key on next page.

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

Book 3 Analysis:

The participants examined the effectiveness of existing risk mitigation activities in the San Francisco area with respect to all risk factors in the Waterway Risk Model. For fourteen risk factors, the participants were in consensus that risks were well balanced by existing mitigations; for three risk factors, the participants were in consensus that risks were NOT adequately balanced by existing mitigations; and for the other seven risk factors, there was no consensus on whether existing mitigations adequately reduced risk. Consensus is defined as 2/3 of the participant expertise being in agreement. For two of the seven risk factors with no consensus, the participants in this workshop judged the mitigated risk level to be higher than was the case during the 1999 PAWSA.

Book 4 – Additional Interventions

Additional Interventions					
Vessel Conditions	**Traffic Conditions**	**Navigational Conditions**	**Waterway Conditions**	**Immediate Consequences**	**Subsequent Consequences**
Deep Draft Vessel Quality	**Volume of Commercial Traffic**	**Winds**	**Visibility Impediments**	**Personnel Injuries**	**Health and Safety**
Enforcement	Balanced	Balanced	Balanced	Balanced	Coordination / Planning
3.0					3.7 Caution
Shallow Draft Vessel Quality	**Volume of Small Craft Traffic**	**Water Movement**	**Dimensions**	**Petroleum Discharge**	**Environmental**
Rules & Procedures	Balanced	Balanced	Nav / Hydro Info	Balanced	Balanced
3.5			2.2 Caution		
Commercial Fishing Vessel Quality	**Traffic Mix**	**Visibility Restrictions**	**Bottom Type**	**Hazardous Materials Release**	**Aquatic Resources**
Rules & Procedures	Balanced	Balanced	Balanced	Coordination / Planning	Balanced
3.5				3.6	
Small Craft Quality	**Congestion**	**Obstructions**	**Configuration**	**Mobility**	**Economic**
Rules & Procedures	Radio Communications	Balanced	Balanced	Waterway Changes	Coordination / Planning
3.3	3.4			3.3 Caution	4.1 Caution

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

Legend:

The intervention general strategy listed is the one that most participant teams selected for further reducing risks. The Risk Improvement is the expected reduction in risk when taking the actions specified by the participants. A green Balanced indicates that no intervention is needed because risk in the waterway was judged to be well balanced by existing mitigations. A yellow Caution

indicates a consensus alert meaning there was a difference between the most effective general strategy and the general strategy most selected by the participants for additional action(s).

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, required 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 (NTM, 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: information / navigation / traffic organization
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 4 Analysis:

The ten risk factors needing additional risk reduction action (per the *Book 3* results) are shown below along with the general mitigation strategy selected by most participant teams, ordered from highest to lowest possible risk improvement.

- Economic – Coordination / Planning (4.1)
- Health & Safety – Coordination / Planning (3.7)
- Hazardous Materials Release – Coordination / Planning (3.6)
- Shallow Draft Vessel Quality – Rules & Procedures (3.5)
- Commercial Fishing Vessel Quality – Rules & Procedures (3.5)

- Congestion – Radio Communications (3.4)
- Small Craft Quality – Rules & Procedures (3.3)
- Mobility – Waterway Changes (3.3)
- Deep Draft Vessel Quality – Enforcement (3.0)
- Dimensions – Nav / Hydro Info (2.2)

Recommended Actions

The catalog of risks and possible mitigation strategies derived from this San Francisco PAWSA workshop are set forth in the next section of this report. This listing provides an excellent foundation from which safety organizations can further examine and take appropriate risk mitigation actions for both near-term action and for future risk mitigation planning.

This listing 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

Baseline Risks:

- Variety of vessels transiting waterway: tank ships / container ships / bulk carriers / vehicle carriers / break bulk / chemical carriers / passenger vessels
- 1% – tank ship transits
- 3% – cargo vessel transits
- Loss of propulsion incidents
- Bulk general cargo vessels – some are operating closer to the margin than others depending on the type of cargo
- Vessels transiting through Stockton / Sacramento (Delta area) are more of an issue than those in the Central Bay area – different industry in different areas; therefore, higher risk
- Port of Richmond / South Bay also higher risk areas
- Substandard operators – 15 vessels detained by USCG in 2007; less than 2% of all vessels needed corrective action
- Language problems with 10-15% of foreign flag crews (e.g., nine different nationalities on board one recent vessel)
- More of an owner / operator issue than a crew issue – more than nationality, corporate culture in which the crew has been trained leads to competency / incompetency
- World-wide critical shortage of competent crew
- Vessel crews may not know how to use their own electronics
- Self-enforcement of company policies is lacking
- Multiple layers in the enforcement chain

Trends:

- Language issues are getting worse
- A continued shortage of competent trainees / training programs

Existing Mitigations:

- U.S. is holding crewmembers to a high standard including enforcement of Standards of Training, Certification, and Watchkeeping (STCW) requirements
- Requirements for double-hulled tank ships
- Existing vessel inspection requirements
- Use of Vessel Traffic Service (VTS)
- Recent review of VTS authority and increased readiness to direct vessel movement
- Advanced arrival notification of deficiencies allowing USCG to take preliminary action before vessel arrives
- Use of Port State Control (PSC) to determine vessel quality
- Exposure liability / classification society process
- Requirements and enforcement of International Safety Management (ISM) Code
- Company participation in Safety Management Systems (SMS)
- Company drug & alcohol policies in place
- State requirement for tug escorts for certain classes of vessels (e.g., tank ships)
- Pilotage – required use of qualified pilots
- Market economies have dictated larger, newer vessels resulting in more reliable vessels with larger cargo capacity; therefore, fewer vessels on the water
- Improved electronics and technology (e.g., Electronic Chart Display Information Systems (ECDIS))
- Proposed technology programs allow for consistency (e.g., pilot laptop program)
- Local information exchange throughout the waterway community (e.g., use of Harbor Safety Committee (HSC) and other waterway committees)
- An active HSC with focused rules on movement
- More USCG support than in previous years

Vessel Conditions: Deep Draft Vessel Quality

New Ideas (number of times suggested)**:**

- Provide better enforcement of current rules and regulations (7)
- Actively enforce existing standards / policies / procedures via additional self-policing by company management (7)
- Provide better technical training for port state control personnel with regard to vessel electronics (e.g., communications equipment, ECDIS) (5)
- Develop a worldwide PSC communications process – vetting reports, better coordination with USCG and other international PSC boards (5)
- Increase punishment for violations (e.g., monetary consequences of noncompliance) (4)
- Increase the number of qualified USCG vessel inspectors (2)
- Develop positive reinforcement incentives for compliance (1)
- Establish an additional VHF radio frequency for the VTS area to eliminate the saturation on Channel 14 (1)
- Conduct more frequent USACE soundings (1)
- Establish AIS repeaters (1)

Vessel Conditions: Shallow Draft Vessel Quality

Baseline Risks:

- 13% – tug & tow transits
- 60% – ferry transits
- 1% – other passenger vessel transits
- Various types of vessels ranging in quality depending on requirements (i.e., better quality on inspected vessels – must meet manning and crew licensing requirements)
- Difficult to get enough trained personnel
- Manning consistency issues (e.g., high-speed ferries use 1-man in pilothouse – same as towboats); High-speed Craft Code doesn't apply and standards are impractical
- Total number of uninspected vessels is not known due to lack of official inspection system
- If passenger vessels and towing vessels have similar casualty numbers, and passenger vessels have more transits, conclusion would be that towing vessels represent a higher risk

Trends:

- Increasing tug / tow barge traffic carrying more cargo

Existing Mitigations:

- Passenger vessels are better at reporting casualties because of additional regulations
- Retirement of single-hulled barges; therefore vessels are newer and pose less of a risk; certain companies already using double-hulled barges
- Required vessel inspections
- Some companies do self-inspections as part of American Waterways Operators (AWO) Responsible Carrier program
- Tug companies are paying attention to employee work hour rules (i.e., mitigating chronic fatigue)
- Increased company focus on employee vetting
- Required training for personnel on escort tugs (state requirement)
- Improved performance of operational monitoring
- Robust outreach program with VTS (e.g., REC requires operators to complete 24-hour VTS training program before license renewal or upgrade)
- Radar endorsements on licenses (though less USCG oversight than in the past)
- Newer equipment in use due to air quality regulations (on older vessels as well)
- Quality of tugs have improved due to tug escort and minimum tug assist requirements

Vessel Conditions: Shallow Draft Vessel Quality

New Ideas (number of times suggested)**:**

- Actively enforce existing standards / policies / procedures via additional self-policing by company management (7)
- Clearly define and enforce the acceptable work-hour requirements / guidelines for towing companies (5)
- Require USCG vessel inspections on uninspected towing vessels (UTVs) (4)
- Require USCG vessel inspections on uninspected passengers vessels (UPVs) (i.e., "6 packs") (4)
- Increase manning requirements for high-speed passenger vessels inspected under 46 CFR Subchapters T & K (3)
- Re-evaluate licensing / pilotage requirements based on cargo type and volume (3)
- Require drug and alcohol testing for crews on all vessels inspected under 46 CFR Subchapters T & K (1)
- Require and review documentation for all crew employed aboard vessels inspected under 46 CFR Subchapters T & K (i.e., Merchant Mariner Documentation (MMD)) to eliminate the possibility of substandard mariners working in the industry) (1)
- Create speed or transit restrictions in reduced visibility for high-speed ferries (1)
- Require two qualified people be in the pilothouse of high-speed ferries (1)
- Establish an additional VHF radio frequency for the VTS area to eliminate the saturation on Channel 14 (1)
- Provide more voluntary training opportunities (1)

Vessel Conditions: Commercial Fishing Vessel Quality

Baseline Risks:

- Currently, low levels of commercial fishing due to low fish populations
- Fishing occurs offshore more than in the Bay, making search and rescue (SAR) difficult
- Brief herring fishery, but occurs in the Delta – vessels vary considerably in quality
- Local fishing vessels tend to be less well maintained than those coming from other areas
- Chronic crew fatigue and extended use of autopilot
- Safety issues occur due to low number of crew on board (in some cases, only one person); therefore, ineffectively operating vessel (e.g., crewmember cannot be manning the radio while working equipment on deck)
- Vessels are mostly uninspected; USCG safety examinations only done on a voluntary basis; voluntary inspection program is inadequate
- Seasonal fishing industry (e.g., salmon, halibut)
- Fishing industry representatives are independent and often do not communicate with one another to share information (i.e., "not giving up their location")
- There is no VTS radar site at Bodega Point to warn commercial traffic of the fishing vessels in the area; hinders the USCG and other vessels' ability to exchange information with fisherman
- Same vessels being used – deteriorating equipment

Trends:

- Fewer and fewer fishing vessels in the fleet

Existing Mitigations:

- Commercial Fishing Vessel Safety Board has been established
- Less commercial fishing / vessels going out of business due to restrictions and type of fishing off the coast (e.g., fishermen are selling their boats to other people who are not fishermen)
- Voluntary Fishing Vessel Examination program
- USCG has a robust program for outreach – "walk the docks"
- Partnership program during herring season between USCG and Fish & Game
- Because there are fewer commercial fishing vessels, USCG safety boardings are done on a higher percentage; examinations are more rigorous
- USCG has more small boats moving about the waterway; more of an enforcement presence

New Ideas (number of times suggested)**:**

- Require USCG inspections of commercial fishing fleet modeled on other nations' successful programs (6)
- Institute Automatic Identification System (AIS) carriage requirements for the commercial fishing fleet (3)
- Institute Emergency Positioning Indicating Radio Beacon (EPIRB) carriage requirements for the commercial fishing fleet (3)
- Require commercial fishing vessel crews be licensed (1)
- Increase punishment for violations (e.g., monetary consequences of noncompliance) (1)

Vessel Conditions: Small Craft Quality

Baseline Risks:

- Small boat operator alcohol usage high at Oakland Inner Harbor, Mandeville Island, and generally throughout the Delta area
- Delta area vessels tend to be poorly maintained while Bay and Golden Gate area vessels tend to be better maintained and of a higher quality
- Recreational operators of wind- and human-powered craft (e.g., wind surfers / kite surfers / sailboarders / kayakers) are problematic in several areas:
  - Coyote Point
  - Richmond Inner Harbor
  - Golden Gate
- Inexperience / poor quality of non-powered vessel operators (e.g., kayaks / sailboarders / windsurfers) – vast majority of USCG rescues
- Some operators ignore rules and regulations (e.g., too-high speed for size of waterway)
- Generally poor Rules of the Road knowledge
- 20% are problematic depending on location

Trends:

- None identified

Existing Mitigations:

- Education / outreach by pilots, auxiliary, and power squadrons has helped to improve operator competency over the years
- HSC outreach – brochures for a variety of vessels from small to large craft
- Outreach to 30+ marinas for large marine events (e.g., "Fleet Week")
- Better USCG enforcement via CG form 4100 boardings
- Better USCG follow through with Rule 9 violation incidents
- Increased use of Global Positioning System (GPS) and EPIRBs for smaller vessels; some have an AIS transceiver that allows for tracking
- Use of internet (i.e., availability of boating safety information)
- Responsible rental companies provide safety instructions, and in some cases, classes
- Required license for operators of motorized vessels is working its way through California legislature
- Human-powered boating groups are better organized

New Ideas (number of times suggested)**:**

- Increase and improve outreach programs / voluntary education (9)
- Better enforce existing rules, particularly in the Delta (8)
- Increase consequences for those operators who do not meet standards and requirements (e.g., Rule 9) (4)
- Institute a VHF-FM radio carriage requirement (4)
- Require a Federal license for all waterway users (3)
- Require a state license for all waterway users (2)
- Require a safety inspection (with documentation thereof carried on board) before a boat is registered (1)
- Adjust current regulations to require all vessels, both motorized and non-motorized, to display an all-around white light at all times at night (1)
- Establish a speed Regulated Navigation Area (RNA) in the Delta to reduce wakes (1)

Traffic Conditions: Volume of Commercial Traffic

Baseline Risks:

- 120,000 - 145,000 vessel transits / year (≈ 400/day)
- 60% (240 transits/day) ferry traffic
- Some ports have room for expansion (e.g., Port of Oakland only at 40% capacity with 2,000 vessels / year; Port of Benicia at 60-70% capacity)
- Individual facilities may not be able to handle any increase in traffic
- Richmond Inner Harbor and San Francisco Pier 35 (cruise ship terminal) cannot handle multiple vessels at the same time
- Vessels awaiting a berth use Anchorage 9; Anchorage 23 too small
- Labor availability / operating hours at ports may result in a back up of vessels awaiting berths
- Still issues with multiple vessels needing pilotage at the sea buoy at the same time, though this isn't as bad as previously

Trends:

- General trend is increase in overall volume of cargo, though number of vessels has decreased slightly because the cargo holds are larger
- Doubling of trade by 2020 expected but vessel traffic dependent on rail, highway, short-sea shipping, and overall economy; increasing Panama Canal traffic, but ports in Mexico are taking cargo from U.S. west coast ports
- Increasing passenger ferry vessel transits expected on existing routes (Water Emergency Transit Authority provided funding to increase routes)
- Increasing short-sea transits (e.g., to Stockton and Sacramento) – but may not be economically viable
- Vessels may be restricted due to government regulations, infrastructure requirements, newly required usage fees

Existing Mitigations:

- Good vessel traffic management currently in place; VTS helps to manage the volume to traffic
- Cargo volumes have leveled out recently
- Larger vessels holding more cargo = fewer vessels transiting area
- Pier availability risk is mitigated by itself – schedule cannot allow more vessels than what is available; vessels follow protocols for awaiting berths
- Due to AIS implementation and radar target integration, VTS operators no longer have to actively track vessels, making it easier for them to stay aware of a greater number of vessels
- Use of Advanced Notice of Arrival (ANOA) helps to meter the flow of arrivals
- Use of the marine exchange; pilots help to meter the flow of traffic
- Dredging to deepen the channel allows larger vessels to enter the port
- Implementation of additional fees and state-imposed environmental requirements keep discretionary cargo vessels from coming to California ports

Traffic Conditions: Volume of Commercial Traffic

New Ideas:

- Risks judged to be well balanced with existing mitigations

Traffic Conditions: Volume of Small Craft Traffic

Baseline Risks:

- 2,000 marine events / year (e.g., sailing regattas, powerboat races, swim from Alcatraz); heaviest on weekends and in summer (about 50% occur during summer season)
- Sail boating most popular areas – San Francisco city front, Knox area, Sausalito, Central Bay, North and South Bays
- Delta – powerboat races at Rio Vista, Mandeville Island, Discovery Bay
- Crab season – vessels take up the entire waterway
- Salmon season – northern and southern offshore traffic lanes are popular fishing areas
- Halibut season – Berkeley Pier area
- Striper season – Mel's Reef (south of Alcatraz Island)
- State encourages building of new marinas
- Despite the area being regulated by conservation committee, there is no limit on activities

Trends:

- 2008 – 10 fewer sailboat races than in previous years; may have reached its plateau
- Less recreational boating due in part to high fuel costs / poor economy / change in family living conditions with less disposable income
- While a decrease in power boat races, there is an increase in small human powered / wind powered vessels; in particular at Oakland estuary

Existing Mitigations:

- Marine event permitting process is allowing more control (i.e., USCG knows where events are taking place)
- VTS provides small craft traffic awareness to commercial vessels
- Club coordinators contact VTS directly regarding events
- Number of commercial fishing vessels is decreasing
- Seasonal restrictions (i.e., bad weather keeps motor- and human-powered boats from going out, but that is when sailing activity increases)
- Fuel prices have decreased power boat operations
- Better and increased outreach and prevention efforts in general
- Use of the internet to make information available to a wider group

New Ideas:

- Risks judged to be well balanced with existing mitigations

Traffic Conditions: Traffic Mix

Baseline Risks:

- Mix of commercial and recreational vessels throughout waterway
- Greatest mix of traffic is in Central Bay – all deep draft traffic comes around Alcatraz Island and through Central Bay and 70-80% of marine events occur in the Central Bay
- Large volume and mix of vessels:
  - Golden Gate Bridge – fishing vessels offshore from ferry building
  - East of Alcatraz (sailing regattas off waterfront / paddle boats / wind surfers)
  - Northeast of Angel Island
  - End of estuary – sailing regatta conflicts
  - Suisun Bay – fishing and commercial conflicts
  - Carquinez Straits – commercial and wind surfing conflicts
  - Point Blunt – several types of vessels
- Delta area has more narrow waterways with bends and twists; competition for space between vessels with different displacements and speeds; lack of Aids to Navigation (ATON) and danger warning signals
- Recreational vessels and ferries (other than high-speed ferries) do not have speed limits, with exception of no-wake zones

Trends:

- None identified

Existing Mitigations:

- Previous conflicts at San Rafael bridge resulted in VTS involvement to establish protocol
- The Ferry Traffic Routing Protocol (FTRP) – a voluntary protocol that established ferry-specific routes (not lanes) allowing for others to predict their movements
- The use of AIS increases awareness
- Permitting of marine events helps manage traffic issues
- The use of USCG / VTS routine broadcasts of information to mariners (e.g., location of fishing activities and regattas)
- Use of RNAs and RNA speed limits set to 15 knots
- Use of safety zones around high-risk / high-interest vessels
- Better USCG follow through with Rule 9 violation incidents
- Captain of the Port (COTP) has already designated all deep draft waterways as a Rule 9 waterways
- Due to shallow draft, high-speed ferries are able to get out of the way of slower vessels in the waterway
- Rules of the Road (COLREGS) requirements
- Deep draft vessel channels are clearly marked
- Tank ships using north and south approach channels, alleviating conflicts with fishing fleets in western approach

New Ideas:

- Risks judged to be well balanced with existing mitigations

Traffic Conditions: Congestion

Baseline Risks:

- Fishing seasons –
  - Crab season – all over waterway
  - Salmon season – northern and southern offshore traffic lanes
  - Halibut season – Berkeley Pier (north and south)
  - Striper season – Mel's Reef (south of Alcatraz Island)
- July 4th congestion at Mandeville Island, Stockton, Pier 32 (e.g., Cape Fog Kaboom)
  - 40 fireworks shows / year mostly near Kirby Cove with large numbers of recreational boats
- San Francisco city front during Fleet Week
- Kirby Cove (by stadium) during baseball games
- Dredging in channels during season (late summer for Oakland and Richmond)
- 300 sailboats in Mare Island Strait during large annual event
- "Opening Day" events during April or May (dates vary by locale) cause congestion (e.g., Redwood City, Sacramento)
- 15 knot RNA restriction on traffic can cause a grouping of vessels in an area

Trends:

- None identified

Existing Mitigations:

- The FTRP – a voluntary protocol that sets forth ferry-specific routes (not lanes) allowing for others to predict high-speed ferry movements
- The use of AIS provides greater awareness; some higher-end recreational vessels are equipped with AIS and if vessel has Minimal Key Device (MKD), then other vessels using ECDIS can see it
- Marine event permitting process is allowing more control – club coordinators contact VTS directly regarding events
- Designated anchorage areas provide a safe area to hold up vs. loitering while awaiting a berth
- Reduction of fishery seasons and fishing fleet size
- Good communications between marine terminals and pilots
- Use of the marine exchange; pilots help to meter the flow of traffic
- Use of two discrete VHF-FM radio frequencies (inshore and offshore) by the VTS
- Limited number of tugs available; therefore, less cargo coming in and being moved through the waterway at any one time
- Rules of the Road (COLREGS) requirements
- Channels are clearly marked for deep draft traffic
- Seasonal restrictions (i.e., bad weather keeps motor- and human-powered boats from going out, but that is when sailing activity increases)

Traffic Conditions: Congestion

New Ideas (number of times suggested)**:**

- Establish an additional VHF-FM radio frequency for the VTS to use to eliminate the saturation on Channel 14 (i.e., a frequency specifically for up-river/Delta communications) (11)
- Establish radar sites at Point Reyes and Pilar Point to 1) eliminate the conflicting need to use long range radar settings to monitor the north and south approach lanes and shorter range radar settings for the bay area, and 2) providing better angles to detect and manage deep draft traffic and significant fishing operations close to traffic lanes (8)
- Establish AIS repeaters so vessels can "see" one another despite local topography limitations (i.e., AIS depends on line-of-sight radio communications that aren't possible in some critical areas) (7)
- Ensure USACE maintains project depths in the channels through annual dredging (6)
- Place a new buoys south of Alcatraz (Blossom Rock / Pier 27 area) to create a deep water traffic lane (3)
- Establish more flexible and better managed International Longshore and Warehouse Union (ILWU) work shift rules (3)
- Ensure USACE hydrographic survey results are distributed in a timely manner (3)
- Deepen Pinole Shoal Channel in San Pablo Bay to 45 feet (1)
- Ensure USACE conducts frequent and accurate sounding surveys of all channels (1)

Navigational Conditions: Winds

Baseline Risks:

- Generally constant
- Areas of strong (greater than 20 knots sustained) winds – outside the Golden Gate Bridge, Raccoon Straits, San Bruno, San Francisco city front (down the slot from the Golden Gate Bridge), Carquinez Straits, and Benicia
- Winds across the channel – Benicia, Richmond in the afternoon, San Bruno
- Fairly predictable by season– summer winds in the afternoon, winter winds from the south preceding a storm
- Vessels can drag anchor
- Microclimates created due to increased construction

Trends:

- None identified

Existing Mitigations:

- Existing protocol for raising Union Pacific Railroad Bridge for deep draft vessel transits during high-wind conditions
- Better means of getting good quality weather forecasts
- Real time access to weather conditions from buoys via the internet and Physical Oceanographic Real-Time System (PORTS) (funded by OSPR)
- VTS maintains an anchorage watch when winds are 25 knots or more
- Tug companies have standard operating procedures (SOPs) for standby vessels in high wind conditions
- Environmental limitations established by companies on when vessels can moor at berths
- Avoidance (i.e., high winds keep motor- and human-powered boats from going out, but that is when sailing activity increases)

New Ideas:

- Risks judged to be well balanced with existing mitigations

Navigational Conditions: Water Movement

Baseline Risks:

- Currents run at 4-5 knots:
  - Open Bar Channel
  - San Francisco city front (crosscurrent between piers)
  - Seasonally (wet winter) – Cache Slough crossing deep water channel
  - Carquinez Straits has higher current due to waterway constriction and spring runoff
  - Raccoon Straits
  - Brother Island
  - Richmond Bridge (buoys sometimes completely underwater)
  - Benicia (at railroad bridge)
  - South of Golden Gate
  - Entrance to Mare Island Strait
- Currents due to spring runoff cannot be predicted
- USACE releases water from flood control dams
- Small craft (i.e., recreational vessels) tend to throw a wake, particularly in the Delta; deep draft vessels also throw a wake, but theirs tend to have less impact due to vessel speed
- Levees that provide protection to the agricultural and developed areas of the Delta need improvements to keep land from flooding

Trends:

- None identified

Existing Mitigations:

- Water movement predictions are fairly good due to PORTS and National Oceanographic and Atmospheric Administration (NOAA) published information
- Tug escort requirements based on current conditions; different requirements for different areas in the bay (e.g., some vessels require tug escort with 4 knots of following current)
- Terminal limitations depending on current conditions; established by individual companies; determine when vessels can moor at berths
- Infrequently done, but the ability to close the bar channel and stay in offshore holding pattern (based on pilot reports) can occur during severe conditions; HSC is actively researching this issue with regard to implementing best practices
- Pilots have established current restrictions for vessels into and out of Port of Oakland
- VTS has procedures in place for the Delta area during high water conditions (e.g., VTS can broadcast conditions and may restrict or stop transits)
- Tugs must perform voyage planning

New Ideas:

- Risks judged to be well balanced with existing mitigations

Navigational Conditions: Visibility Restrictions

Baseline Risks:

- Fog is a daily condition, though fairly predictable ½ the year in most areas with the exception of –
  - Winter fog in Delta
  - Outside the Golden Gate (casualties occurring between commercial and fishing vessel traffic – two incidents recently off Point Reyes and Pilar Point; VTS has no visual surveillance of immediate coastal areas)
  - Unusual circumstances (e.g., fog in Central Bay during M/V Cosco Busan incident)
- Generally San Pablo Bay, Suisun Bay, and Delta are not affected, though Carquinez Straits does have foggy conditions periodically
- Length of fog – usually lifts after 6 to 12 hours, but can be more persistent occasionally
- Larger amounts of fog at Point Blunt

Trends:

- Appears to be less fog than in the past, possibly due to increased city dwelling / buildings creating microclimates

Existing Mitigations:

- Universal acceptance of clearly defined parameters in new visibility rules for deep draft (1600 GT and above) vessel movements; established by the HSC, which takes pressure off of operators
- Better means of getting good quality weather forecasts
- Use of radar
- Use of AIS
- Use of VTS
- Racons clearly mark the center span of bridges
- As part of the SMS system, enhanced pilothouse manning is required during times of reduced visibility
- Union Pacific Railroad Bridge has defined protocols for reduced visibility (½ mile)
- Good placement of buoys
- Use of fog signals
- Additional requirements for high-speed ferry operations in reduced visibility are being discussed by the HSC

New Ideas:

- Risks judged to be well balanced with existing mitigations

Navigational Conditions: Obstructions

Baseline Risks:

- Stockton Deep Water Ship Channel (San Joaquin River) – pilots voluntarily stop vessel movement at night due to debris
- River debris throughout entire waterway during spring runoff
- Crab pots in offshore traffic lanes
- Oakland estuary – sunken wrecks (e.g., 110-foot tug sank east of deep draft traffic lane at 30-40° angle resulting in a portion (1/3) of the tug in channel)
- South part of estuary – bridge obstructions
- Shag, Blossom, Arch, Harding Rocks – underwater rocks protruding out of water

Trends:

- None identified

Existing Mitigations:

- Local ship drivers know where the rocks are
- USACE removes debris in waterway on a regular basis
  - Specifically funded to do so
  - Three boats available / one in operation each week day
  - Have to report quantity of debris removed to the HSC on a regular basis
- USCG using ATON to mark wrecks within the waterway
- USACE permitting process ensures all waterway stakeholders can review projects that will extend into navigable areas

New Ideas:

- Risks judged to be well balanced with existing mitigations

Waterway Conditions: Visibility Impediments

Baseline Risks:

- Bridges – Miller Sweeney Bridge (Fruitvale Bridge) at south end of Oakland Channel
- Background lighting issues throughout the Bay; specific problem areas:
  - San Francisco waterfront
  - Electronic billboard at Oakland Inner Harbor obscures range lights at night; very bright when left in daylight condition / intensity
  - Building security lighting at Miller Sweeney Bridge
  - Refinery and city lighting around Martinez
- Recreational boater height of eye is lower to water than commercial vessel perspective, so background lighting more of an issue for small craft
- Vegetation blocking crossing / merging situations and other vessel traffic in waterways throughout the Delta
- Vegetation issue reducing light visibility in the Port of Stockton at a wildlife area

Trends:

- None identified

Existing Mitigations:

- Port of Stockton raising rear range light being impeded by vegetation growth
- Processes in place regarding ATON discrepancies – problem reported to VTS, who then notifies appropriate ATON unit for action (i.e., repair / replacement)
- Use of AIS
- Use of VTS – providing reports to mariners of what they should expect to see during their transit
- USCG has the authority to correct some lighting problems – mariners can access regulations for process

New Ideas:

- Risks judged to be well balanced with existing mitigations

Waterway Conditions: Dimensions

Baseline Risks:

- San Joaquin River from Port of Stockton to Prisoner's Point (Mandeville Cut) – 250 feet wide
- Union Pacific Railroad Bridge – 294 feet wide and 135 feet high; pilots limit maximum vessel width to 138 feet; vessels coming down river are challenged because of current coupled with waterway dimensions
- South Hampton Shoal has traffic limitations due to depth of water; therefore, multiple vessels transiting only at high water
- Oakland – one-way traffic due to narrow channels
- Rio Vista Bridge – one-way traffic; 250 feet wide
- Old Sacramento River – very narrow, but some tug and barge traffic to repair levees
- Narrow channels resulting in moored vessels pulling away from dock when other vessels transit through area:
  - Martinez
  - N.Y. Slough
  - Richmond
  - Stockton (permanently moored cement ship)
- Anchorages 5 and 23 have limited holding areas (e.g., shoal to rocky bottom)

Trends:

- None identified

Existing Mitigations:

- Better communications between operators / companies and USACE – getting data out sooner after depth changes occur
- Use of ATON to mark channels
- Use of PORTS for real time reading of tidal levels
- Dock-to-dock passage planning
- Effective NOAA charting system – verifying updates and making sure they are accurate
- Availability of accurate GPS
- Use of ECDIS
- When draft constrained, vessels avoid transits at low tide

New Ideas (number of times suggested)**:**

- Ensure USACE maintains project depths in the channels on a regular basis (10)
- Ensure frequent and accurate sounding surveys are completed for all channels (9)
- Ensure hydrographic data survey results are distributed in a timely manner (4)
- Deepen Pinole Shoal Channel in San Pablo Bay to 45 feet (1)
- Increase clearance height and width at Union Pacific Railroad Bridge (1)
- Widen turning basin in Oakland Inner Harbor (1)
- Perform maintenance dredging at Anchorage 5 (1)

Waterway Conditions: Bottom Type

Baseline Risks:

- Muddy bottom from upper Delta areas to San Pablo Bay
- Rocky and sandy bottoms past San Pablo Bay into central San Francisco Bay
- Rocky bottom:
  - The Brothers
  - Invincible Rock
  - Whiting Rock
  - North of Richmond at San Rafael Bridge
  - Anchorages 5 and 23
- Sand and clay bottom in Oakland Inner and Outer Harbors
- Pier 27 Rock – issue with deep draft vessels being able to make turn – "cutting the corner"
- Rock on top of BART tunnel which is 10 - 12 feet below the harbor bottom

Trends:

- None identified

Existing Mitigations:

- Traffic routing measure through Central Bay – RNA restricts outbound traffic lane to 28 feet of draft (over Arch and Shag rocks)
- Pilotage provides local knowledge
- Better vessel design with recent double-hull and double-sided requirements
- Use of fathometers
- Minimum under keel clearance policies of 2 feet in HSC Plan and company SOPs; most SMS plans also address keel clearance
- USACE is responsive to requests for updated surveys

New Ideas:

- Risks judged to be well balanced with existing mitigations

Waterway Conditions: Configuration

Baseline Risks:

- Bends exist greater than 45 degrees:
  - San Joaquin River
  - Old Sacramento River
  - Through Golden Gate Bridge and heading northbound
  - Oakland Bar Channel entrance to Red Creek
  - Oakland Inner Harbor
  - Carquinez Straits
- Intersections and convergences:
  - San Joaquin and Sacramento Rivers
  - N.Y. Slough
  - Mare Island Channel
- Crossing traffic areas:
  - Ferry traffic runs from downtown San Francisco waterfront to north areas
  - Alcatraz Island ferries
  - From Piers 33 and 41 to Alcatraz and Oakland
- All three waterway configuration issues occur at the eastern entrance to the deep water traffic lane (Point Blunt)

Trends:

- None identified

Existing Mitigations:

- USACE dredging a straight channel (e.g., Sacramento deep draft channel)
- Use of AIS
- Use of VTS
- Use of FTRP (ferry protocol)
- Mandatory pilotage for most deep draft ships
- RNAs established to control traffic through the area (e.g., Prisoner's Point in Stockton – one way traffic required by RNA)
- Policy in place for pilots to transit within a 2-hour window during high-water
- Marine event planning and permitting process

New Ideas:

- Risks judged to be well balanced with existing mitigations

Immediate Consequences: Personnel Injuries

Baseline Risks:

- Large passenger carrying vessels frequently present
- Cruise ships
  - 3,000 – 4,000 people per ship
  - Operate 2 - 3 times / month
- Ferry traffic:
  - Largest ferry carries 750 passengers
  - Operate on a regular basis (e.g., Alcatraz tour ferries make 10 - 12 transits / day)
- Dinner cruises:
  - M/V San Belle carries up to 2,000 passengers, though typically only 1,200 on board; operates 60 transits / year
  - Other dinner cruise vessels have from hundreds down to only 30 passengers on board, depending on the vessel
- Charter fishing / head boats:
  - Salmon season brings in multiple charter transits (40 - 50 / day)
  - Offshore for rockfish
- Whale watching boats (and other excursion boats)
- Military vessels:
  - Occasional aircraft carrier (approximately 5,000 crew), especially during Fleet Week
  - USCG 378s (approximately 200 crew)
  - Ready reserve force (limited number of crew even at full compliment)

Trends:

- None identified

Existing Mitigations:

- Better communications systems (e.g., VTS can coordinate response efforts)
- Mass casualty drills are conducted
  - Cruise ships have to conduct regular drills; crews trained to deal with large scale incidents; vessel design also aids in incident
  - VMAP members drill annually
- The use of VMAP allows ferry operations to respond to mass casualties
- Members of VMAP have additional inflatable buoyant apparatus on board
- VMAP members are directed by USCG to respond
- Most passenger carrying vessels (and all Subchapter K vessels – more than 150 passenger capacity) are VMAP members
- Other non-VMAP member vessels may be equipped to respond
- USCG Auxiliary can respond; also have communications systems that can be used during a response
- Other small boat fleets are available to assist in response
- Simply the shear volume of vessels on the water increases response capabilities
- 2 – 3 fire boats; post-9/11 asset acquisitions for first responder capability
- USCG Auxiliary has aircraft for observation
- 22 deep draft vessel Potential Places of Refuge (PPOR)) sites identified by local conservation committee (i.e., in the event holding areas are necessary while responding to incident

New Ideas:

- Risks judged to be well balanced with existing mitigations

Immediate Consequences: Petroleum Discharge

Baseline Risks:

- Large tank ships have 650,000 barrels (27.3 million gallons) capacity / vessel
- 1.1 million-barrel capacity on Chevron vessels, but not run at full capacity due to draft limitations; typically 800,000 barrels in single-hull vessel (33.6 million gallons)
- 350,000 barrels in biggest barge (14.7 million gallons)
- Full range of petroleum products moving through San Francisco waterways (e.g., gasoline, kerosene, jet fuel, bunker C).
- Three single-hulled tank vessels using the waterway

Trends:

- None identified

Existing Mitigations:

- 2010 – single-hulled oil tankers not permitted
- 2026 – all petroleum carrying vessels required to be double-hulled, double-sided
- M/V Cape Mohegan and M/V Cosco Busan incidents provided lessons learned
- Incident Command System (ICS) brings all parties together to respond in a coordinated effort
- Regular drills held so stakeholders know one another and practice working together
- Oil Spill Contingency Plans required by state and Federal governments for tank and non-tank vessels
- Companies are required to have an oil spill response organization (OSRO) under contract (e.g., National Response Corporation (NRC) or Marine Spill Response Corporation (MSRC))
- Area Contingency Plans (ACPs) are required by OPA 90 to ensure all parties are in line with one another regarding response tactics, etc.
- Oil spill contingency plan holders drilled routinely; 16 required elements within a 3-year rotation
- California has a boom grant for onsite equipment
- Strong volunteer program to clean up wildlife
- Oil Spill Trust Fund (contributed to by companies) is available if responsible party is not designated
- Each vessel is required to have a Certificate of Financial Responsibility
- Use of OSPR – a dedicated response agency
- Improved communication with government agencies
- The option to use one of the 22 deep draft potential places of refuge (PPORs)
- Public affairs in the environmental area is better prepared based on lessons learned during since recent incidents

New Ideas:

- Risks judged to be well balanced with existing mitigations

Immediate Consequences: Hazardous Materials Release

Baseline Risks:

- Anhydrous ammonia: 1 or 2 transits / week either to Sacramento or Stockton; 20,000 tons of cargo per ship; ship size is 600-700 feet long (i.e., less than 40,000 GT vessel
- Chlorine
- A variety of nitrates (e.g., potassium nitrate) going to Stockton
- Ethanol at Selby (below Carquinez Bridge)
- Military munitions at Concord
- Containerized radioactive cargo into Port of Oakland
- Port of Richmond – smaller quantities / chemical facilities
- Carriage of multiple cargoes per vessel poses a risk in that dangerous cargoes may be on board but not known because not being offloaded in this area (e.g., paraffin wax offloaded locally while benzene was on board vessel that was headed to the east coast)

Trends:

- None identified

Existing Mitigations:

- Could use local assets through programs like Safeport – using inactive ships to take radiological devices off vessels
- Use of ANOA – with crew and cargo manifest provided
- CFR regulations require vessels carrying cargoes of particular hazard to proceed directly to offload facility
- High-risk vessels are escorted by USCG and boarded before entering the Bay
- "Superfund" – Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) – fund to pay for clean up if designated party not found/identified
- Communications systems to warn about incidents and safeguard lives (e.g., USCG broadcast notices to mariners, HOMEPORT web-site, public safety department reverse 911)
- Post 9/11 resulted in additional asset funding
- USCG Pacific Strike Team close by and well equipped for hazmat response
- Bay committee tasked to develop hazardous material response policy as part of the Area Contingency Plan
- Marine exchange notifications
- Ability to broadcast safety messages to general public (though not tested enough)
- State and Regional Emergency Management Systems (SIMS) and (RIMS) through the Office of Emergency Services (OES) – get information out to public
- Earthquake awareness at county level provides capability for a water incident
- Volunteer emergency response organizations
- The option to use one of the 22 deep draft PPORs (places of refuge)

Immediate Consequences: Hazardous Materials Release

New Ideas (number of times suggested)**:**

- Make improvements to USCG continuity of operations / infrastructure capabilities (e.g., designate an area to reconvene that provides all necessary equipment to effectively perform response operations) (8)
- Increase first responder training on a volunteer basis (8)
- Require additional first responder training (6)
- Develop an emergency citizen information line – 211 (5)
- Increase OES public outreach and awareness (2)
- Measure the effectiveness of previous public outreach efforts through lessons learned (e.g., how effective was the information that was sent out during the Festival of Sail) (1)
- Conduct more drills / training (1)
- Improve and measure the effectiveness of interagency and public communications (1)

Immediate Consequences: Mobility

Baseline Risks:

- 70% of containers coming into Oakland on ships are subsequently moving across the Union Pacific Railroad Bridge
- Delta area poses large mobility issues
- Channel blockage could occur at:
  - Pinole Shoal
  - North Channel
  - Below West Bend
  - Entrances to Oakland Inner Harbor and Outer Harbor (Oakland Bar Channel – significant)
  - South Hampton Shoal Channel, possibly
  - Union Pacific Railroad Bridge, possibly
- Critical maritime transportation system shoreside infrastructure that could be impacted by a vessel accident:
  - Union Pacific Railroad Bridge in Carquinez Straits
  - Bay Bridge
  - Interstate Highway 680 Bridge
- Heavy-lift salvage equipment is not available locally (there are a few intermediate vessels in Vallejo and Alameda that can provide smaller-lift operations if needed)

Trends:

- None identified

Existing Mitigations:

- Alternate transportation modes are abundant
- Many alternate routes on roadways
- Rail traffic could be rerouted around the Carquinez Straits bridge
- Bridges have been reinforced for earthquake protection
- Vessels could use other ports (e.g., Los Angeles/Long Beach) rather than coming here
- USCG has a Marine Transportation System Recovery Unit providing assistance in the form of prioritization of cargoes, etc.
- Current heavy-lift crane used to work on Bay Bridge may be staying on west coast upon completion of project
- Tug companies are required to have a contract with a salvage company to provide assistance within a certain timeframe
- Some oil companies have their own salvage / recovery teams

New Ideas (number of times suggested)**:**

- Improve bridge fendering to deflect / alleviate vessel impact (primarily at Union Pacific Railroad Bridge) (8)
- Provide more funding for heavy lift salvage equipment in the Bay area (8)
- Develop a coordinated contingency plan for recovery aspects within the Marine Transportation System (MTS) (or if already in place and effectively working, provide for better coordination of existing MTS recovery plans) (7)

Subsequent Consequences: Health and Safety

Baseline Risks:

- 800,000 people live/work close to waterways in San Francisco and surrounding areas
- Water intakes throughout the Delta provide drinking water for all of California

Trends:

- None identified.

Existing Mitigations:

- Refineries have a warning system (siren and automated phone system); tested, but with mixed results
- Some public safety departments have a reverse 911 system
- Terminals have been closed in past incidents
- Beaches are closed in the event of a spill
- Oakland terminal has completed an evacuation drill with effective results
- Financial assistance via insurance companies
- Through VMAP, ferry terminal matrix used to determine how many vessels/passengers will fit in a terminal (e.g. more than 10,000 people moved from Oakland to San Francisco in one night)
- California Water Quality Board (WQB) has a system of checks and notifications so providing a water intake shut down can be done; USCG phone tree includes WQB notification of vessel incidents
- Recent ineffective responses created the need to focus on providing better responses

New Ideas (number of times suggested)**:**

- Develop a universal early warning system throughout the Bay area (vice current limited system) (7)
- Increase first responder training on a volunteer basis (4)
- Educate the public on potential hazards being carried throughout the Bay area (3)
- USCG inform pilots of the vessel's cargo if particularly hazardous (2)
- Inform the fire department of hazardous cargoes transiting through waterway to ensure they are adequately prepared in the event of an accident (1)

Subsequent Consequences: Environmental

Baseline Risks:

- Wetlands:
  - Suisun Bay
  - San Pablo Bay
  - South Bay
  - East Bay marshes
  - Richardson Bay
- Endangered species:
  - Plover at Crissy Field, Ocean Beach
  - Smelt in the Delta
  - Green sturgeon
  - Brown pelican (marine events can be shut down e.g., fireworks displays)
  - Lesser terns
- Sensitivity to water quality:
  - Tourists
  - Locals
  - Three marine sanctuaries from the Golden Gate Bridge to the Farallon Islands

Trends:

- None identified.

Existing Mitigations:

- Standard oil spill response practices in place for dealing with environmental issues
- USCG has lessons learned from M/V Cosco Busan incident regarding public relations:
  - Should not report quantity spilled; rather report that USCG is responding to the maximum spill potential of the incident
  - Increase training of public relations staff
  - Possibly restrict vessel movements in the Bay during the cleanup to reduce oil drag
- Direct involvement with agencies through ICS
- Public affairs programs in place
- State of California overall, and entire Bay area in particular, is more interested in environmental quality than in most other places in the U.S.
- Expanded volunteer efforts / non-profit environmental groups willing to assist in clean up efforts
- Restoration of habitats through National Resource Damage Assessment (NRDA) – standard is that affected areas will be cleaned until they are as clean as they were before the incident

New Ideas:

- Risks judged to be well balanced with existing mitigations

Subsequent Consequences: Aquatic Resources

Baseline Risks:

- Multiple species in waterway (e.g., crab, smelt, halibut)
- Year-round fishery with a seasonal component (e.g., halibut, salmon, striper)

Trends:

- None identified

Existing Mitigations:

- Area Contingency Plans have identified sensitive areas; agencies are required to respond within a particular timeframe in these areas
- State agency (Fish & Game) monitors stock and orders closures / re-openings
- Pending state legislation regarding impacted aquatic resources incidents
- Good information network

New Ideas:

- Risks judged to be well balanced with existing mitigations

Subsequent Consequences: Economic

Baseline Risks:

- Affected by waterway closure:
  - National effect; 30% of Oakland cargo going intermodal inland
  - Crude oil shipped into the port is refined and products are shipped out as well as being used locally; large economic impact if waterway closed (i.e., lack of surplus refinery capacity in other areas if crude oil shipments needed to be diverted)

Trends:

- Pending California environmental regulations may require vessels to use shoreside power when moored; there is a concern that shoreside infrastructure may not be able to meet this new requirement, resulting in fewer cargo vessels using San Francisco Bay

Existing Mitigations:

- Rerouting of container traffic to other ports (e.g., Los Angeles / Long Beach) is feasible in the event of a waterway closure
- Small potential use of trucking at great logistical and financial expense

New Ideas (number of times suggested)**:**

- Provide more funding for heavy lift salvage equipment in the Bay area (6)
- Develop a Memorandum Of Agreement (MOA) between Federal and local government agencies for use of Federal salvage assets (5)
- Develop a coordinated contingency plan for recovery aspects within the MTS (or if already in place and effectively working, provide for better coordination of existing MTS recovery plans) (4)
- Institute national disaster response tax relief to take the place of lost earnings due to a closed port (1)