

## VII] Maintaining and Preserving Vessels



**W**SF's vessel and terminals are the foundation of the ferry system. Securing funding for important maintenance, structural improvements and preservation will ensure the lifespan of these assets. Capital investments ensure that the ferry system remains viable for years to come. WSF makes capital investments in its fleet to protect existing vessels through scheduled maintenance, emergency repairs, preservation activities, and improvement projects. Vessel maintenance and preservation are critical to the ferry system's infrastructure.

The ferry system operates its ten routes using 24 vessels. WSF owns 28 vessels; four of which are on a deactivated status. Deactivated vessels are boats that are used only in an extreme emergency and therefore have less maintenance and preservation money dedicated to them.

### Maintenance

Vessel maintenance is a combined effort of the vessel's engine crew and machinists at the Eagle Harbor maintenance facility as well as larger maintenance contracts performed at local shipyards. Engine crews monitor the ferry's propulsion system and auxiliary machinery, performing planned maintenance procedures and maintaining virtually every piece of equipment onboard the ferry. Many of these tasks are performed while the vessel is underway. Crews use night-time hours to perform heavier repair and maintenance functions.

Vessel maintenance is grouped into two categories: basic and intermediate. Basic vessel maintenance is also referred to as ship-board preventative maintenance, and includes activities that can be accomplished by the ship's operating crew while the vessel is in service or moored for the night. Examples of this maintenance include oil changes, tune-ups, and systems adjustments.

Intermediate vessel maintenance includes activities that require removing the vessel from service. Most intermediate maintenance activities are accomplished at the Eagle Harbor Maintenance Facility and by specialty vendors. Often this work requires a shore-based infrastructure that is not available aboard ship. Examples of this maintenance include rebuilding engines, hydraulic component overhauls and upholstery repair.

Washington State Ferries employs a detailed and complex maintenance schedule to address maintenance issues that can be anticipated and scheduled.

Washington State Ferries' begins scheduling routine maintenance and annual inspections two years in advance. Using a highly detailed and scheduled maintenance program allows the ferry system to meet Coast Guard regulations for required maintenance, and minimize the impact on our operations and ultimately our customers.

Once a vessel is scheduled to undergo maintenance, steps are taken to assure appropriate service remains on the route where the vessel is being pulled from. With a schedule set in advance, WSF is able to plan which vessels will need to be reassigned. Many times, several vessel changes will be necessary in order to meet the demand on all routes.

Vessel maintenance for 2001-2003 totaled \$19.0 million in FY 2002 and \$14.8 million in FY 2003.

## Improvements to Maintenance Program

The ferry system's Maintenance Productivity Enhancement Tool (MPET) system helps WSF track vessel maintenance by transferring data from ship to shore via a wireless computer system.

Over the 2001-2003 biennium, the ferry system worked to complete installation of the system on every active vessel. This system will make the maintenance department more consistent, more efficient, and will allow WSF to reduce paperwork and inventory.

The tool provides WSF employees 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.

## Emergency Expenditures

Washington State Ferries allots funds for emergency repair of its vessels. Emergency repair activities include unexpected damage to vessels, such as occurs when a ferry makes a hard landing at a dock. Emergency repairs differ from other capital investments because they are governed by statutes that streamline the contracting process. This allows WSF to expedite repairs and get the vessel back in service as soon as possible. In the 2001-2003 biennium WSF used \$1.8 million in capital funds for emergency repairs to vessels. Once that money is spent, WSF draws from either the Operating budget for maintenance work, or regular capital funding.

## Preservation

In general, auto ferries have a useful lifespan of about 60 years. Vessels require preservation investments throughout their lives but needs peak as they approach 30 and 60 years of operation. WSF has four vessels that are that are over 75 years old, and over half of its auto vessels were constructed prior to 1975.

Vessel preservation includes the activities that require the services and facilities of a commercial shipyard. Examples of this maintenance include dry dock inspections, exterior painting, structural repairs, and replacing complete systems, such as electrical or propulsion systems. Preservation such as this can give new life to an aging vessel that is still under its initial lifespan. Capital investments in preservation are essential to ensure that Washington State's ferry system is using equipment that is safe and reliable to transport its customers.

WSF uses the life cycle model preservation program. Vessel parts are classified into a category - either vital or other. Vital parts are those designated by the US Coast Guard as vital to the protection of people, the environment and the vessel. Other parts of the vessel may be important but not vital as defined by the US Coast Guard.

Each part has a life cycle, and each is tracked, and either replaced or preserved according to its lifecycle. By doing this, the ferry system can allot its resources in a way that makes sense for the entire system. In the absence of investments to protect these assets, the overall life cycle rating for the fleet declines.

## Ferry Vessels

In 2001-2003, WSDOT spent \$86 million to preserve the ferry system's vessels, including emergency repairs.

Investments focused on ferries in the Issaquah Class (\$32 million), Jumbo Class (\$16 million), Evergreen State Class (\$14 million) and Super Class (\$10 million)

Washington State Ferries measures the performance of its preservation program in terms of the number of vessel systems and structures refurbished or replaced. Systems and structures may consist of multiple components. For example, the engine system on a ferry may consist of four engines. Overall, investments in ferries replaced 137 systems and structures on 24 of the 28 vessels owned by the ferry system during this time period. 111 vital systems and structures, and 26 other systems and structures were preserved.

## Project Facts

- The average age of a WSF vessel is over 30 years. Four were built in 1927.
- WSF will invest \$576 million over ten years toward ensuring existing vessels are safe, sound, comfortable and efficient.
- WSF rehabilitates or replaces 717 vessel systems and structures annually.

## Vessel Classes of WSF

### Steel Electric 1927



Nisqually, Illahee, Quinault, Klickitat - 1927

### Miscellaneous 1947



Rhododendron - 1947

### Evergreen Class 1954 –1959



Evergreen State - 1954, Klahowya - 1958, Tillikum - 1959

### Miscellaneous 1967



Hiyu - 1967

### Super Class 1967



Hyak, Kaleetan, Yakima, Elwha - 1967

### Jumbo Class 1972



Spokane, Walla Walla - 1972

### Issaquah Class 1979 – 1982



Issaquah - 1979, Kittitas - 1980, Kitsap - 1980, Cathlamet - 1981, CHelan - 1981, Sealth - 1982

### Jumbo Mark II Class 1997 – 1999



Tacoma - 1997, Wenatchee - 1998, Puyallup - 1999

### Passenger-Only Class – 1989



Skagit, Kalama - 1989

## Issaquah Class Biennium Work

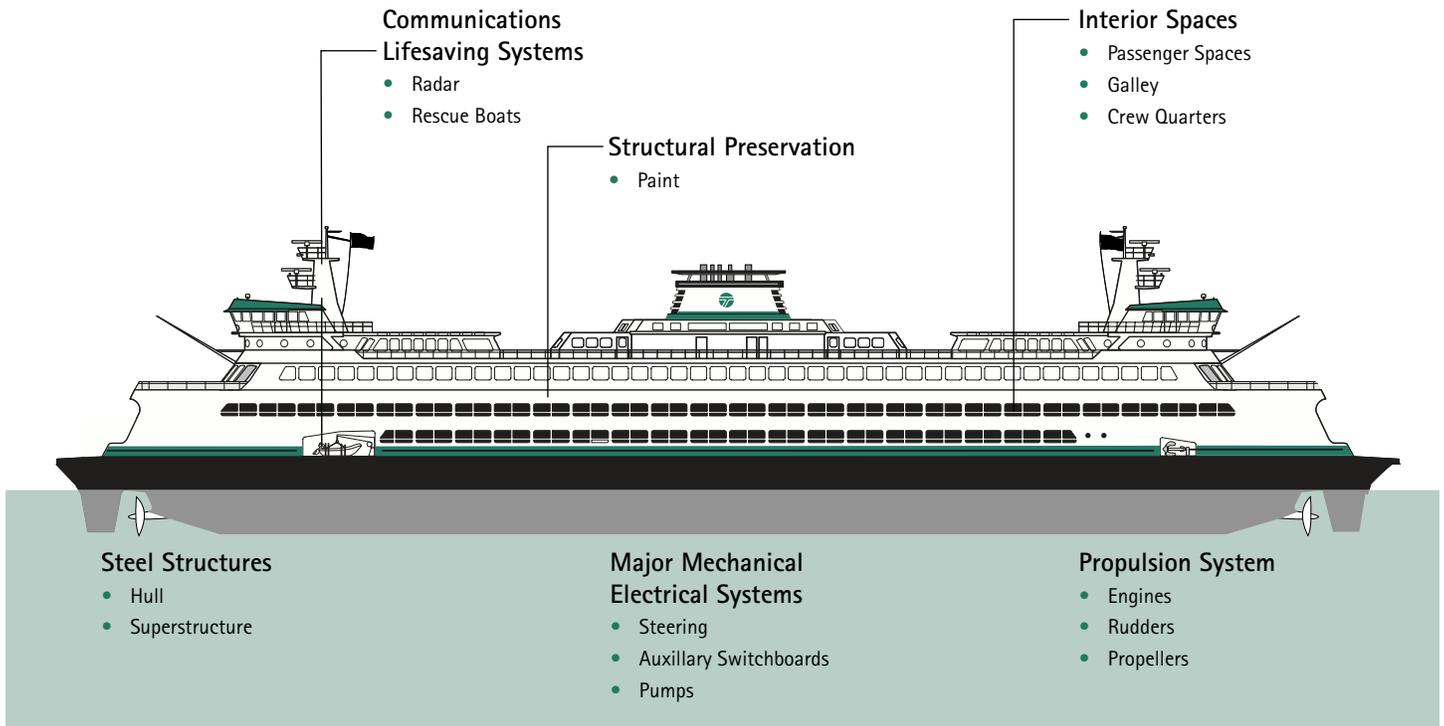
The six vessels in the Issaquah Class were built between 1979 and 1982. They are just past the 30-year midpoint of their expected lives (when preservation costs peak). During the 2001-2003 biennium, WSF spent \$32 million to replace or refurbish 75 of the systems and structures on these vessels. The US Coast Guard classified 59 of these systems and structures as vital. Sixteen other systems and structures were also preserved.

The work accomplished renewed the life cycles of 24 propulsion systems, 15 major mechanical systems, 14 communication-navigational-life saving systems, 10 steel structures, nine structural protection systems, two interior spaces, and one piping system.

Examples of equipment and parts that were installed during the 2001-2003 Biennium:

- Old engines were replaced with engines of more fuel efficient design and reduced emissions
- New controllable pitch propeller hubs
- Matthews Marine steering gear controls
- New ships service diesel generators
- A vital service diesel generator
- New pilothouse control consoles
- A remodeled passenger deck interior
- Two new main propulsion General Electric EFI diesel engines
- New rescue boats and davits
- Marine Evacuation Systems
- Vital service diesel generator
- Passenger deck interior package
- SSOG Switchboards with paralleling capabilities
- Carlisle & Finch Zenon Searchlights
- Started the design for Data-cogging capabilities

## Vessel Systems and Structures



## Jumbo Class Biennium Work

The two vessels in the Jumbo Class were built in 1972. They are also just past the 30-year midpoint of their expected lives. During the 2001-2003 Biennium, WSF spent \$16 million to replace or refurbish 14 of the systems and structures on these vessels. The US Coast Guard classified 11 of these systems and structures as vital. Three other systems and structures were also preserved.

The work accomplished renewed the life cycles of five communication-navigation-life saving systems, four steel structures, two propulsion systems, two structural protection systems, and one major mechanical system.

Replaced or refurbished items include rescue boats, the general alarm system, interior communications and temporary emergency power, generators, rudders, steel on the hull, auto deck and superstructure, and protective systems for the hull and sewage tanks.

## Evergreen State Class Biennium Work

The three vessels in the Evergreen State Class were built in the 1950's and refurbished in the late 1980's and mid-1990's. They are in the second half of their expected lives. During the 2001-2003 Biennium, WSF spent \$14 million to replace or refurbish 11 of the systems and structures on these vessels. The US Coast Guard classified eight of these systems and structures as vital. Three other systems and structures were also preserved.

The work accomplished renewed the life cycles of six propulsion systems, three structural protection systems and two life saving systems.

Replaced or refurbished items include rescue boats, propulsion controls, switchboards, and motors.



## Super Class Biennium Work

The four vessels in the Super Class were built in the 1967. Three were refurbished in 1991, 1999 and 2000. One vessel has not yet received major refurbishment. They are in the second half of their expected lives. During the 2001-2003 Biennium, WSF spent \$10 million to replace or refurbish 17 of the systems and structures on these vessels. The US Coast Guard classified 13 of these systems and structures as vital. Four other systems and structures were also preserved.

The work accomplished renewed the life cycles of eight communication-navigation-life saving systems, three propulsion systems, three steel structures, two structural protection systems and one piping system.

Types of items replaced or refurbished include

- Rescue boats
- A sprinkler system
- Generators
- Rudders
- Auto deck and tank steel
- Protective systems for potable water and sewage tanks.

## Other Vessel Class Biennium Work

WSF spent \$5 million to replace or refurbish 20 of the systems and structures on the remaining vessels of the fleet. The US Coast Guard classified all of these systems and structures as vital.

The work accomplished renewed the life cycles of 14 communication-navigation-life saving systems, four propulsion systems, one major mechanical system and one steel structures.

Types of items replaced or refurbished include

- Rescue boats
- Radars
- Diesel engines
- Rudders
- Hull steel
- CO2 system and controls

## Environmental Protection

WSF's vessel preservation program provides the following environmental protection:

- Replacing or refurbishing navigation systems allow ferry captains to use state-of-the-art equipment and up-to-date information to safely navigate vessels to avoid potentially hazardous situations (such as shoals or other vessels) in all weather conditions. Installation of these new systems will help to minimize any risk of vessel groundings or collisions and the potential for an oil spill that may result from those types of incidents.
- Replacing or refurbishing propulsion systems allows captains and crew to expertly control vessel speed and direction. Upgrades to these systems also work to minimize any risk of vessel groundings or collision and the potential for resultant spills.
- Replacing or refurbishing mechanical and electrical systems allows WSF to improve the energy efficiency of its vessels. Increased energy efficiency promotes environmental protection in many ways, from reducing the natural resources that are needed to power the vessels, to minimizing the wastes and/or emissions that are generated. WSF is installing new engines in its Jumbo Class vessels. These new engines contain electronic fuel injection systems that will reduce air emissions by up to 50 percent.
- Replacing or refurbishing piping systems ensures that the fluids that are necessary for ships operations (such as fuel, lubricants, fresh water and bilge water) are safely contained and managed inside the vessel. Fluids handled in this way pose little risk of release into the sensitive aquatic environment of Puget Sound.

## On the Brink...

After a vessel's engine reaches its averaged 60-year lifespan, preservation is no longer a viable option. At this point, continuing to funnel money into maintenance and preservation of the vessel becomes irresponsible and ineffective.

With a class of vessels that is over 75 years old, the Steel Electric Class, Washington State Ferries is looking for alternatives to the preservation process. WSF hopes to retire the four Steel Electric Class vessels in the fleet (the *MV Quinalt*, *MV Nisqually*, *MV Klickitat* and the *MV Illahee*).

In late 2003, WSF issued the first in a series of Requests For Proposals for a contract to design and build four auto ferries capable of carrying 130 vehicles and over 1,200 passengers and crew per vessel. WSF estimates the contract will be worth \$285 million.

The vessels will be passenger friendly, complying with standards under the Americans with Disabilities Act, and safe, conforming to Federal Regulation standards for operations on lakes, bays and sounds.

The plan approved by the legislature schedules the first vessel delivery in 2008. The project will bring new levels of efficiency, reliability and flexibility to the system's ferry fleet.



## Vessel Construction Activities

### 2001-2003 Biennium Investments and Performance Measures

DOLLARS IN MILLIONS

Vessel Investments	Total	Preservation	Improvements
<b>Jumbo Mark II Class Ferries</b>	<b>\$2.1</b>	<b>\$2.0</b>	<b>\$0.1</b>
MV Puyallup	\$0.7	\$0.7	\$0.0
MV Tacoma	\$0.5	\$0.5	\$0.0
MV Wenatchee	\$0.8	\$0.7	\$0.1
<b>Jumbo Class Ferries</b>	<b>\$16.0</b>	<b>\$16.0</b>	<b>\$0.0</b>
MV Spokane	\$6.7	\$6.7	\$0.0
MV Walla Walla	\$9.3	\$9.3	\$0.0
<b>Super Class Ferries</b>	<b>\$10.4</b>	<b>\$10.4</b>	<b>\$0.0</b>
MV Elwha	\$3.2	\$3.2	\$0.0
MV Hyak	\$5.9	\$5.9	\$0.0
MV Kaleetan	\$0.9	\$0.9	\$0.0
MV Yakima	\$0.4	\$0.4	\$0.0
<b>Issaquah Class Ferries</b>	<b>\$31.7</b>	<b>\$31.7</b>	<b>\$0.0</b>
MV Cathlamet	\$7.9	\$7.9	\$0.0
MV Chelan	\$3.5	\$3.5	\$0.0
MV Issaquah	\$5.3	\$5.3	\$0.0
MV Kitsap	\$5.1	\$5.1	\$0.0
MV Kittitas	\$3.4	\$3.4	\$0.0
MV Sealth	\$6.5	\$6.5	\$0.0
<b>Evergreen State Class Ferries</b>	<b>\$14.2</b>	<b>\$14.2</b>	<b>\$0.0</b>
MV Evergreen State	\$0.5	\$0.5	\$0.0
MV Klahowya	\$5.9	\$5.9	\$0.0
MV Tillikum	\$7.9	\$7.9	\$0.0
<b>Steel Electric Class Ferries</b>	<b>\$1.4</b>	<b>\$1.4</b>	<b>\$0.0</b>
MV Illahee	\$0.4	\$0.4	\$0.0
MV Klickitat	\$0.5	\$0.5	\$0.0
MV Nisqually	\$0.2	\$0.2	\$0.0
MV Quinault	\$0.4	\$0.4	\$0.0
<b>Miscellaneous Class Ferries</b>	<b>\$0.3</b>	<b>\$0.3</b>	<b>\$0.0</b>
MV Hiyu	\$0.0	\$0.0	\$0.0
MV Rhododendron	\$0.3	\$0.3	\$0.0
<b>Passenger-only Class Ferries</b>	<b>\$0.2</b>	<b>\$0.2</b>	<b>\$0.0</b>
MV Kalama	\$0.2	\$0.2	\$0.0
MV Skagit	\$0.0	\$0.0	\$0.0
MV Tyee Law	\$0.0	\$0.0	\$0.0
Kalama/Skagit Replacement	\$0.0	\$0.0	\$0.0
<b>Passenger-only Fast Class Ferries</b>	<b>\$0.1</b>	<b>\$0.1</b>	<b>\$0.0</b>
MV Chinook	\$0.0	\$0.0	\$0.0
MV Snohomish	\$0.0	\$0.0	\$0.0
<b>Replacement Auto-passenger Ferries</b>	<b>\$0.2</b>	<b>\$0.2</b>	<b>\$0.0</b>
Emergency Repairs	\$1.8	\$1.8	\$0.0
<b>System-wide Vessel Project</b>	<b>\$7.4</b>	<b>\$7.4</b>	<b>\$0.0</b>
<b>Total Vessel Investments</b>	<b>\$85.9</b>	<b>\$85.8</b>	<b>\$0.1</b>