Port of Coos Bay
Workshop Report

Introduction

A Port Risk Assessment Workshop was conducted for the Port of Coos Bay on September 7, 2000. This workshop report provides the following information:

- Brief description of the process used for the assessment;
- List of participants;
- Numerical results from the Analytic Hierarchy Process (AHP) [1]; and
- Summary of risks and mitigations discussion.

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

Assessment Process

The risk assessment process is a structured approach to obtaining expert judgments on the level of waterway risk. The process also addresses the relative merits of specific types of Vessel Traffic Management (VTM) improvements for reducing risk in the port. Based on the Analytic Hierarchy Process (AHP), the port risk assessment process uses a select group of waterway users/stakeholders in each port to evaluate waterway risk factors and the effectiveness of various VTM improvements. The process requires the participation of local Coast Guard officials before and throughout the workshops. Thus the process is a joint effort involving the local maritime community and the agencies/entities responsible for implementing selected risk mitigation measures.

This methodology employs a generic model of port risk that was conceptually developed by a National Dialog Group on Port Risk and then translated into computer algorithms by the Volpe National Transportation Systems Center. In that model, risk is defined as the sum of the probability of a casualty and its consequences. Consequently, the model includes variables associated with both the causes and the effects of vessel casualties. Because the risk factors in the model do NOT contribute equally to overall port risk, the first session of each workshop normally is devoted to obtaining expert opinion about how to weight the relative contribution of each variable to overall port risk. Due to time constraints, this was not done in Coos Bay. Rather, the workshop participants began by discussing the risks in Coos Bay, then they established scales to measure each variable in the port risk model. Once the parameters have been established for each risk-inducing factor, port-specific risk is estimated by putting into the computer risk model specific values for that port for each variable. The computer model allows comparison of relative risk and the potential efficacy of various VTM improvements between different ports.

Coos Bay Port Risk Assessment Background

[1] Developed by Dr. Thomas L. Saaty, et al, to structure complex decision making, to provide scaled measurements, and to synthesize many factors having different dimensions.

Coos Bay was selected for a port risk assessment at the request of the Coos Bay Harbor Safety Committee.

Participants

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

Participant	Organization	Phone	Email
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Facilitation Team Members	Organization	Phone	Email
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There were no representatives from either the commercial fishing industry or the recreational boating community in attendance at the workshop. Half of the participants who completed the numerical risk and risk mitigation assessments were active duty Coast Guard members. The results from the workshop should be read with these participant demographics in mind.

Numerical Results

Book 3 Factor Scales - Condition List *(Generic)*

	Scale Value
Wind Conditions	
a. Severe winds < 2 days / month	1.0
b. Severe winds occur in brief periods	2.6
c. Severe winds are frequent & anticipated	5.0
d. Severe winds occur without warning	9.0
Visibility Conditions	
a. Poor visibility < 2 days/month	1.0
b. Poor visibility occurs in brief periods	2.6
c. Poor visibility is frequent & anticipated	5.2
d. Poor visibility occurs without warning	9.0
Tide and River Currents	
a. Tides & currents are negligible	1.0
b. Currents run parallel to the channel	2.3
c. Transits are timed closely with tide	5.3
d. Currents cross channel/turns difficult	9.0
Ice Conditions	
a. Ice never forms	1.0
b. Some ice forms-icebreaking is rare	2.1
c. Icebreakers keep channel open	5.5
d. Vessels need icebreaker escorts	9.0
Visibility Obstructions	
a. No blind turns or intersections	1.0
b. Good geographic visibility-intersections	2.0
c. Visibility obscured, good communications	4.9
d. Distances & communications limited	9.0
Channel Width	
a. Meetings & overtakings are easy	1.0
b. Passing arrangements needed-ample room	2.1
c. Meetings & overtakings in specific areas	5.8
d. Movements restricted to one-way traffic	9.0
Bottom Type	
a. Deep water or no channel necessary	1.0
b. Soft bottom, no obstructions	2.5
c. Mud, sand and rock outside channel	5.4
d. Hard or rocky bottom at channel edges	9.0

Waterway Complexity

a. Straight run with NO crossing traffic	1.0
b. Multiple turns > 15 degrees-NO crossing	3.0
c. Converging - NO crossing traffic	5.3
d. Converging WITH crossing traffic	9.0

Number of People on Waterway

a. Industrial, little recreational boating	1.0
b. Recreational boating and fishing	3.0
c. Cruise & excursion vessels-ferries	5.6
d. Extensive network of ferries, excursions	9.0

Petroleum Volume

a. Little or no petroleum cargoes	1.0
b. Petroleum for local heating & use	3.1
c. Petroleum for transshipment inland	5.3
d. High volume petroleum & LNG/LPG	9.0

Chemical Volume

a. Little or no hazardous chemicals	1.0
b. Some hazardous chemical cargo	2.7
c. Hazardous chemicals arrive daily	5.6
d. High volume of hazardous chemicals	9.0

Economic Impacts

a. Vulnerable population is small	1.0
b. Vulnerable population is large	3.1
c. Vulnerable, dependent & small	5.7
d. Vulnerable, dependent & large	9.0

Environmental Impacts

a. Minimal environmental sensitivity	1.0
b. Sensitive, wetlands, VULNERABLE	3.4
c. Sensitive, wetlands, ENDANGERED	6.3
d. ENDANGERED species, fisheries	9.0

Health and Safety Impacts

a. Small population around port	1.0
b. Medium - large population around port	2.3
c. Large population, bridges	5.3
d. Large DEPENDENT population	9.0

Analysis:

The purpose of Book 3 is for the participants to calibrate a risk assessment scale for each risk factor. For each risk factor there is a low (Port Heaven) and a high (Port Hell) severity limit, which are assigned values of 1.0 and 9.0 respectively. The participants determined numerical values for two intermediate qualitative descriptions between those two extreme limits. On average, participants from this port evaluated the difference in risk between the lower limit (Port Heaven) and the first intermediate scale point as being equal to 1.7; the difference in risk between the first and second intermediate scale points was equal to 2.8; and the difference in risk between the second intermediate scale point and the upper risk limit (Port Hell) was 3.6.

Book 4 - Risk Factor Ratings *(Port of Coos Bay)*

Fleet Composition	Traffic Conditions	Navigational Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences
5.6	13.7	17.0	21.0	4.7	14.7

% High Risk Deep Draft	Volume Deep Draft	Wind Conditions	Visibility Obstructions	Number of People on Waterway	Economic Impacts
2.0	1.8	4.4	3.5	2.7	5.7
% High Risk Shallow Draft	**Volume Shallow Draft**	**Visibility Conditions**	**Channel Width**	**Volume of Petroleum**	**Environmental Impacts**
3.6	4.0	6.2	4.4	1.0	8.0
	Vol. Fishing & Pleasure Craft	**Tide & River Currents**	**Bottom Type**	**Volume of Chemicals**	**Health & Safety Impacts**
	4.8	5.4	5.3	1.0	1.0
	Traffic Density	**Ice Conditions**	**Waterway Complexity**		
	3.1	1.0	7.8		

Analysis:

This is the point in the workshop when the process begins to address local port risks. The participants use the scales developed in Book 3 to assess the absolute level of risk in their port for each of the 20 risk factors. The values shown in the preceding table do NOT add up to 100. Based on the input from the participants, the following are the top risks to port safety in the Port of Coos Bay (in order of importance):

1. Environmental Impacts (8.0)
2. Waterway Complexity (7.8)
3. Visibility Conditions (6.2)
4. Economic Impacts (5.7)
5. Tide & River Currents (5.4)
6. Bottom Type (5.3)

Book 5 - VTM Tools *(Port of Coos Bay)*

Fleet Composition	Traffic Conditions	Navigation Conditions	Waterway Configuration	Immediate Consequences	Subsequent Consequences

% High Risk Deep Draft		Volume Deep Draft		Wind Conditions		Visibility Obstructions		Number of People on Waterway		Economic Impacts	
13	-0.5	**20**	-1.7	**8**	0.5	**9**	0.3	**17**	-0.7	**4**	1.6
RA		RA		RA	ALERT	CM	ALERT	RA		OTH	ALERT
% High Risk Shallow Draft		**Volume Shallow Draft**		**Visibility Conditions**		**Channel Width**		**Volume of Petroleum**		**Environmental Impacts**	
13	-0.5	**11**	0.1	**3**	2.3	**9**	0.3	**18**	-0.9	**1**	3.6
RA	ALERT	RA		CM	ALERT	RA		RA		OTH	
		Vol. Fishing & Pleasure Craft		**Tide & River Currents**		**Bottom Type**		**Volume of Chemicals**		**Health & Safety Impacts**	
		6	1.2	**5**	1.3	**7**	0.7	**18**	-0.9	**15**	-0.6
		RA	ALERT	CM	ALERT	RA		RA		RA	
		Traffic Density		**Ice Conditions**		**Waterway Complexity**					
		16	-0.7	**12**	-0.3	**2**	3.3				
		RA		RA		AN	ALERT				

Legend:

See the **KEY** (below). Rank is the position of the Risk Gap for a particular factor relative to the Risk Gap for the other factors as determined by the participants. Risk Gap is the variance between the existing level of risk for each factor determined in Book 4 and the average acceptable risk level as determined by each participant team. Negative numbers imply that the risk level could INCREASE and still be acceptable. The teams were instructed as follows: *If the acceptable risk level is equal to or higher than to the existing risk level for a particular factor, circle RA (Risk Acceptable). If the mitigation needed does not fall under one of the VTM tools, circle OTH (Other) at the end of the line. Otherwise, circle the VTM tool that you feel would MOST APPROPRIATELY reduce the unmitigated risk to an acceptable level*.

The tool listed is the one determined by the majority of participant teams as the best to narrow the Risk Gap. An ALERT is given if no mathematical consensus is reached for the tool suggested. Below are the tool acronyms and tool definitions.

KEY	
Risk Factor	
Rank	Risk Gap
Tool	ALERT

RA	Risk Acceptable
AN	Improve Aids to Navigation
CM	Improve Communications
RR	Improve Rules & Regulations
SI	Improve Static Navigation Info
DI	Improve Dynamic Navigation Info
VTIS	Vessel Traffic Information System
VTS	Vessel Traffic System
OTH	Other – not a VTM solution

Analysis:

The results shown are consistent with the discussion that occurred about risks in the Port of Coos Bay area. For 11 out of the 12 risk factors for which there was good consensus, the participants judged the risk to be at an acceptable level already due to existing mitigation strategies.

An alert, indicating that there was no group consensus, occurred in 8 risk factors because votes were split between several VTM tools, as indicated:

- % High Risk Shallow Draft – RA (4), CM (1), RR (3)
- Volume Fishing & Pleasure Craft – RA (3), CM (2), RR (3)
- Wind Conditions – RA (4), CM (3), SI (1)
- Visibility Conditions – RA (1), CM (3), RR (2), DI (1), VTIS (1)
- Tide & River Currents – RA (2), CM (4), SI (1), OTH (1)
- Visibility Obstructions – RA (3), CM (4), VTS (1)
- Waterway Complexity – RA (1), AN (2), RR (2), SI (1), DI (2)
- Economic Impacts – RA (3), CM (1), OTH (4)

Summary of Risks

Scope of the port area under consideration: The participants defined the geographic bounds of the port area as follows:

- Begins at sea buoy (2 miles off shore)
- South Slough past Joe Ney Slough to end of slough
- North Slough and Haynes Inlet to the tide gate
- North Bend, Kentuck Slough to the tide gate
- Willanch Inlet
- Marshfield Channel
- Coos River to head of tide water (8 miles upstream) and including Catching Slough
- Isthmus Slough to tide gate (12 river miles)
- Coal Bank Slough

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Fleet Composition		
Percent High Risk Deep Draft Cargo & Passenger Vessels	**Today:** • Low level of risk in this factor • No Port State Control Priority I vessels come to Coos Bay • ~20 Priority II vessels per year; all because they are due for annual inspection • Bilge water, gray water, ballast water being dumped would affect environment **Trends:** • Steady state	**Existing Mitigations:** • CG inspects all vessels coming into port • ISM Code standards imposed on ships satisfy this factor; 95% of ships entering Coos Bay already comply • Mandatory pilotage for Coos Bay **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Fleet Composition (continued)		
Percent High Risk Deep Draft Cargo & Passenger Vessels	**Today:** • Sail boards are a problem • 10% of recreational boats are high risk due to: – Inadequate knowledge of the rules of the road; – Poor navigation skills; and – Boat operators under the influence of alcohol and drugs. • Commercial fishing vessels using South Slough (ten times in past 3 years) in fog hit ATON; sometimes have outriggers still out which significantly widens vessel's track • Condition of fishing fleet questionable due to age • 200 SAR cases per year handled by CG Station Coos Bay; majority are vessels breaking down during recreational boating season • No commercial response (tow) business in Coos Bay, all done by CG • Most commercial fishing traffic comes out of South Slough; very seasonal; operators seem to have low awareness of rules of road – especially right of way • Some recreational craft visiting the port in summer • Salmon trollers fishing across channel at entrance do not know rules of road, do not answer/monitor radio, do not keep clear of entering traffic **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions		
Volume of Deep Draft Vessels	**Today:** • Deep draft traffic uses the port all the way to the Turning Basin • 8 ships per month calling at Coos Bay • Capabilities exist to handle higher volume of traffic in terms of docks available **Trends:** • Over past 31 years have seen a declining trend line with some steady levels • Do not see any increase in shipping for next 20 years • Declining population due to limited industrial needs in region; increasing becoming a retirement community, healthcare and hospitals increasing • New ship repair facility, including marine railway opening on North Spit (barges and military contracts targeted) • Industrial Facility recently built at North Bend Airport • Ocean Terminals has permits and is ready to upgrade at NE portion of North Spit	**Existing Mitigations:** • Volume of deep draft vessel traffic easily accommodated by the port's waterways and existing infrastructure **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		
Volume of Shallow Draft Vessels	**Today:** • Tug and barge traffic used the port to Marshfield Channel • Shallow draft category includes tugs & tows, USACE vessels, one dinner cruise boat, and commercial fishing vessels • Coos Bay home port for 40 to 50 trawlers in 60-70 foot range and 40 to 50 trollers in 30-50 foot range • Fishing fleet docks concentrated at entrance of South Slough • 8-10 seagoing tows per month bringing log imports from Washington, Canada and Alaska • Wood chips exported on barges to other domestic ports • Log rafts require significant surface area • 1-2 tandem timber tows per month to Hawaii and California **Trends:** • Seeing increase in tug and tow traffic as deep draft ship traffic declines • Commercial fishing trawl fleet experiencing decline in fish, resulting in declining number of boats • Salmon troll fishery increasing. Overall trend is decline in annual catch	**Existing Mitigations:** • Port waterway and infrastructure capacity far exceeds current traffic requirements **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		
Volume of Fishing & Pleasure Craft	**Today:** • Volume driven by weather, season, and whether fish are running – 20 on a typical day – up to 200 for fishing events • Marinas and boat ramps are scattered throughout the port: – Charleston – Empire docks – CLM docks – West side of north spit at pond (new) – California Street Docks (new) – Several along Coos River • Principal activities include crabbing, clamming, and fishing • Some larger recreational boats in south bay • Trailerable 15-21' boats at bridge and in South Slough **Trends:** • Salmon season in upper river causing increasing volume of recreational fishing	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Traffic Conditions (continued)		
Traffic Density	**Today:** • Salmon trollers in South Slough during fishing season (July) • Crab season around Charleston with recreational boaters conflicting with tugs and tows • 200 recreational boats at jetties during fisheries in path of traffic in channel • Charleston at mouth of South Slough • Congestion off shipyard around Marshfield Channel with interaction of fishermen and barge traffic • During fisheries season, congestion in Turning Basin above Marshfield Channel **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions		
Wind Conditions	**Today:** • 25 knots and above affect big ship movements • 20-25 knots affect commercial fishing and recreational boats • Consistently heavier north winds during summertime • Winter winds from the south • 35 knot winds typically associated with fronts • 90-knot sheer winds once or twice a year • Wind blows across channel out of North Slough • Tugs and tows get set by winds onto aids to navigation • No designated anchorages, however deep draft ships sometimes anchor offshore awaiting transit – Bottom drops quickly – Exposed area with risk of dragging ashore, e.g., NEW CARISSA **Trends:** • None discussed	**Existing Mitigations:** • Pilots move ships in morning calms before winds pick up • Have ample warning of approaching fronts • Flags and lights at entrance to alert operators to bar conditions • Flags and lights at CG Station and boat ramps alerting operators to bar conditions **New ideas:** • State of Oregon considering restricting anchoring within state waters to reduce risk of groundings • Provide radio stations with bar conditions for incorporation into their news and other announcements • NOAA include bar conditions in their broadcasts • Education for public on where to call for bar conditions • Electronic billboards announcing current hazard level

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions (continued)		
Visibility Conditions	**Today:** • Fog experienced 15 May through 15 September about 15 days per month • Offshore fog banks enter the lower bay • Local fog in the upper bay • Fog typically comes at night and burns off mid-morning • Fog can cause ships and tugs to miss tide window, especially at the railroad swing bridge • Wintertime brings drizzle conditions which can restrict visibility **Trends:** • None discussed	**Existing Mitigations:** • Pilots will not intentionally enter fog with deep draft vessels or commence ship movements during fog conditions • Fog signals • Radar on commercial vessels • VHF/FM radio for bridge-to-bridge communications • Mandatory pilotage and written rules **New ideas:** • Educate recreational boaters on hazards of operating in fog • Encourage use of GPS with moving map displays for finding own position • AIS-type systems • More frequent radio station announcements on fog conditions and future predictions

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Navigation Conditions (continued)		
Tide & River Currents	**Today:** • Currents 3 knots and can be 5 knots at buoy #4 in jaws of jetty entrance • Tidal range of 7 feet • Port area currents are tidal, not river current driven • Less than 3 knots in sloughs and creeks • Winter winds and strong river flows can result in an ebb current all day • Cross current at railroad bridge coming out of North Slough • Cross current at Marshfield Channel junction coming down Coos River • Cross current at Charleston coming out of South Slough • Cross current at Jarvis Turn **Trends:** • None discussed	**Existing Mitigations:** • Mandatory pilotage • Local knowledge of most port users • Tide and current tables and predictions • Tug company has policies about what can be done on ebb and flood tides • USACE tide gauges along the river but used only by dredge operators • USCG announcements for time of next tide change • When the water is brown you know that somethin' ain't right **New ideas:** • Review U.S. Coast Pilot for accuracy of information for the port • Improve information exchange between members of port community – USACE share tide gauge information with other users – Sheriffs Department share freshette remote transmitted river height gauge information currently collected for flood prediction. – Tug companies share policy information based on local knowledge with Harbor Safety Committee for distribution
Navigation Conditions (continued)		
Ice Conditions	**Today:** • Not an issue **Trends:** • None discussed	**Existing Mitigations:** • ¼" ice seen in port one time in last 20 years **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration		
Visibility Obstructions	**Today:** • Inside Range in Charleston area – Background lighting inbound – Fishing boats masking ranges with their flood lights • Lack of lighting in Jarvis Turn; very dark area at night • Mucullack Turn for tug and tows (height of eye issue) • Marshfield turn height of eye issue for tugs and smaller vessels **Trends:** • None discussed	**Existing Mitigations:** • Radio communications between vessels as they approach blind bends **New ideas:** • CG planning to install inbound and outbound ranges in Jarvis Turn
Waterway Configuration (continued)		
Channel Width	**Today:** • No passing at railroad bridge at North Point • Deep draft restricted to channel • Charleston at light #7 not a safe place to meet or pass • Charleston entrance channel has high sedimentation and channel shifts constantly. Not enough width for two fishing vessels to meet or pass, especially with outriggers out **Trends:** • None discussed	**Existing Mitigations:** • Pilots never allow deep draft ships to pass or meet in the harbor • 300-foot wide channel • Pilots coordinate with tugs and barges for where to meet or pass • Tugs coordinate between themselves on where to meet and pass • Tugs push ahead rather than tow astern • Pilots arrange to meet and pass in reaches; will not pass in bends and corners **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration (continued)		
Bottom Type	**Today:** • Hard spots at jetties and corners on inside of entrance • Rock from entrance channel up to mile 2 to 3 on west side of Empire Range • Submerged jetty to east of Charleston—more a recreational hazard • Guano Rock at buoy #4 • Some rock outside of Jarvis Turn • Rock to east of channel at Lower Bay Buoy #16 • Deadheads a big problem – both cut trees and blow-downs – washing down river especially in winter after a big storm – breakaways from coastal log raft tows **Trends:** • None discussed	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Waterway Configuration (continued)		
Waterway Complexity	**Today:** • Bends located at – (see chart for names) • Blind bends at Charleston and North Point for tug & tows • Intersections at – Marshfield Channel – Charleston – (see chart for names) • Air draft – 70’ power line restriction at Charleston – ILS approach to airport takes planes low over channel; now a 200-foot approach so does not affect ships • Alignment issue with railway bridge at Charleston • Alignment issue in short distance with road and rail road bridge at North Slough – Inbound, some time to line up – Out bound no opportunity to line up • Isthmus Slough draw bridge issue • Interactions of multiple risk factors in Charleston area **Trends:** • 4-5 years out, may reduce ILS approach to Cat II with 100-foot approach	**Existing Mitigations:** • Aids to navigation in place • Tide management for air draft issue under power lines • Virtually entire system has ranges • Mandatory pilotage for all deep draft ships • Scheduled maintenance of channel by USACE • Rules of the Road • USCG presence and response capability • State police and sheriff’s department marine patrol presence • Mandatory state requirement for completing designated boater education course **New ideas:** • Install new Range at Jarvis Turn where none exists now • Raise awareness of education programs available for recreational boaters • Continue to promote education for recreational boater • Install additional red buoys in entrance channel • Review enhancement of aids to navigation in Charleston Channel • Enforce existing rules and regulations • Use communications between vessels to control passing and overtaking situations

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Immediate Consequences		
Number of People on Waterway	**Today:** • One dinner cruise boat carrying up to 49 passengers (T-boat) in Coos Bay • Two dinner cruise boats in Charleston year round • One dinner cruise boat in Charleston which is seasonal • Two charter fishing boats in Charleston, maximum of 30 people per boat **Trends:** • No growth foreseen	**Existing Mitigations:** • None discussed **New ideas:** • None discussed
Immediate Consequences (continued)		
Volume of Petroleum Cargoes	**Today:** • No bulk petroleum cargoes in or out of the port • Existing traffic is empty barges coming in for repair **Trends:** • No increase in activity foreseen	**Existing Mitigations:** • Discussed under Environmental Impacts risk factor **New ideas:** • None discussed
Immediate Consequences (continued)		
Volume of Hazardous Chemical Cargoes	**Today:** • Empty caustic soda barges • Empty chemical barges sometimes are /are not gas-freed • These barges only coming in for shipyard repairs **Trends:** • No activity planned or anticipated	**Existing Mitigations:** • None discussed **New ideas:** • None discussed

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences		
Economic Impacts	**Today:** • Port closure would have immediate impact on fisheries; boom would close down access to affected slough • An extended port closure would have a minimal impact on forest products; would continue to build inventory, just no distribution; no need for laying off employees • Major oyster producer in state is in Coos Bay; would loose market share because they could not harvest • Major clamming industry in port around Clam Island (Empire Channel) • Local restaurants unable to obtain fresh seafood if oil spill • Deep draft grounding by itself would not close port; tugs and fishing vessels can go around **Trends:** • Steady state	**Existing Mitigations:** • No salvage capability in Coos Bay • Sause Brothers Ocean Towing tugs available if in Coos Bay but not a seagoing tug and only 2500 to 3000 HP (9000 realistically needed for salvage towing) **New ideas:** • Level of risk deemed acceptable because surrounding regional or national assets available for response

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences (continued)		
Environmental Impacts	**Today:** • Mammals, breeding areas, wetlands, endangered species, oyster beds, clam beds, seal colonies at Baltimore Rock offshore of Cape Arago • North spit is plover (endangered species) • Coho salmon is endangered species • Coos Bay eastern side and North Slough breeding area, and endangered species area • South Slough Research Reserve sites • Nearest ORSO is Astoria • Port fees for deep draft ships are three times the Columbia River fees to pay for COOP **Trends:** • None discussed	**Existing Mitigations:** • Endangered species legislation • Endangered species law enforcement • Pollution response cooperative in the port • Coast Guard on site • Area Contingency Plan in place which identifies sensitive locations • Very limited boom supplies in port • COOP is needed for deep draft vessels and tugs/barges, but not fishing vessels or oyster/clam farmers • COOP provides an initial response level of effort to get things stopped and under control • COOP is voluntary response by volunteers • Annual USCG training and exercise • Annual training and exercise by COOP plus actual events **New ideas:** • Identify follow-on sources for solutions • Pursue CG/COOP BPA agreement • Increase boom capabilities • Need more response equipment • Dedicated COOP staff vice volunteers • Balance port fees so that port remains competitive with other ports • Need COOP for fishing vessels and recreational craft generated spills • Enhance training for volunteers • Conduct cross-agency training and exercises

FACTOR	RISKS	RISK MITIGATION STRATEGIES
Subsequent Consequences (continued)		
Health & Safety Impacts	**Today:** • Population centers: – Charleston – Empire – Glasgow – Ferndale – Marshfield • Total port population is 40,000 people • Tourist population in summer for an additional 20% in the Charleston and sand dunes areas • Population could be affected by toxic smoke from shipboard fire depending upon wind direction **Trends:** • Growing retired population	**Existing Mitigations:** • Water supply not affected; reservoir and well water **New ideas:** • None discussed

Summary of Port of Coos Bay Waterway Navigational Attributes