

This section identifies specific measures and ongoing activities which help identify existing safety and security risks in Puget Sound's Marine Transportation System (MTS) and surrounding area. It is organized by primary categories of (1) Puget Sound Regional Environment, (2) Vessels, (3) Casualty Data, and (4) Port Safety and Security.

The Puget Sound Regional Environment

In order to understand existing MTS risks through interpretation of measures and activities, it is helpful to first understand the nature of the environment and operations in this region.

Economics

The Puget Sound area and the waters of the Pacific Northwest provide several fine harbors for commercial and public vessels. The area has historically supported a valuable fishery (both recreational and commercial) and a large, ever increasing, recreational fleet. The area is home to several oil refineries, the third largest containerized cargo complex in the nation, a large Seattle-based fishing fleet, and the largest passenger ferry fleet in the nation. The Strait of Juan de Fuca provides access to the port of Vancouver, BC as well as several U.S. ports. The Marine Transportation System in Puget Sound provides an important economic link to Asian markets, as well as a port of entry for goods from those countries.

Area of Responsibility

The Area of Responsibility (AOR) for Marine Safety Office Puget Sound includes the Pacific Coast of the State of Washington from the Queets River northward; the Strait of Juan de Fuca, the Strait of Georgia and Haro Strait to the Canadian border; Puget Sound; Rosario Strait; and parts of Idaho, Montana and the inland waters of Washington.

Weather

The weather can vary greatly within the zone, since there are both coastal and inland waters.

Reduced Visibility:

Reduced visibility can be caused by fog, rain or other precipitation. While rain is common in this area, it is rarely severe enough to reduce visibility so as to hazard vessel operations. Fog is more likely to be the cause of reduced visibility. Reduced visibility increases the risk of vessel collisions and groundings, although the use of radar and accurate navigation equipment (GPS) mitigates this. The highest risk is collision with small vessels that both do not show up well on other vessels' radar and do not use radar themselves. Reduced visibility occurs most often near Elliott Bay (164 days/year) and the entrance to the Strait of Juan de Fuca (155 days/year). The central Strait of Juan de Fuca experiences approximately 55 days per year of reduced visibility, and the Eastern Strait and San Juan Islands experience approximately 30 days per year.

High Winds and Heavy Seas:

High winds are primarily a hazard for vessels at anchor, causing them to drag anchor. Anchor draggings occur in all anchorages, but most often in Commencement Bay and Elliott Bay to unladen vessels and other vessels with high freeboard/large sail area (e.g., vehicle carriers). High winds can also cause difficulties for vessels maneuvering in tight quarters, such as the East and West Duwamish Rivers and the waterways in Tacoma.

Heavy seas are primarily a problem at the entrance to the Strait of Juan de Fuca and a lesser problem in the central Strait of Juan de Fuca. Large vessels in transit, particularly containerhips, can have their cargo knocked loose by heavy seas, and heavy seas make boarding a pilot extremely hazardous.

Currents:

Tidal currents pose risk to vessels operating in confined waterways. The highest currents in this area are experienced in Deception Pass (up to 7 knots), but few commercial vessels transit those waters. Waters with swift currents *and* significant levels of commercial traffic include the Tacoma Narrows (5 knots+) and Admiralty Inlet (4 knots). With many narrow channels and islands, currents can be unpredictable and can change over a short distance.

Cold Water

The waters of Puget Sound are defined by regulation to be Cold Water since the monthly mean water temperature is less than 59 degrees F year round. Typical water temperatures in Puget Sound range from 40-50 degrees F, resulting in average survival time for persons in the water of only 2-3 hours.

Environmental Sensitivity

Nearly all the coastline in the Area of Responsibility (AOR) can be considered “environmentally sensitive.” Particularly important areas include the Olympic Coast National Marine Sanctuary, Padilla Bay National Estuarine Research Reserve, and the South Slough National Estuarine Research Reserve. The steep slopes, exposed location, and lack of roads, resources, and infrastructure along the Washington coast can make any response in that area extremely challenging.

Vessels

The waterways of Puget Sound are heavily used. In 2002 Vessel Traffic Service Puget Sound handled over 220,000 vessel transits. This traffic is dominated by the 22 Washington State Ferries, which combined make close to 500 transits every day. Figure 2-1 shows the traffic distribution for 2001, and figure 2-2 shows the traffic distribution for 2002. For the most part, no significant trends are evident from this data.

Figure 2-1

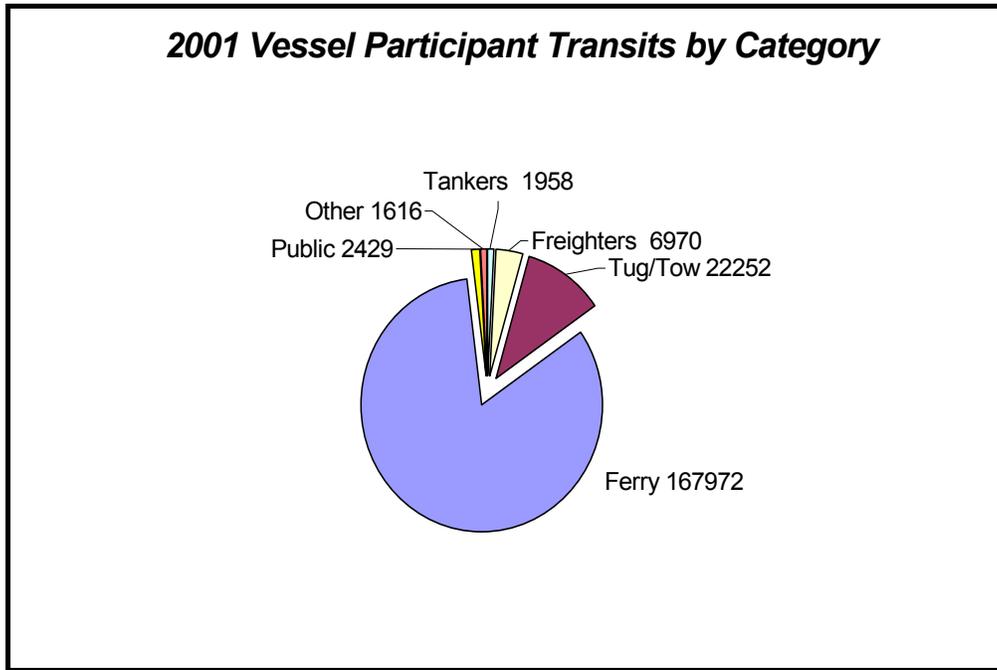
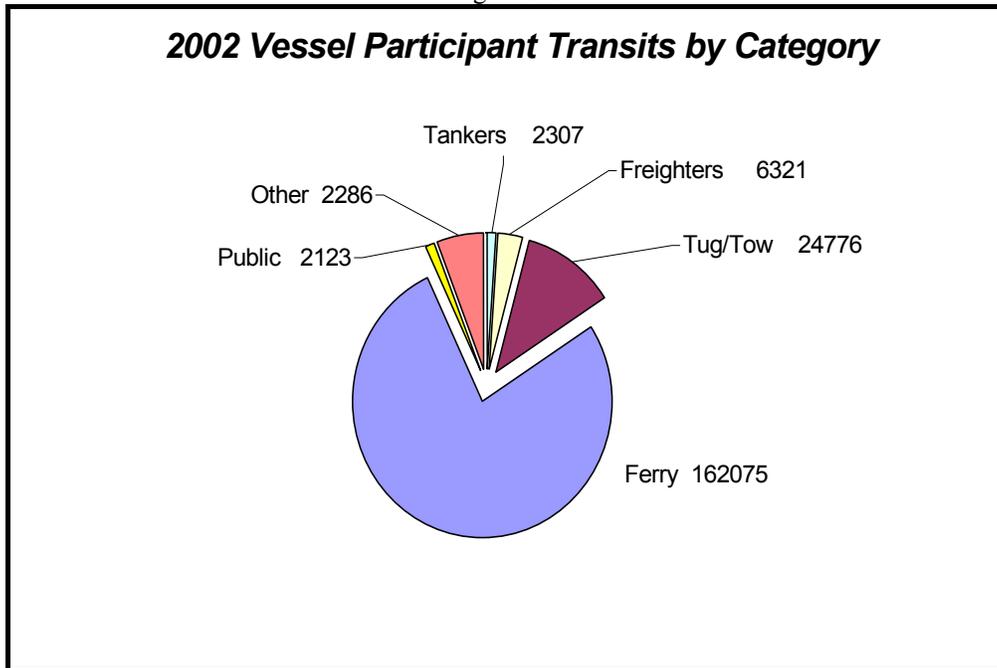
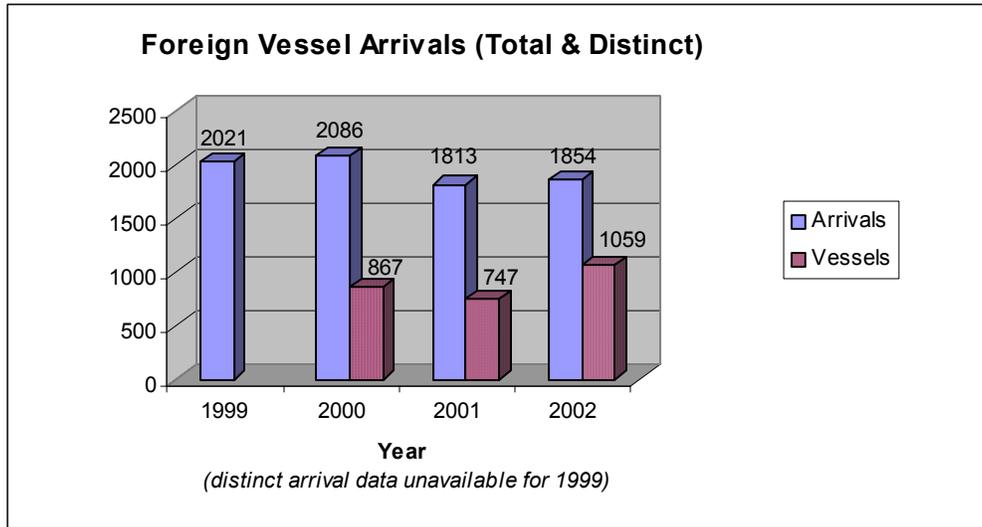


Figure 2-2



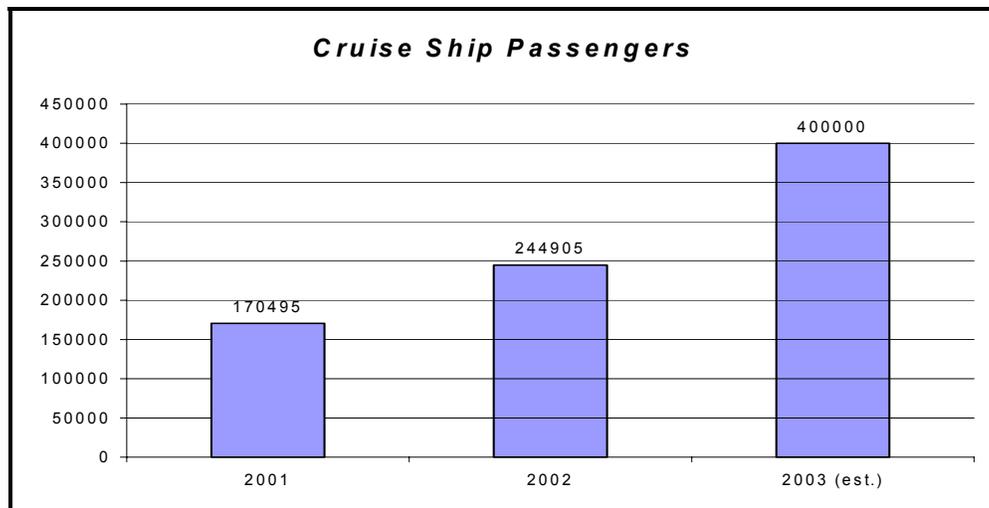
Cumulative foreign vessel arrivals also remained fairly consistent from previous years, although the number of distinct vessel arrivals (a vessel which makes several arrivals over the course of the year is treated as one distinct vessel arrival) increased from 747 in 2001 to 1059 in 2002. No particular reason is evident for this change, but nonetheless it indicates that a greater number of distinct foreign vessels arriving in the Puget Sound region made a relatively fewer number of port calls from previous years (see figure 2-3)

Figure 2-3



Cruise ship activity in Seattle began in 2000 and has continued to grow dramatically. As depicted in figure 2-4, projections for 2003 are for over a 40% increase in passengers carried. This clearly indicates an area where the MSO will need to devote additional resources and attention in forthcoming years.

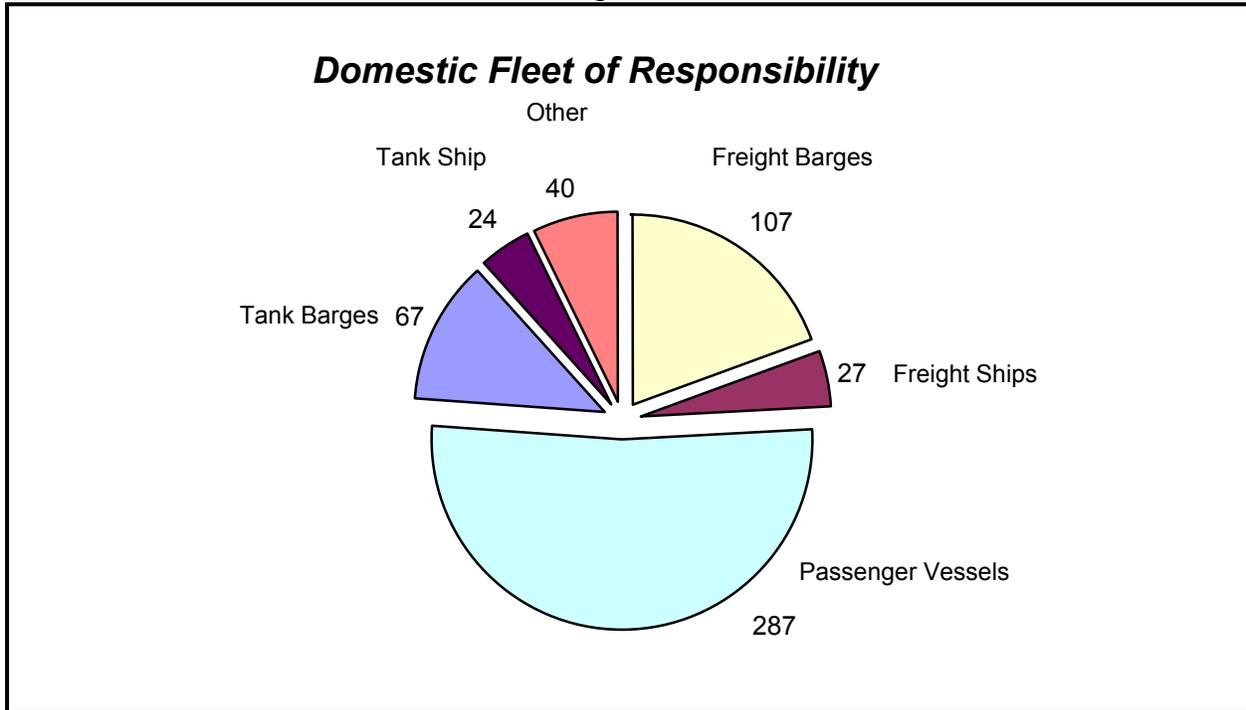
Figure 2-4



Source: Port of Seattle

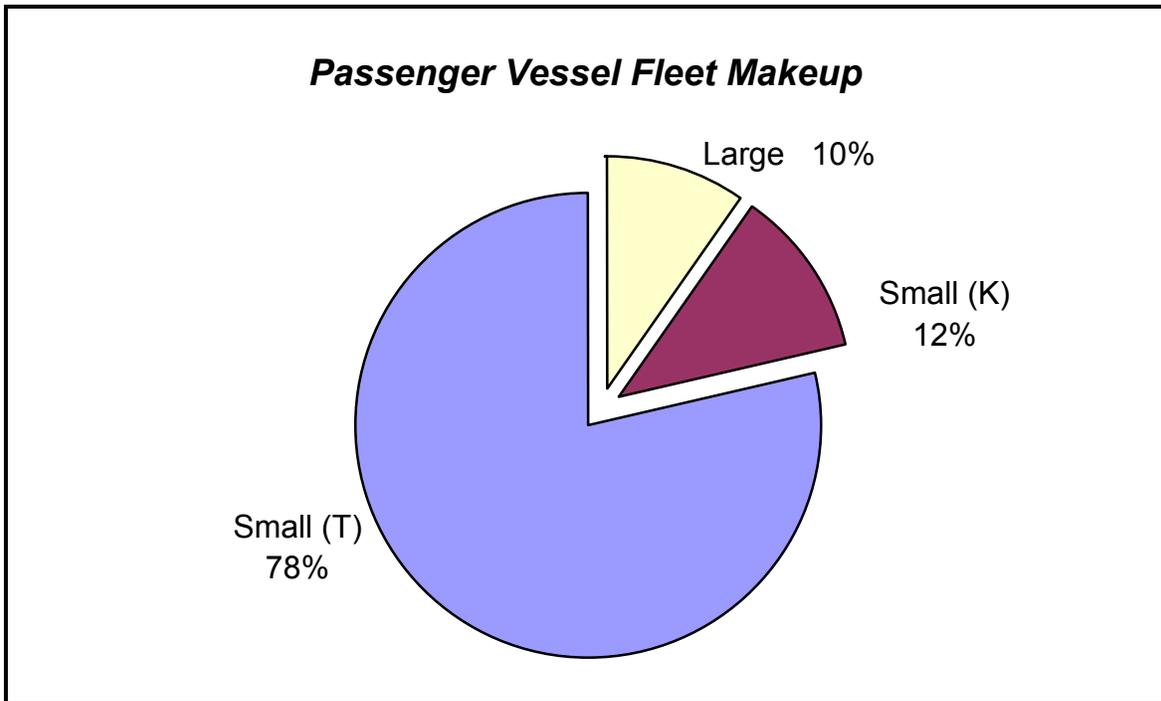
There is also significant domestic vessel traffic in the region. Passenger vessels make up a significant portion of the domestic fleet of responsibility and, as might be expected, a significant portion of the traffic in the region as previously discussed (see figure 2-5).

Figure 2-5



The composition of the local passenger vessel fleet is depicted in figure 2-6. Large passenger vessels are those admeasured at greater than 100 gross tons (GT). Some vessels in that category are capable of carrying up to 2500 passengers. Almost all of the Washington State Ferries fall into this category. Small Passenger vessels are those passenger vessels less than 100 GT. There are two classes of Small Passenger Vessels. Boats regulated under Title 46 Code of Federal Regulations, Subchapter T may carry up to 150 passengers or offer overnight accommodations for up to 49 passengers. The second class of vessels consists of those that carry 151 or more passengers or that have overnight accommodations for 50 or more passengers. They are inspected under Subchapter K.

Figure 2-6



Passenger Vessel Operations

Washington State Ferries - Over 26 million passengers transit the waters of Puget Sound aboard Washington State Ferries (WSF) annually. For comparison, WSF carries more passengers annually than AMTRAK does nationwide. WSF vessels operate on runs daily with several routes that cross the heavily used commercial traffic lanes. With an average of 500 transits daily, the Washington State Ferries account for about 80% of all commercial traffic in Puget Sound. Their operations also include two high-speed (30+ knot operations) vessels – the M/V CHINOOK and the M/V SNOHOMISH.

Victoria Clipper - Over 350,000 passengers are carried annually on the 4 vessels in the Victoria Clipper fleet. These vessels run between Seattle and the San Juan Islands, and Seattle and Victoria, BC. These routes are mostly within the Traffic Separation Scheme. Their operations include two high-speed vessels – the VICTORIA CLIPPER I and VICTORIA CLIPPER IV

Black Ball Transportation – Over 500,000 passengers are carried annually on the M/V COHO between Port Angeles, WA and Victoria, BC on a route that crosses the Traffic Separation Scheme of the Strait of Juan de Fuca.

Argosy - This fleet of 11 vessels carries over 450,000 passengers annually. The ROYAL ARGOSY is a small passenger vessel dinner cruise boat with a passenger capacity of over 800 (the passenger capacity for the ROYAL ARGOSY makes it one of the largest small passenger vessels in the nation). Operations vary between Lake Washington, Lake Union and Elliott Bay. Vessels typically operate less than one mile from shore.

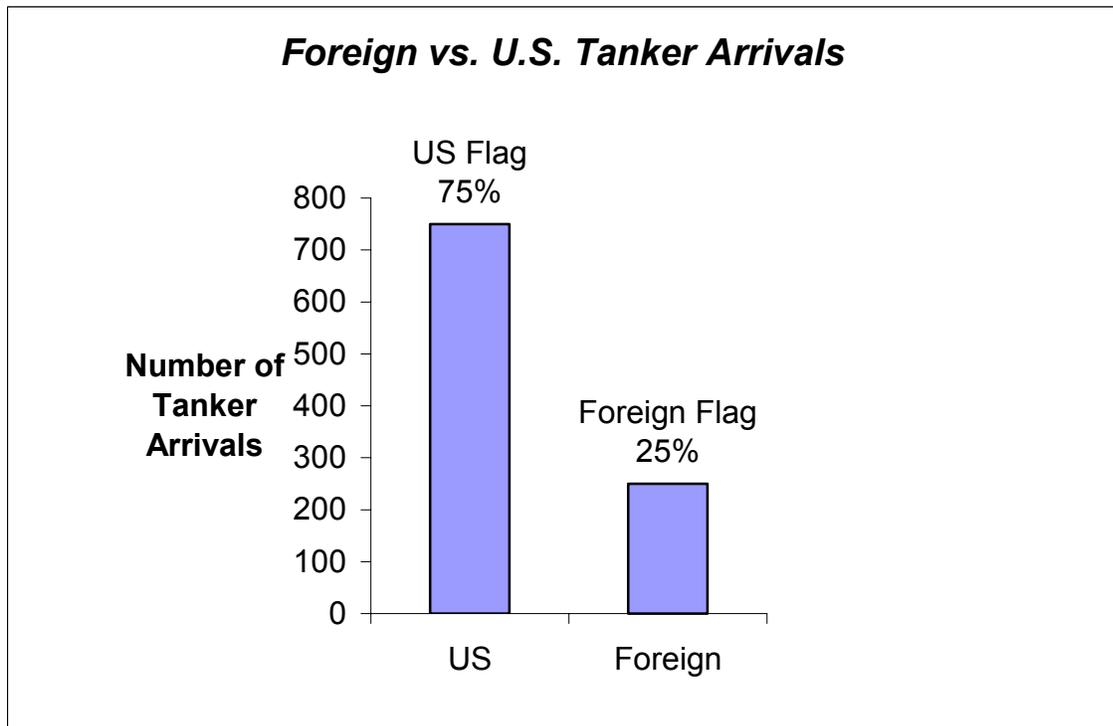
New Construction

Many new vessels are built in the Pacific Northwest for service locally and throughout the western United States, Alaska and Hawaii.

Tank Vessels

Historical data shows on average over 1900 tankship transits annually, moving billions of gallons of crude oil and refined product. The primary cargo of these vessels is Alaskan North Slope Crude oil from the Trans-Alaskan Pipeline, which is brought to Puget Sound for refining with mostly U.S. flagged vessels.

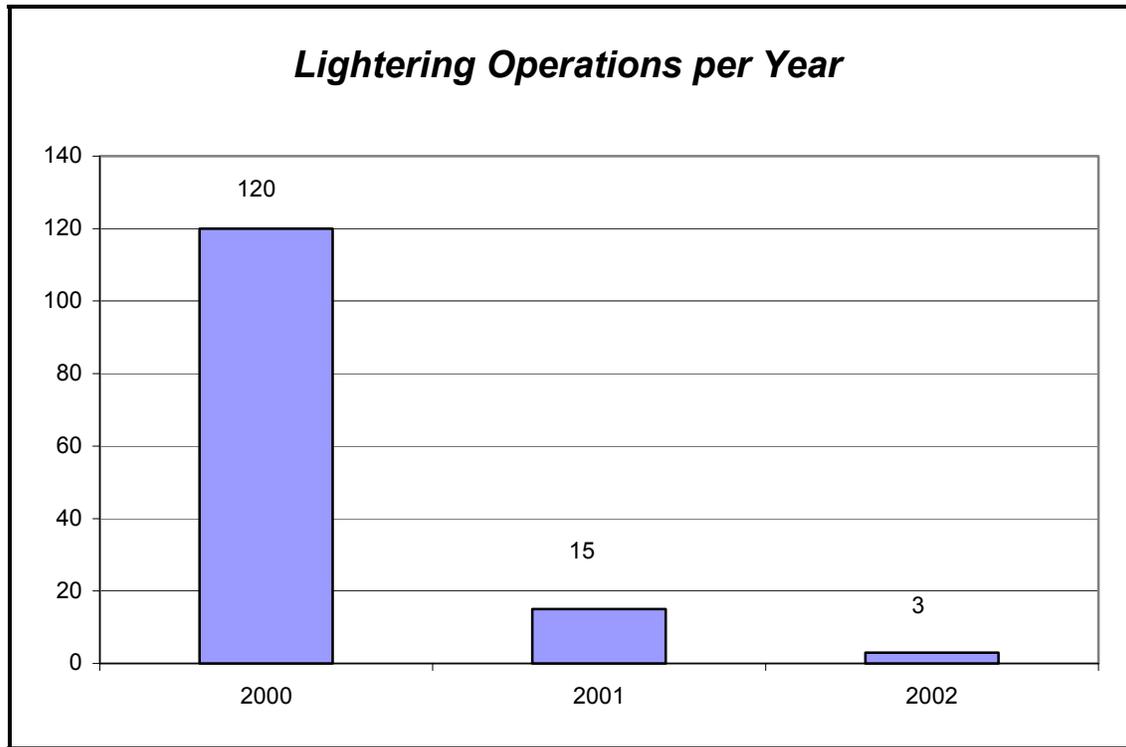
Figure 2-7



Oil Movement

Dozens of oil transfers take place everyday in the Puget Sound region. These may involve a recreational boater getting a fill-up at a marina or a 900-foot tankship unloading a cargo of crude oil. In either case, there is the risk of an oil spill. Occasionally, cargo oil is transferred from tankships to tank barges during a process called lightering. These lightering operations are depicted in Figure 2-8. The number of lightering operations has decreased significantly since 2000 and are expected to remain at current levels into the future. The larger number of lightering operations conducted during 2000 is attributable to the operational limitations of the shoreside infrastructure following the 1999 Bellingham pipeline explosion and 2 refinery accidents.

Figure 2-8



Freight Vessels

Over 6,300 freight vessel transits took place in 2002, with a portion of those transits carrying the 2.6 million TEU containers¹ that crossed the Seattle and Tacoma port piers in 2002. The Seattle-Tacoma port complex ranks as the third busiest container port in the U.S.² in terms of TEU throughput. In addition to container vessels, many bulk cargo ships carry cargoes such as coal, grain, timber and sulfur through the waters of Puget Sound and the Strait of Juan de Fuca.

Fishing Vessels

The Washington State based commercial fishing fleet numbers about 2,950 vessels and is divided into two distinct components: a distant water fleet of approximately 1570 vessels operating primarily in Alaska, and a local fleet of about 1400 vessels operating primarily in Pacific Northwest waters. Approximately 12,350 crew members (operators, fishermen, processors) serve onboard distant water fleet fishing industry vessels, while 3,700 workers crew the locally operated vessels. The distant water fleet typically is harvesting groundfish, shellfish, salmon/herring, or operating in a support role. The locally operated fleet is typically engaged in diving operations, trolling (tuna), salmon, longlining (halibut) groundfish, trawling (shrimp), or crabbing.

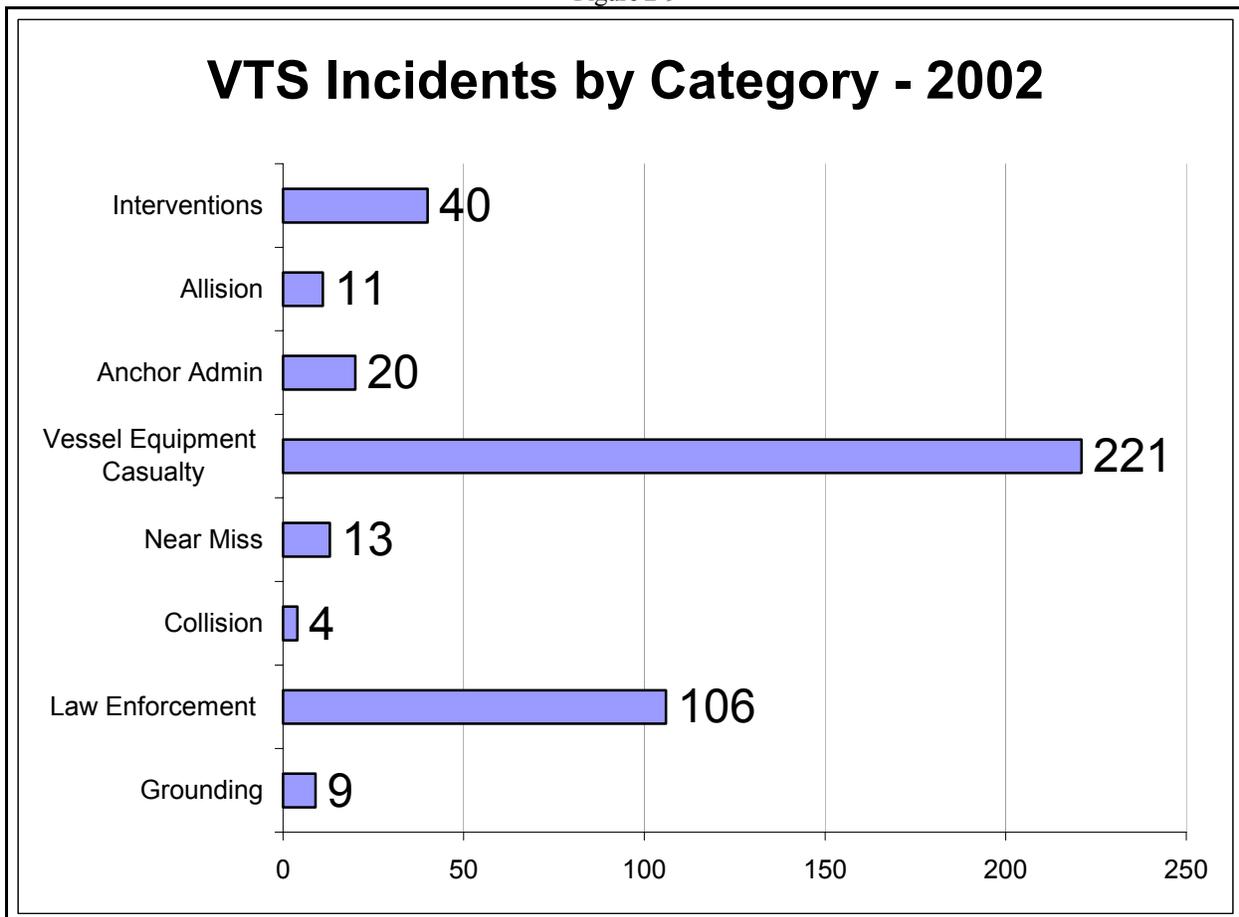
¹ Twenty-foot Equivalent Units (TEU) of containerized cargo

² American Association of Port Authorities data

Casualty Data

Unfortunately, not all transits are completed without mishaps. Figure 2-9 shows the number of incidents reported to VTS Puget Sound by category. Each incident is recorded by the Watch supervisor in an electronic log. A summary of marine casualties and incidents involving diminished maneuverability are recorded in figures 2-10 and 2-11.

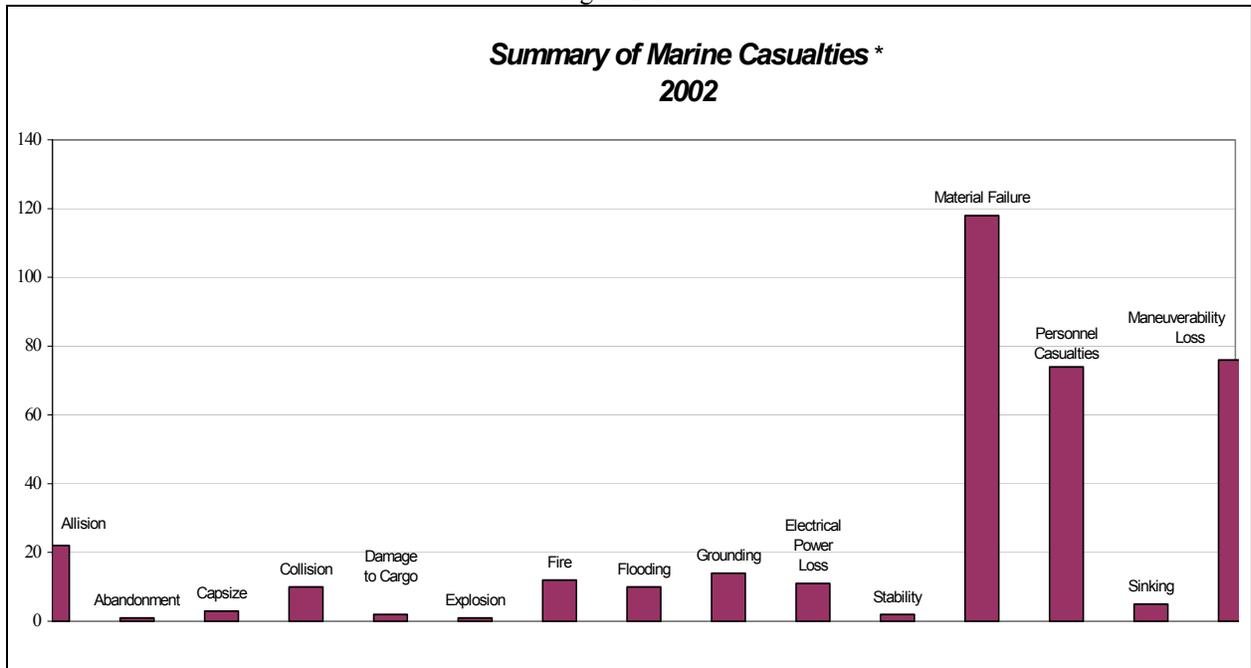
Figure 2-9



* Interventions. A developing situation in which the VTS calls attention to a particular circumstance, hazard or conflict requiring action by participating vessels to prevent a casualty.

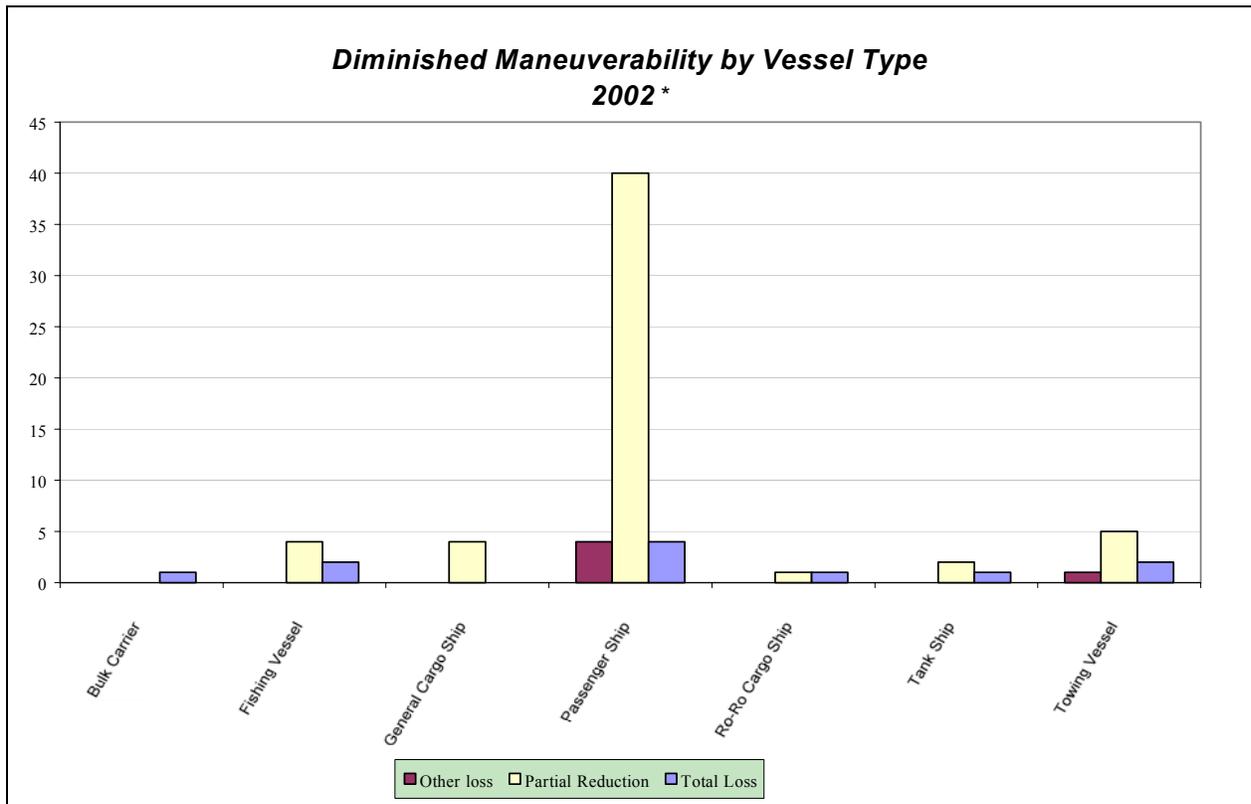
*Law Enforcement Incidents can include navigation rule violations, boating while intoxicated, and other law enforcement operations.

Figure 2-10



*Marine casualties represent casualties reported to the Coast Guard in accordance with 46 CFR Part 4.

Figure 2-11

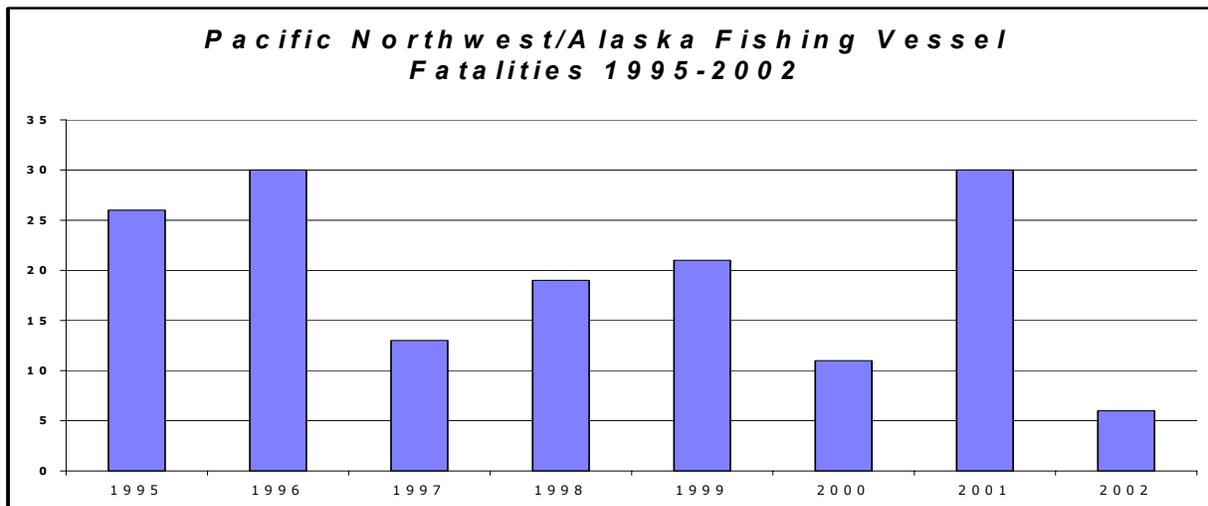


*90% of passenger ship vessel maneuverability incidents attributable to Washington State Ferries, which were generally minor in nature and quickly repaired.

Fishing Vessels

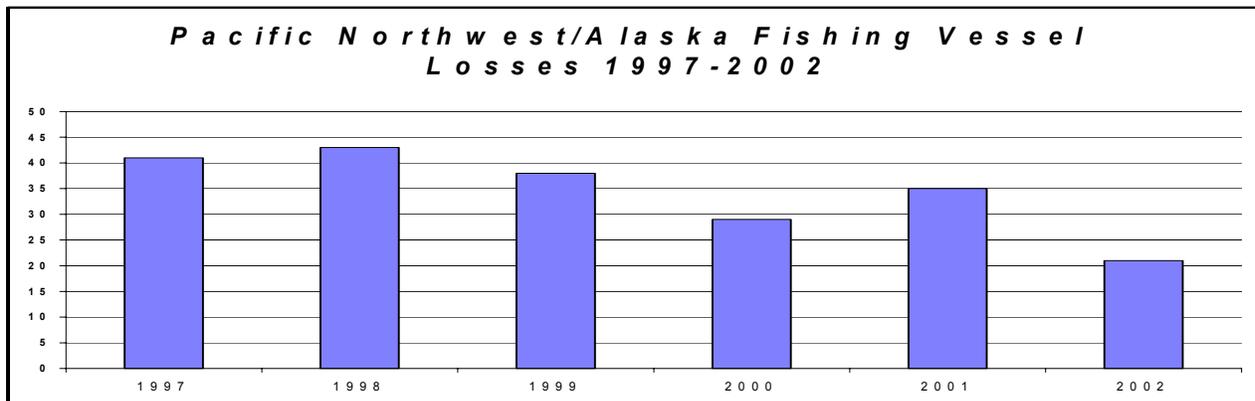
The fishing industry continues to be relatively hazardous, in terms of accidents and worker fatalities. However, 2002 saw a significant reduction in fatalities and vessel losses from previous years. Casualty data from D13 & D17 is provided in Figures 2-12 and 2-13, including fatalities and vessel losses. This data incorporates figures from five Captain of the Port zones serving Alaska, Washington, and Oregon (MSO Juneau, MSO Anchorage, and MSO Valdez in D17; MSO Puget Sound and MSO Portland in D13). Since 1995, commercial fishing fatalities in D13 averaged 6 per year in D13, and ranged from 7 to 23 in D17.

Figure 2-12³



Source: USCG (2003)

Figure 2-13

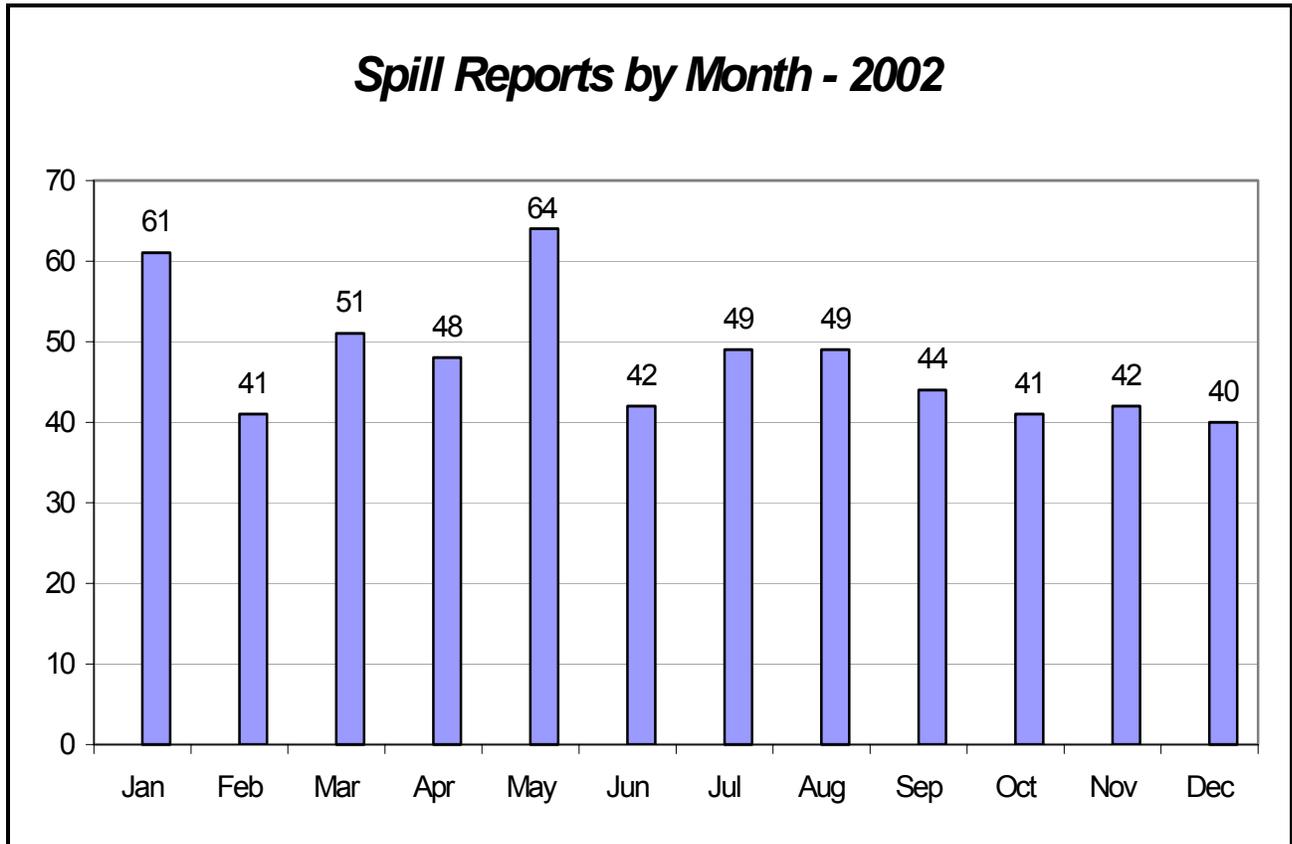


³ Significant increase in 2001 attributable to the sixteen persons lost in the sinking of the ARCTIC ROSE

Oil Spills

Oil spills occur year round with little variation from month to month; 40 – 60 spill reports per month are typical. Variability in the number of reports can be attributed to an increase in recreational boating during summer months and times of heavy weather during the winter months.

Figure 2-14

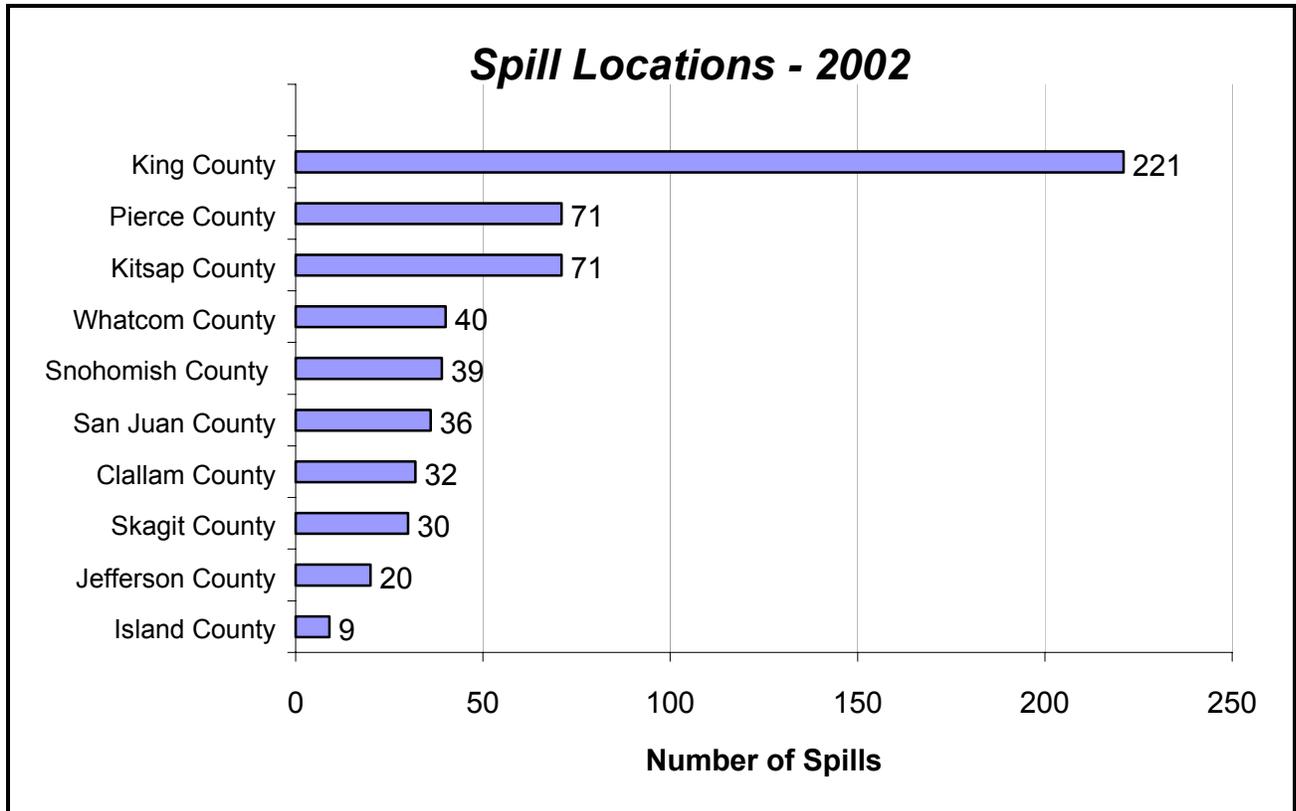


The majority of reported spills occur in the more populated (and patrolled) areas of Seattle and Tacoma and in areas with high levels of commercial activity. These areas include refineries in Ferndale and Anacortes, the U.S. Navy Fuel Depot in Manchester, and oil, container, and general cargo terminals in Seattle and Tacoma.

Spills originate from every type of vessel and facility on or near the water. Many spills, including some high volume spills, come from sources completely outside the Coast Guard's jurisdiction, such as rail, truck and industrial accidents, or underground storage tanks leaking into storm drains. The recent National Research Council report Oil in the Sea III: Inputs, Fates, and Effects (2002) stated that 16.2 million gallons of a total of 29 million gallons spilled annually in the U.S. are attributable to street runoff, industrial waste, municipal wastewater, refinery wastewater, and recreational vessels. Only approximately 1.5 million gallons are attributable to spills from tank vessels. However, the significant, acute impact of a large oil spill on a region differs greatly from the effects of a large amount of oil spread across the country.

Regardless of source, the Coast Guard is obligated to monitor and direct a proper response for those spills impacting the coastal zone waters.

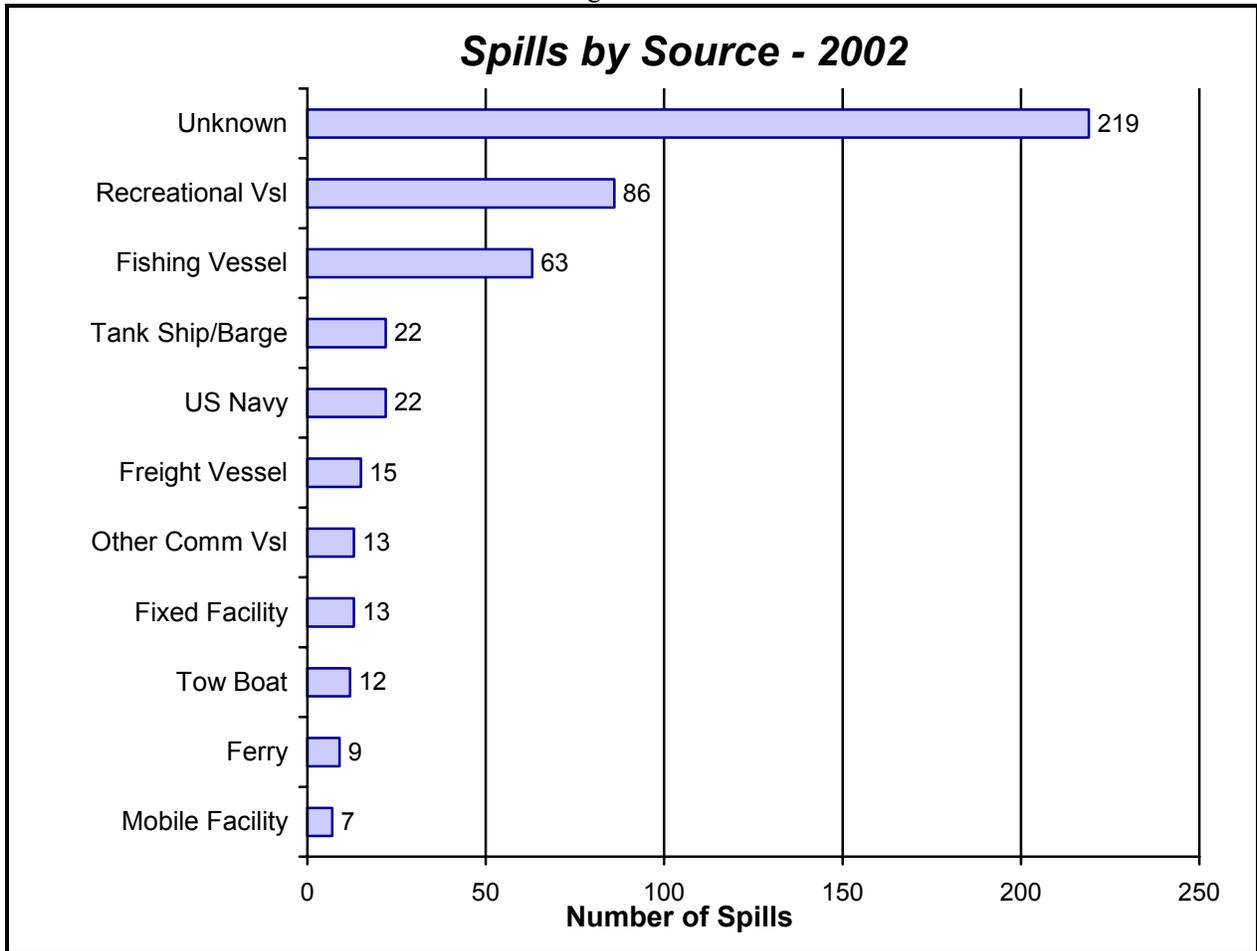
Figure 2-15



Many other spills come from sources where the Coast Guard has nominal jurisdiction, but little practical ability to identify and prevent potential spills. Examples include abandoned and derelict vessels, and the tens of thousands of recreational vessels that operate in Puget Sound.

Some spills do, of course, come from inspected vessels and facilities. More frequently, low volume spills come from auxiliary machinery and other secondary systems. While rare, high volume spills do occur from the fuel and cargo systems that are targeted by Coast Guard inspection activity. The cause of the higher volume fuel and cargo related spills from inspected and uninspected commercial vessels and facilities ranges from human factors, engineering, structural failure, operator error, and unusual current and weather conditions. Since there is no single solution to addressing all these potential scenarios, a comprehensive risk-based inspection and prevention program is needed to continue to improve spill prevention efforts.

Figure 2-16



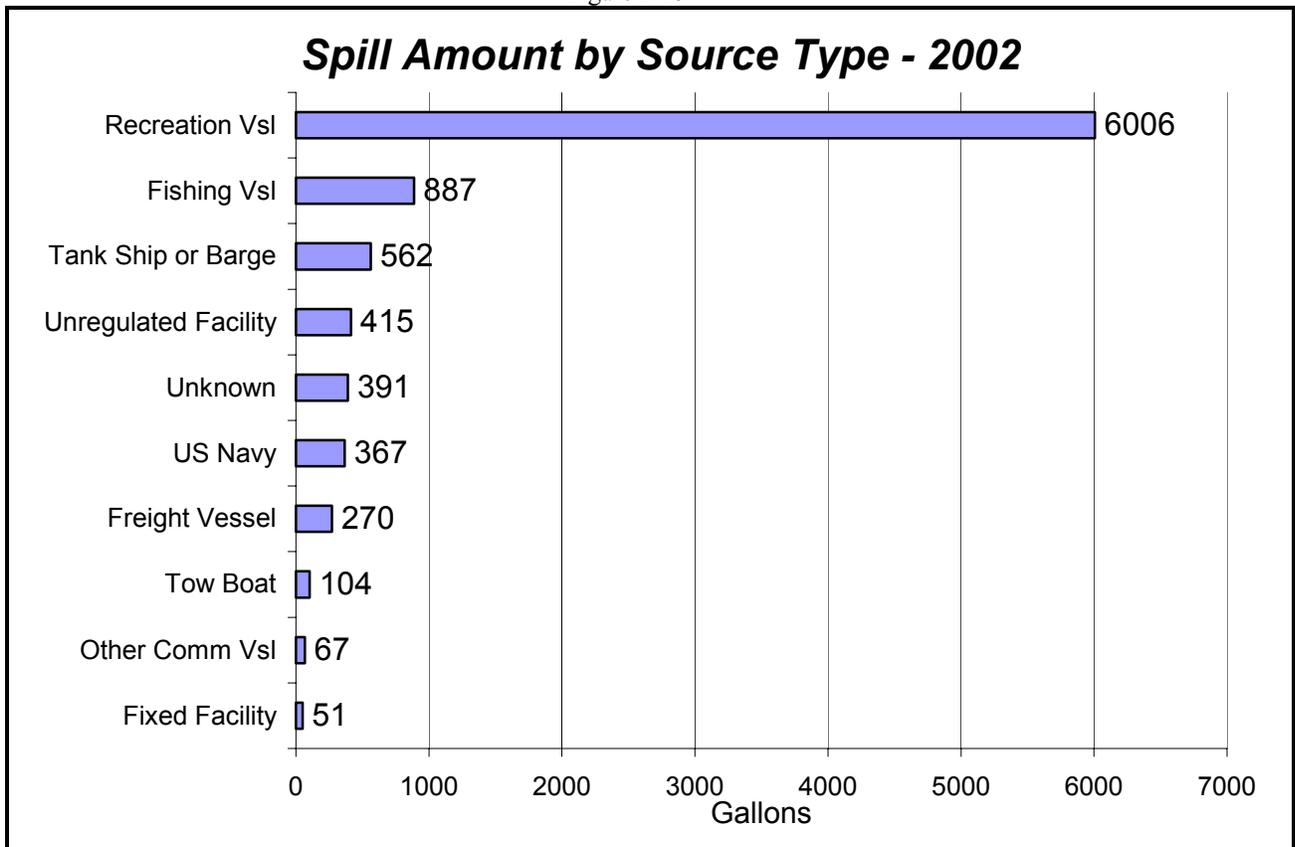
Risk is calculated as the product of probability and consequence. Recreational vessels account for a high number of spills, which translates to high probability. Historically, however, recreational vessels only account for a small percentage of the total volume spilled, translating to low consequence. Therefore, the spills from recreational vessels may be considered as relatively low risk in nature. There was an anomaly in 2002, where recreational vessels accounted for a large percent of the total oil spilled due to two large marina fires, resulting in the sinking of 40 large recreational vessels. Tank vessels and bulk liquid oil facilities are highly regulated and are operated by highly trained professionals. The probability of spills from tank vessels and facilities is lower; however when spills do occur, the volumes are larger in magnitude and in consequence, equaling high risk. Spills from uninspected vessels (fishing and towing vessels) and derelict vessels have a moderate probability of occurring and account for relatively high volumes equaling higher risk. Our investigative response and enforcement efforts are focused on larger spills and spills from commercial vessels and facilities where enforcement results in industry-wide compliance.

Figure 2-17

• Types of Petroleum Transported and Transferred in MSO Puget Sound's AOR

- Crude Oil, from Alaskan North Slope and various other oil producing countries
- Intermediate Fuel Oil 380/180
- Bunker C
- Marine Diesel Oil
- Lube Oil
- Gasoline
- JP 5 (kerosene)
- JP 8
- LPG
- Vacuum Gas Oil and other intermediate refined products

Figure 2-18



Related to the source of the spilled oil is the cause of the oil spill. While there can be many contributing factors to most spills, broad categories of causes include the following:

- Mechanical failure of hydraulic lines
- Structural failure of hulls of derelict vessels (vessel sinkings)
- Structural failure of cargo tanks, cargo piping, or cargo relief valves
- Operator error during fueling – generally related to overfilling a fuel tank
- Human factor engineering related spills, such as poorly documented procedures

- Truck rollovers, collisions, mechanical failures, and human errors from non-marine sources such as trucks, trains, factories, etc.
- Most spills from vessels occur while they are at the dock, rather than while underway.

MSO Puget Sound depends on partnerships with local law enforcement, emergency management, and State resources as well as USCG auxiliary to provide initial assessment and verification of pollution incidents occurrence, size, source, and severity. This initial assessment enables the MSO to evaluate the risk and determine the appropriate level of investigation and response activity, resulting in the efficient use of limited resources.

MSO Puget Sound is continuing to work with Washington Department of Ecology in the development of a series of protocols on pollution investigation, response, information sharing, as well as facility inspection and response plan review as part of a memorandum of agreement developed and signed by the Governor and the USCG District 13 Commander. The protocols better define the roles, responsibilities, and partnership between the USCG and WA DOE in order to better respond to pollution incidents and protect the environment.

Port Safety and Security

Facility Security

There are 71 USCG regulated waterfront facilities in the Puget Sound region, including: 28 mobile oil transfer facilities, 22 fixed oil transfer facilities, 16 designated waterfront facilities for the handling of dangerous cargoes, 2 hazardous Chemical Facilities, 2 cruise ship terminals, and a liquefied hazardous gas (LHG) terminal.

The level of attention placed on waterfront security issues increased dramatically from the previous year. In February 2002, U.S. Coast Guard Pacific Area (PACAREA) Instruction 16611 *Security Guidelines for Waterfront Facilities* was implemented to provide guidance to all Captains of the Port (COTP) for the inspection and maintenance of adequate security measures for waterfront facilities in the Pacific Area during the present heightened threat conditions. This instruction detailed specific measures and actions and required substantial personal interaction between Coast Guard inspectors and facility security managers to help clarify the intent of the guidelines. Each facility, with the exception of mobile facilities, was required to submit a security plan for review by the COTP. Within the MSO Puget Sound's AOR, all of the regulated waterfront facilities submitted security plans deemed adequate by the COTP.

Random COTP Harbor Security Patrols were used to verify facility compliance. Discrepancies were typically resolved immediately on site, however, some required additional follow up corrective actions. The PACAREA Instruction allowed for alternative security measures to be implemented in lieu of the guidelines, provided the proposed alternatives met or exceeded the intended level of security. This provision allowed a scaleable approach and application of the guidelines to fit a particular facility's unique operation, location, needs, etc. However, every effort was made to ensure a consistent approach to the application of the guidelines.

On January 13, 2003, Navigation and Vessel Inspection Circular (NVIC) 11-02 *Recommended Security Guidelines for Facilities* was released by Commandant. These guidelines were similar in nature and effect to the PACAREA guidelines, and therefore the Security plans written in

accordance with those guidelines remained in effect. The plans are continually under review for compliance with the NVIC.

With the addition of these multiple security regulations, the PSS branch maintained increased vigilance on harbor patrols and inspections and supplemented patrol personnel with the assistance of the Coast Guard Auxiliary.

Container and Hazardous Material Inspections

Marine Safety Office Puget Sound conducts container inspections on an almost daily basis in accordance with Commandant instruction 16616.11, *Guidance and Procedures for Conducting Containerized Hazardous Materials Inspections*. Under the policy and procedures set forth in the Marine Safety Manual, containers and portable tanks are inspected for compliance with the Hazardous Materials regulations in 49 CFR 171-180 and the Safety Approval of Cargo Containers in 49 CFR 450-453.

MSO Puget Sound is required to complete a minimum of 2,148 containers inspections annually based on Commandant policy. This policy bases the number of required inspections on the number of billets assigned to the unit for this purpose (MSO Puget Sound is assigned three). In 2002 MSO Puget Sound inspected 6,007 containers.

Waterways Management

Marine Safety Office Puget Sound continues to coordinate with industry, government and public stakeholders to assess and mitigate risks to the maritime transportation system and its users. To that end, we continue to reevaluate existing uses of the waterways and the operations and actions that affect them, such as security and safety zones, marine events and fisheries activities.

In March, 2002, a Ports and Waterways Safety Assessment (PAWSA) was conducted for Haro Strait and Boundary Pass. The purpose of the PAWSA was for U.S. and Canadian stakeholders to assess current risks and risk mitigations in those waterways, and prepare recommendations to improve these waterways. The final report has been published and the recommendations from the report will be incorporated into the final submission to IMO in July 2004 for the final approved traffic lanes in Haro/Boundary and the lanes around Discovery Island.

In December 2002, the IMO approved traffic lanes went into effect. These changes impacted over 21 U.S. charts, and five Admiralty charts. Since implementation, there have been only minor interventions from Canadian and U.S. traffic centers on ensuring compliance with the new lanes. As a result of the modified shipping lanes in the Straits, some local tribes have expressed concern over the impact to traditional fishing areas. In order to work with affected tribes on this issue, a special work group has been formulated to address concerns and come up with mitigation strategies. This group is comprised of local tribes, CG Headquarters, District (m/l), and VTS Puget Sound. In addition, the Haro Strait Working Group was created to look at the proposed lanes in Haro Strait and around Discovery Island. Due to the high amount of concern over the proposed changes as a result of Port Access Route System, implementation of the IMO approved changes in these areas was delayed. This work group has specific tasking in coming up with an agreed upon set of proposed changes to Haro/Discovery Island, which will be submitted to IMO in July 2004.

Marine Events.

Coordinate activities with other USCG units, and event organizers to assess risks posed by marine events, then develop and implement mitigation strategies. Development and use of a branch Standard Operating Procedure (SOP) to standardize handling of permits and events allows consistency and thoroughness in reducing risks.

Major perennial events such as Seafair are evaluated after completion to identify any improvements that can be made to USCG operations.

Safety/Security Zones, ATFP.

The MSO assisted with coordination between USCG District 13, U.S. Navy, and USCG Group Seattle to develop and implement Bangor Security Zone and enforcement policies prior to 9/11 that extended the protective areas and authorities for ballistic missile submarines, resulting in improved security.

Following the events of 9/11, the MSO developed implementation plans and enforcement policy for 14 USC 91 zones, resulting in improved security for naval vessels throughout the region. In addition, a Temporary Security Zone was established to protect tank ships from potential acts of sabotage or terrorism.

Tribal fisheries

Coordination efforts continue with the Tribes, the Puget Sound Harbor Safety and Security Committee (PSHSC), and the Port of Seattle to ensure all groups are familiar with USCG policies and goals to balance tribal fishing rights with acceptable private/commercial navigation safety on area waterways. Since 2001, there has been remarkable increased cooperation between all affected stakeholders in reducing the number of net conflict incidents. Since 9/11, the USCG has not been utilizing its on water resources in removing nets. Tribal enforcement officers and the Port of Seattle Police are now the primary "responders" to net conflict incidents where the net(s) are clearly posing a navigation hazard or are illegally tied off to private property.

In addition, lightering operations in Puget Sound have decreased by 70% due to the re-opening of a major oil pipeline in Bellingham. Tanker transits through Haro Strait stayed constant with last year's volume. Lastly, net conflicts on the East waterway and Duwamish River in Elliot Bay dropped from 14 to 3.