



04.

ASSETS



Assets

Since 1951, WSF's foundation has been its vessels and terminals. WSF uses several vessels and most of the terminals acquired in the original purchase from the Puget Sound Navigation Company. WSF protects its investment by emphasizing preservation as a capital program priority. As vessels approach 30 years of service and timber trestles approach 40 years, preservation requirements rise dramatically. Four vessels and approximately one-third of all trestle sections are currently nearing the end of their projected useful life. As a result, preservation costs are claiming an increasing share of WSF's resources. In addition to preservation, WSF adheres to a comprehensive maintenance program for vessels and terminals that protects its investment and enables WSF to handle and prevent emergencies.

The Fleet

WSF's fleet began with 19 vehicle ferries—16 purchased from the Black

Ball line, one from King County, and two from private owners. Four of the vessels included in the original 1951 purchase, the Steel Electric Class, are still operating today. WSF's fleet increased this biennium with the addition of the Snohomish passenger-only fast ferry—the *Chinook's* sister ship. The current fleet includes 29 vessels—24 vehicle ferries and five passenger-only vessels—ranging in size from the 460-foot long Jumbo Mark II ferry able to accommodate 218 vehicles and 2,500 passengers to the 86-foot long Tye passenger-only vessel with a 250-passenger capacity.

In general, auto ferries have an estimated useful life of about 60 years and passenger-only vessels have a life of 25 years. WSF has four auto ferries that are approaching 75 years of service, and over half of its auto vessels were constructed prior to 1975. Major preservation efforts are typically required when auto vessels approach the end of their 30-year service life. Four active vessels are approaching this milestone, with six more at the 20-year mark. The average age of WSF's passenger-only vessels is about nine years.

WSF makes capital investments in its 29-vessel fleet to accomplish two objectives—1) to protect existing vessels through emergency repairs and preservation activities, and 2) to improve the capacity of the fleet to meet growth in customer demand for ferry service. In the 1999/01 biennium, WSF invested \$107.7 million in the fleet, including:



WSF welcomes the *Snohomish* to its fleet.

- ▶ \$3.5 million for emergency repairs to fix damaged vessels and return them to service as quickly as possible,
- ▶ \$78.4 million for preservation to replace vessel systems and structures when they reach the end of their life cycles,
- ▶ \$25.8 million to add new vessels to the fleet or for improvements to increase the capacity of existing vessels.

Emergency repairs are a relatively small line item in WSF's Capital Program, but are WSF's highest priority in its capital budget. Serious scheduling problems occur if vessels experience unforeseen damage. Consequently, WSF expedites

emergency repairs in order to quickly return vessels to service in safe and sound condition.

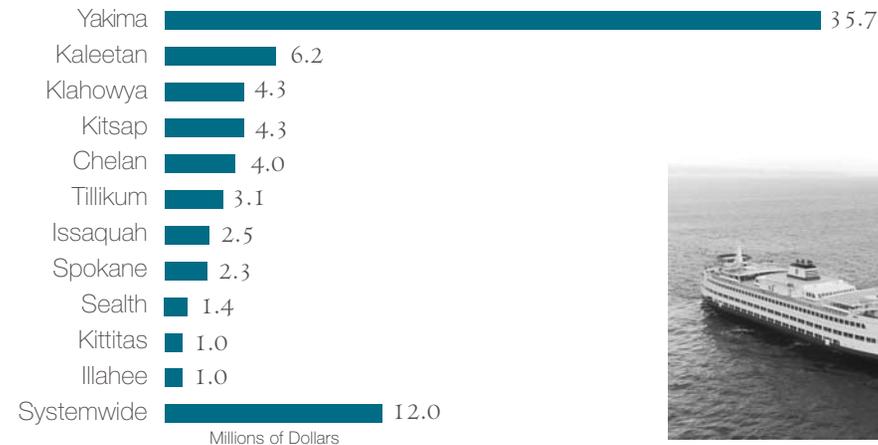
WSF made emergency repairs to 14 vessels during the 1999/01 biennium. Three-quarters of the expenditures went to three vessels:

- ▶ *Elwha* for its hard landing at the Orcas Island ferry terminal and repair of its propulsion drive motors, generators and alternators,
- ▶ *Klickitat* for repairs to its propulsion drive motors,
- ▶ *Chinook* for repair to its propulsion engines and water jets.

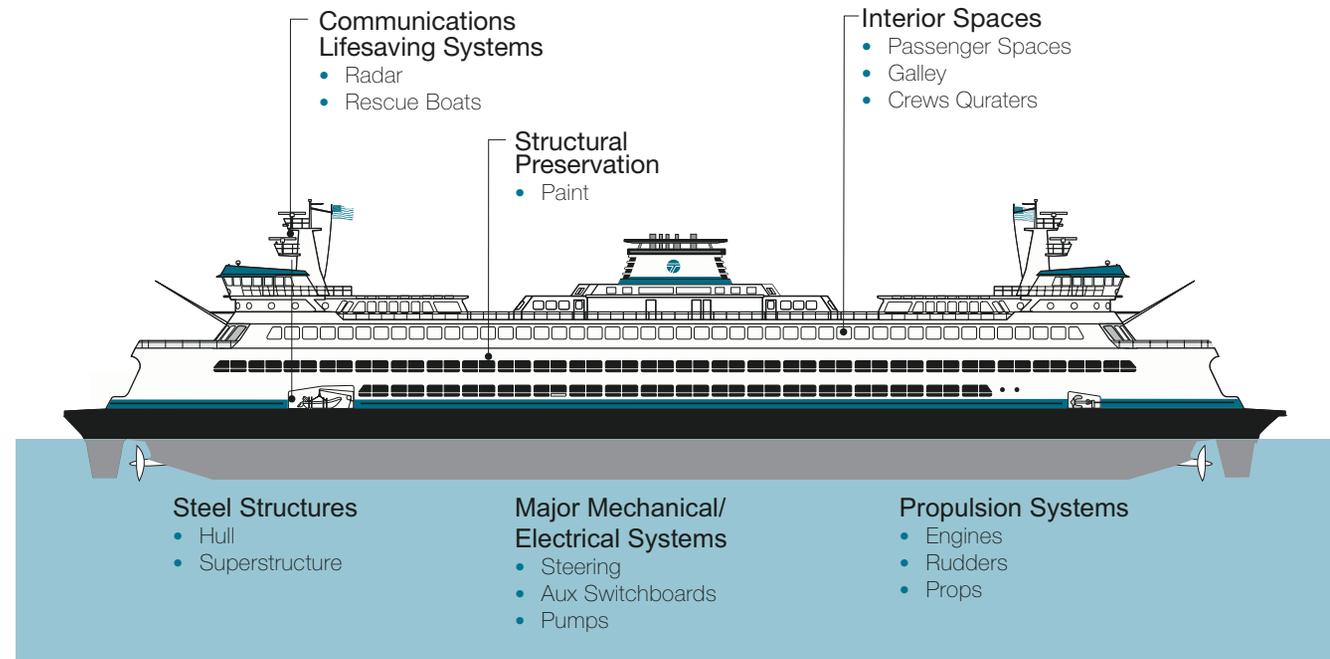
The vessel preservation effort in the 1999/01 biennium replaced or refurbished 72 vessel systems and structures. These included 42 vital Category 1 systems and structures needed for the safety of people, vessels, terminals, and the environment, and 30 non-vital Category 2 systems and structures. This preservation effort emphasized propulsion, communication, navigation and life saving systems. Preserving the *Yakima* accounted for half of the replaced and refurbished systems, and the multi-biennial initiative to preserve the six Issaquah class vessels accounted for another 22 systems. Even with WSF's focus on preservation, the vessel preservation efforts were unable to stop the deterioration in the life-cycle ratings of the fleet. The fleet began the biennium with a Category 1 life-cycle rating of 84% and a Category 2 life-cycle rating of 63%, and ended with a Category 1 rating of 77% and a Category 2 rating of 55%. In effect, the number of systems and structures reaching the end of their life cycles during this period exceeded the number of vessel components that were preserved.

WSF has begun to emphasize preserving Category 1 vessel systems and structures, per the recommendation of the Joint Task Force on Ferries. WSF uses a series of small contracts to target Category 1 systems over several biennia to ensure the most critical systems are preserved first. This strategy was used for preserving the six Issaquah class vessels.

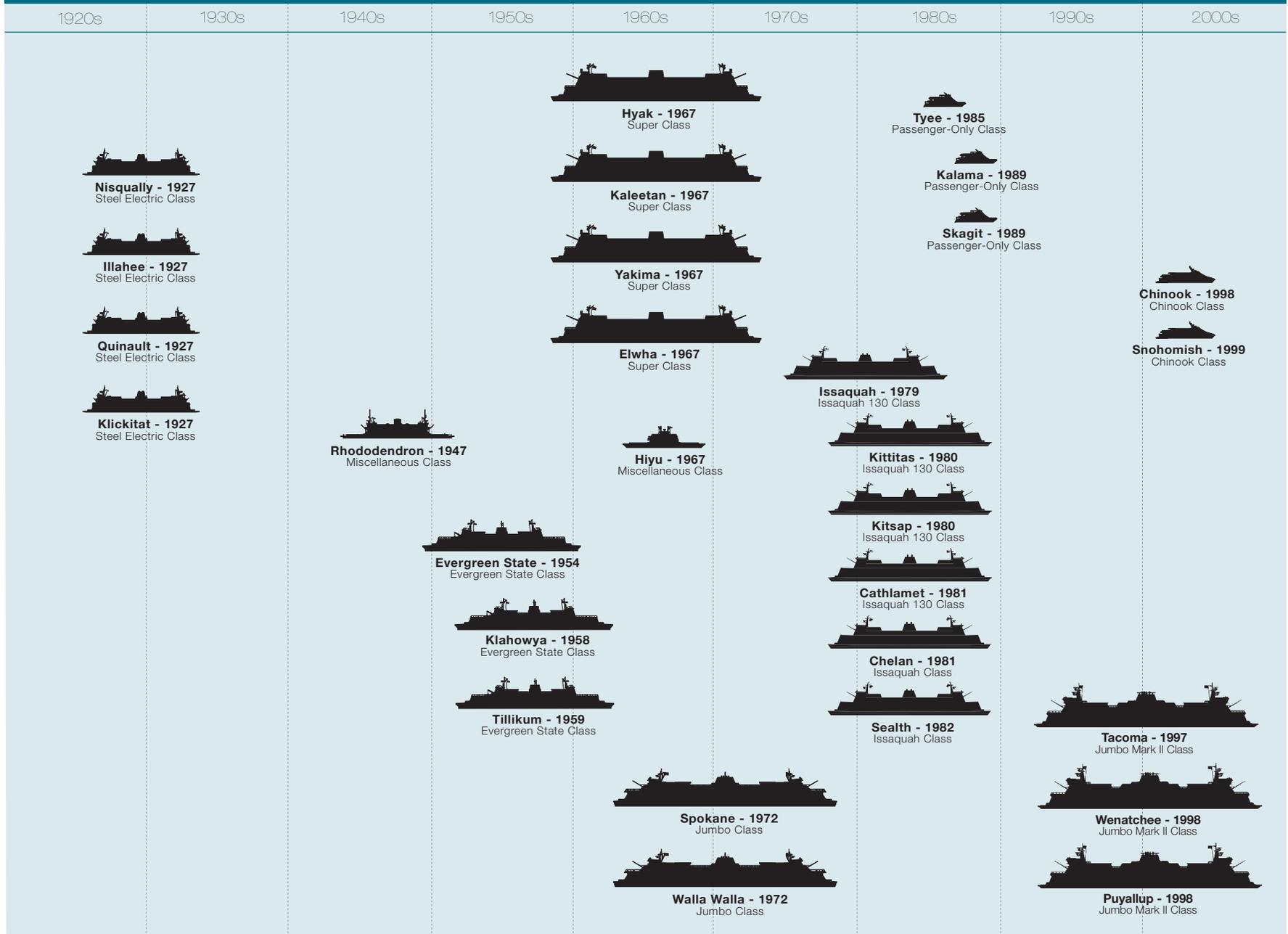
Vessel Preservation Spending \$78.4 Million - 1999/01 Biennium



Vessel Systems and Structures



Historic Vessel Construction



Vessel Specifications

Class	Name	Length (feet)	Beam (feet)	Speed (knots)	Auto Capacity	Passenger Capacity	Crew
Jumbo Mark II	Tacoma	460	90	18	218	2,500	14
	Wenatchee						
	Puyallup						
Jumbo	Spokane	440	87	18	206	2,000	14
	Walla Walla						
Super	Hyak	382	73	14-18	160	2,500	13
	Kaleetan						
	Yakima						
	Elwha						
Issaquah 130	Issaquah	328	78	16	130	1,200	10
	Kittitas						
	Kitsap						
	Cathlamet						
Issaquah	Chelan						
Issaquah	Sealth	328	78	16	100	1,200	10
Evergreen State	Evergreen State	310	73	13	100	1,000	11
	Klahowya						
	Tillikum						
Steel Electric	Ilahaee	256	73	12	75	616	8
	Quinault						
	Nisqually						
	Klickitat						
Miscellaneous	Rhododendron	225	63	12	65	546	8
	Hiyu	150	63	10	40	200	4
Passenger-Only	Tyee	86	31	25	0	250	4
	Kalama	112	25	25	0	250	4
	Skagit						
Chinook	Chinook	143	39	38	0	250	5
	Snohomish						

WSF spent \$25.8 million on vessel improvements in this biennium. Most (\$18.7 million) involved closing out new vessel construction contracts that were substantially completed in the prior biennium, including contracts for the three new Jumbo Mark II class ferries (*Puyallup*, *Tacoma* and *Wenatchee*) and the two new passenger-only fast ferries (*Chinook* and *Snohomish*). WSF also added a second deck to the *Chelan*, which increased its auto-carrying capacity from 100 to 130 cars.

Acting on recommendations contained in the 2001 Performance Audit, new design-build legislation was passed in May 2001, which allows use of a modified Request for Proposals (RFP) process to design and build new vehicle ferries over \$10 million. This three-phase process allows WSF to evaluate and select a limited number of shipyards to participate in development of technical proposals, consult with shipyards while they prepare their technical proposal, and select the responsive and responsible shipyard with the lowest price. WSF hopes to use this new process to design and build a new class of vehicle ferries to replace WSF's oldest vessels—the Steel Electric class and the *Rhododendron*. The new vessels could be utilized on the Keystone/Port Townsend route. The vessels are planned to accommodate approximately 110 vehicles and about 900 passengers. WSF also hopes to expand its passenger-only fleet to include four new vessels in the future. These additional vessels could allow passenger-only



The Hiyu and Klickitat at the Eagle Harbor maintenance facility.

service from both Kingston and Southworth to downtown Seattle. Construction of these vessels is dependent upon the approval of the statewide transportation referendum planned to go to the voters in November 2002.

In addition to vessel preservation and improvements, WSF has an aggressive vessel maintenance program that encompasses all of WSF's vessels. Vessel maintenance for 1999/01 biennium totaled \$32.9 million—\$17.1 million in 2000 and \$15.8 million in 2001. WSF uses a reliability-focused vessel maintenance strategy with inputs from predictive maintenance programs (oil and vibration analysis), planned maintenance (based on past experience), and operator observations (such as temperature rises). To supplement this maintenance strategy,

WSF assigns a staff chief engineer to each vessel. The staff chief engineer "owns" their ship and sets the preventative maintenance schedule, writes maintenance requests, is responsible for the maintenance budget, and represents the vessel to WSF's management. This level of staff responsibility is unique among vessel operators, and enhances the overall reliability of WSF's fleet.

Vessel maintenance is grouped into two broad categories: basic and intermediate. Basic vessel maintenance is defined as tasks that can be completed by the engine crew in about 8 hours or less. The vessel's engine crew performs most basic vessel maintenance when the vessel is tied up in the late evenings. Basic maintenance ranges from oil

changes to rebuilding the head on an engine power pack. Even a simple oil change can be challenging when considering a Jumbo Mark II vessel has four engines that each need 400 gallons of oil. Another basic maintenance task includes refueling the vessels. Smaller passenger-only vessels are fueled every other night with approximately 600 gallons of diesel fuel per vessel, while the Jumbo Mark II vessels are fueled with about 60,000 gallons twice per month.

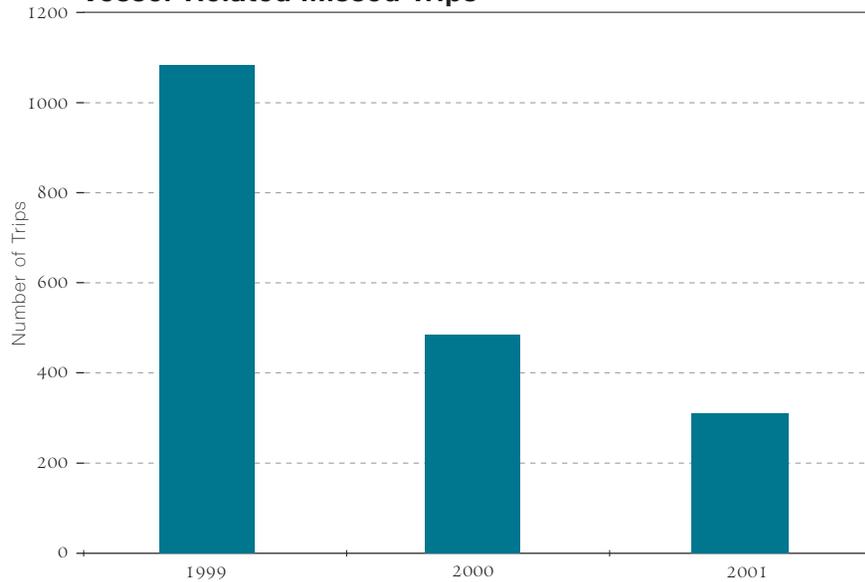
Intermediate vessel maintenance is defined as tasks that require more than 8 hours or assistance from the machinists at Eagle Harbor maintenance facility or an outside vendor to complete. Intermediate maintenance ranges from a unit exchange (removing and replacing an engine/generator set or a steering

system) to an engine overhaul. Engine overhauls are the specialty of the highly skilled machinists at the Eagle Harbor maintenance facility. The 15 machinists are available 24 hours per day, 7 days per week to completely overhaul the 156 individual diesel engines in WSF's fleet. Some of the engines are very large. For example, the four engines on a Jumbo Mark II are similar to locomotive engines with each weighing approximately 200,000 pounds. Engine crews and Eagle Harbor machinists must get creative at times to support WSF's 99.6% service reliability rate. With permission from the U.S. Coast Guard, WSF crews have performed major maintenance, like changing an engine's crankshaft, while the vessel was underway and operating on its other engines. Highly skilled and creative crews and



The Skagit approaches Vashon Island.

Vessel-Related Missed Trips



machinists have reduced the number of missed trips due to vessel-related problems over the past several years. In 2001, less than 0.2% of WSF's total service trips were missed due to vessel-related problems (311 trips out of 178,500 total service trips). The most common cause of vessel-related missed trips has been due to vessel propulsion systems. To improve its in-house repair capabilities, WSF sought and hired an propulsion engineer experienced with WSF's propulsion systems. Having this expert on staff has expanded the knowledge base of WSF's vessel maintenance staff and has enabled propulsion repairs to be completed more quickly.

WSF's vessel maintenance will be improved in the future with an upgrade to its Maintenance Productivity Enhancement Tool (MPET) system. The system is being extended to every vessel via a wireless computer system to transfer data ship-to-shore. This upgrade will provide WSF employees real-time location of parts and the ability to review planned maintenance schedules, the maintenance history of each piece of machinery, preventative maintenance processes, and total costs of maintenance including labor, travel time, and materials. This upgraded system will make the maintenance department more efficient and will allow WSF to reduce its paperwork and inventory.

Terminals

Fifty years ago, WSF purchased or leased the property for 17 terminals, of which 13 are still in use (Anacortes, Bremerton, Edmonds, Fauntleroy, Friday Harbor, Kingston, Lopez Island, Mukilteo, Orcas Island, Point Defiance, Seattle's Colman Dock, Shaw Island, and Winslow). Since then, WSF has purchased or leased the property for seven additional terminals to complete its system—Clinton, Keystone, Port Townsend, Sidney, B.C., Southworth, Tahlequah, and Vashon Island. WSF's 20 terminals are located in eight counties within Washington State and in British Columbia.

Terminal facilities range from large terminals with high activity levels to small but functional terminals on routes with

lower ridership. Seattle's Colman Dock on Pier 52 in downtown Seattle is WSF's busiest terminal, serving approximately 10.8 million riders and 3.1 million vehicles in 2001. Its main features include three docking slips for auto-passenger ferries serving the Bainbridge Island and Bremerton routes, an off-street holding area for vehicles, enclosed waiting rooms, overhead loading facilities for passengers, a docking area for Bremerton and Vashon Island passenger-only vessels, some WSF offices, and several retail facilities. In contrast, the terminal facilities at Shaw Island, Tahlequah, and Point Defiance have only a single loading ramp, which must be shared by both vehicles and pedestrians, and no formal off-street holding lot for ferry vehicles. Other WSF terminal facilities range between these two extremes.



Edmonds Terminal.

Terminal Facilities

Location	Ownership	Vehicle Amenities				Pedestrian Amenities		
		Toll Booths	Vehicle Holding Capacity	Transfer Spans		Waiting Area	Overhead Loading	Available Public Transit
				Primary	Tie Up			
Anacortes	Other	4	560	2	2	X	X	X
Bainbridge Island	WSF	4	208	2	1	X	X	X
Bremerton	WSF	2	100	2	0	X	X	X
Clinton	WSF	4	100	2	0	X		X
Edmonds	WSF	3	175	1	0	X	X	X
Faultieroy	WSF	2	100	1	0	X		X
Friday Harbor	WSF	1	255	1	1	X		
Keystone	Other	2	100	1	0	X		X
Kingston	Other	3	290	2	1	X	X	X
Lopez Island	WSF	1	75	1	0	X		
Mukilteo	Other	3	110	1	0	X		X
Orcas Island	WSF	1	150	1	0	X		
Point Defiance	Other	1	50	1	0	X		X
Port Townsend	WSF	2	110	1	1	X		X
Seattle	WSF	4	650	3	0	X	X	X
Shaw Island	WSF	1	15	1	0			
Sidney, B.C.	Other	1	240	1	0	X		X
Southworth	WSF	2	150	1	0	X		X
Tahlequah	WSF	0	5	1	0	X		X
Vashon Island	WSF	0	100	2	1	X		X

WSF's domestic terminals and maintenance facility consist of 48 trestle sections with construction dates ranging from 1938 to 2000. The composite age of WSF's terminals averages 25 years, with one-third of trestle sections at or past their normal life expectancy. As terminal facilities age, terminal preservation and improvement projects become critical to protecting the public's

investment in these facilities. During the 1999/01 biennium, WSF spent \$48.0 million for terminal construction projects—78% (\$37.6 million) on preservation projects and the remaining 22% (\$10.4 million) on improvement projects. Preservation and improvements were made at nearly every terminal in the ferry system.

WSF makes capital investments in its 19 domestic ferry terminals and the Eagle Harbor Maintenance Facility. These investments protect existing facilities and improve their capacity to receive vessels and load and unload passengers and vehicles. In the 1999/01 biennium, WSF invested \$51.5 million in these facilities—\$3.5 million for emergency repairs, \$37.6 million for preservation, and \$10.4 million

for capacity improvements. Damage to a ferry terminal can interfere with vessel landing, loading and unloading, disrupting the delivery of ferry services. Consequently, WSF expedites emergency repairs in order to keep the system sailing smoothly. WSF made emergency repairs to nine terminals in the 1999/01 biennium. The majority (70%) of the expenditures were spent on three terminals—Orcas Island, Mukilteo, and Kingston. The most significant emergency involved the Elwha's hard landing at the Orcas Island ferry terminal dock. This accident alone claimed over two-fifths of the terminal emergency repair funds expended during the biennium. The emergency work at Mukilteo repaired the ferry terminal's bridge seat, and the work at Kingston involved repairs to the vehicle transfer span and sewer.

WSF's terminal preservation effort replaced or refurbished 85 terminal systems and structures in the 1999/01 biennium. This effort included 55 Category 1 (vital) and 30 Category 2 (all other) systems and structures, and emphasized building structures, systems and utilities; dolphins; and passenger overhead loading structures. The Bremerton and Clinton ferry terminals accounted for the largest number of systems and structures preserved. Work at Bremerton preserved 13 systems and structures including passenger-overhead loading structures, passenger-only ferry facilities, dolphins, and a wingwall. Work at Clinton preserved 12 systems and structures including dolphins, the south trestle bulkhead, tollbooths, the agent's office, and the covered pedestrian walkway.

Improvements due to Terminal Preservation Investments

- ▶ Reduces the risk of damage to the environment caused by failure of terminal systems and structures.
- ▶ Eliminates marine contamination by replacing creosote-treated timber terminal structures with concrete and steel structures.
- ▶ Employs environmental mitigation, such as replanting eelgrass.
- ▶ Controls and removes hazardous materials at terminal and maintenance sites.

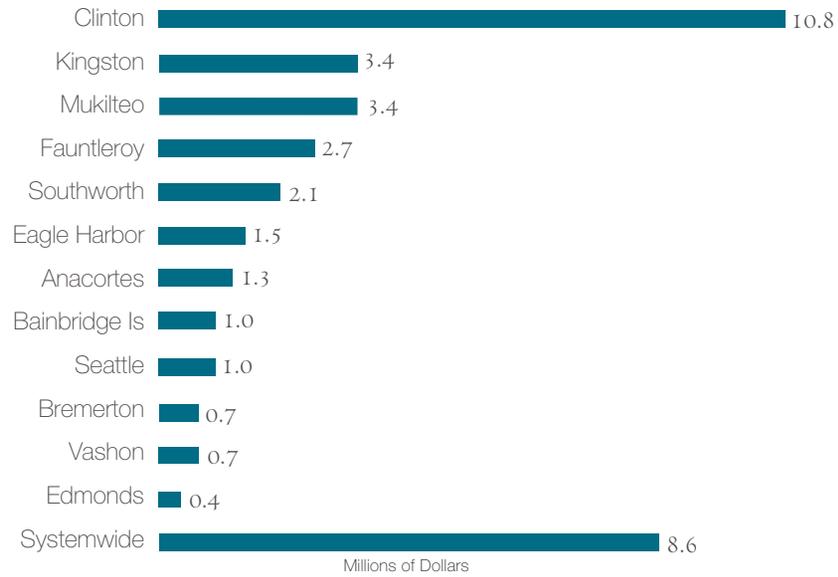


Clinton Terminal after Phase 1 expansion.

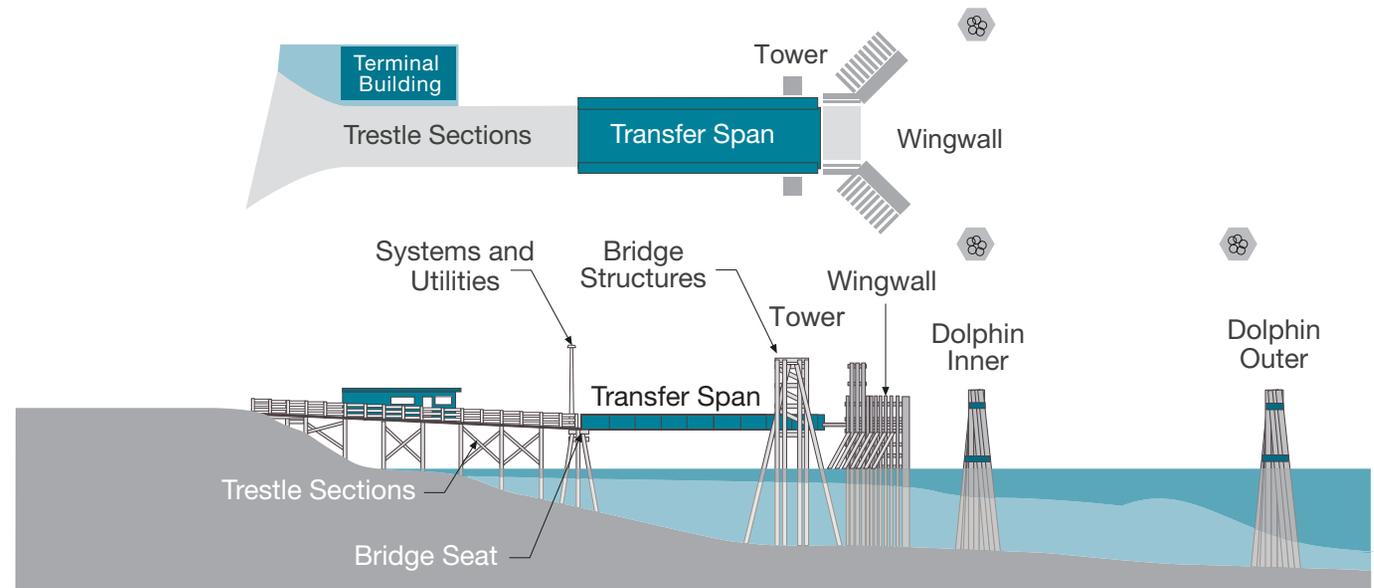


Bremerton Terminal.

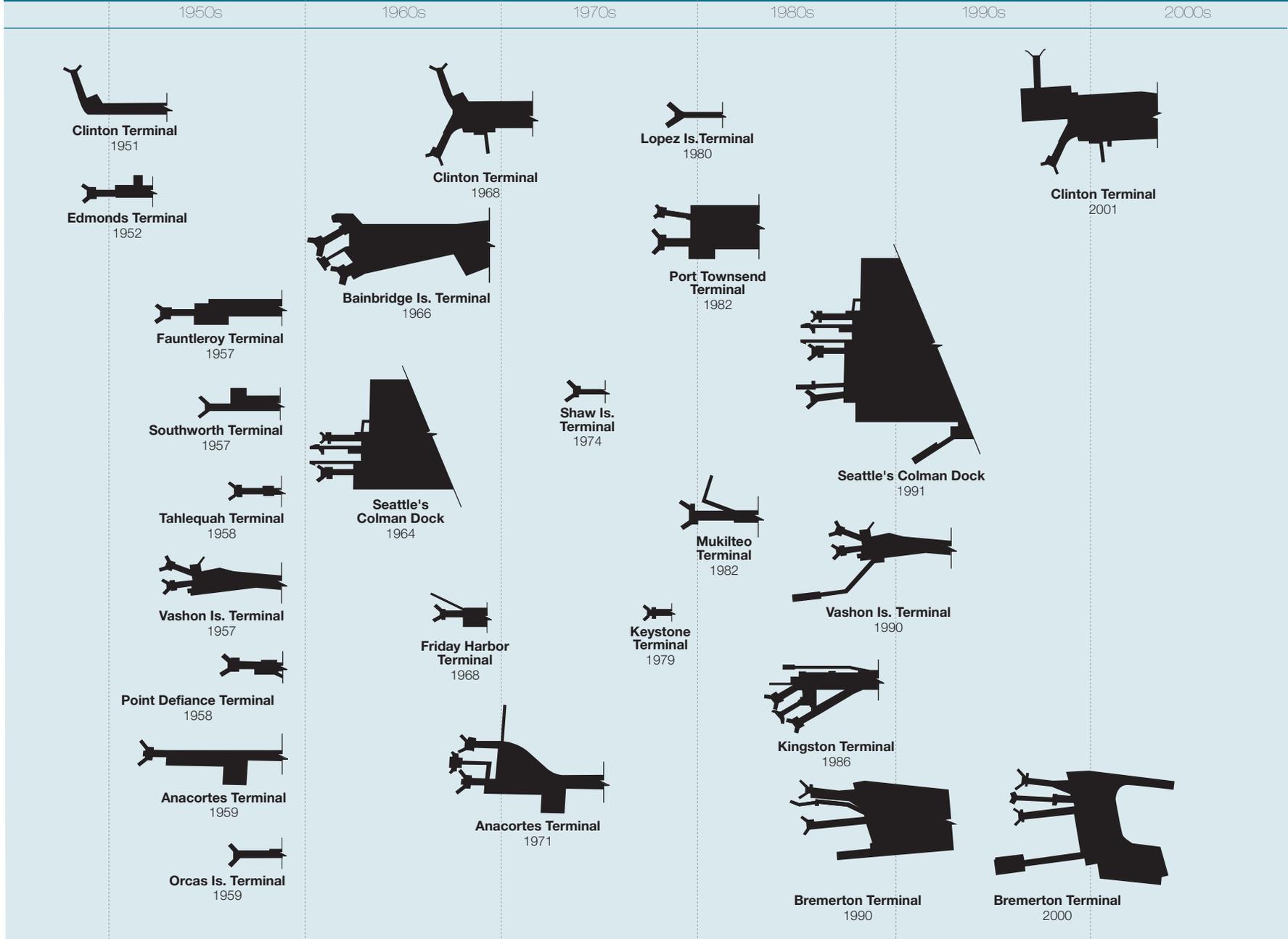
Terminal Preservation Spending \$37.6 Million - 1999/01 Biennium



Terminal Systems and Structures



Historic Terminal Improvements Since 1951



WSF spent \$10.4 million on terminal improvements this biennium. Approximately one-third (\$3.5 million) was spent to widen the trestle at the Clinton terminal, which minimized the disruption to terminal operations and increased the terminal's capacity to land, load and unload vessels. WSF spent \$2.9 million at the Seattle Ferry Terminal for the Slip 1 passenger overhead loading and to prepare the master development plan and environmental impact statement for the future development of the terminal. About \$3.4 million was spent designing facilities at Kingston, Seattle and Southworth for expanded passenger-only ferry service. However, this work was halted with the

passage of I-695. Finally, WSF provided \$0.6 million in funding to support two partnerships—one involving the Bremerton Transportation Center project, and the other involving Sinclair Landing passenger-only project.

WSF has a maintenance program that encompasses all of WSF's terminals. Terminal maintenance for 1999/01 biennium totaled \$16.2 million—\$8.0 million in 2000 and \$8.2 million in 2001. Terminal maintenance consists of four main elements: preventative maintenance (PM), inspections, correctives, and enhancements. Since 1997, WSF has used a Maintenance Productivity Enhancement Tool (MPET)



Seattle's Colman Dock.



Construction at Clinton Terminal.

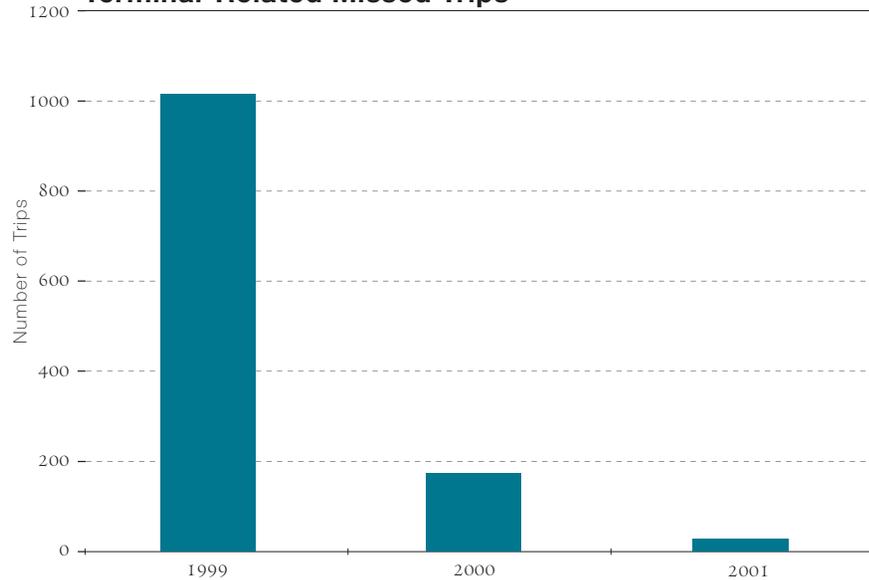
program to automatically assign work orders for preventative maintenance on an established cycle and to track corrective work orders. Preventative maintenance can begin as an inspection and then become a scheduled replacement or a corrective. Approximately 1,250 preventative maintenance work orders were completed in the 1999/01 biennium by the shops at Eagle Harbor (carpenter, electric, machine, pipe, shore gang, weld) as well as outside vendors (HVAC, sprinkler systems, pest control, landscaping).

Other types of inspections involve structural and dive inspections. Structural inspections occur at each terminal annually and are performed by the WSDOT Bridge Preservation office. Their

scope of work was increased over the past two years to include the Eagle Harbor facility as well as the tie-up and offshore structures at all the terminals. In 1999/01, dive inspections were conducted at 13 of the 20 terminals to inspect underwater structures to determine such things as the marine borer activity in the wood pilings, and the condition of coatings and anchor chains.

Terminal maintenance correctives are performed by Eagle Harbor Maintenance Facility staff, WSDOT maintenance staff, or outside vendors or contractors. Approximately 2,980 corrective or enhancement work orders were completed in the 1999/01 biennium. Typical correctives performed by Eagle Harbor staff include cable changes due to premature wear, hydraulic cylinder

Terminal-Related Missed Trips



replacement, painting, plumbing repair, and electrical system troubleshooting. Examples of correctives performed by outside vendors include repairs to HVAC systems, automatic doors, elevators, roofs, pavement, security alarms, and public announcement systems. Outside contractor correctives include repairs to dolphins, wingwalls, and under dock pilings; swapping floating dolphins; and replacing anchor chains. Terminal enhancements are made to meet changing service requirements and can include improvements to terminal signage, accessibility, and workspace for terminal employees.

Effective terminal maintenance is a factor in the low number of missed trips each year due to terminal-related problems.

There were 166 and 23 terminal-related missed trips in 2000 and 2001, respectively. Of the 166 missed trips in 2000, 121 were missed due to construction of the Bremerton passenger-only terminal that removed and relocated the service, and 32 were missed due to construction at the Clinton ferry terminal. The remaining missed trips in 2000 and in 2001 involved such things as power outages, planned maintenance, and slip obstructions. 🚢

