



JOINT TRANSPORTATION COMMITTEE FERRIES FINANCING STUDY II

VESSEL ACQUISITION SIZING AND TIMING (2009- 2030) DRAFT REPORT

JTC FERRY POLICY GROUP
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Cedar River Group
John Boylston



Legislative Direction

2007 Legislature directed JTC to:

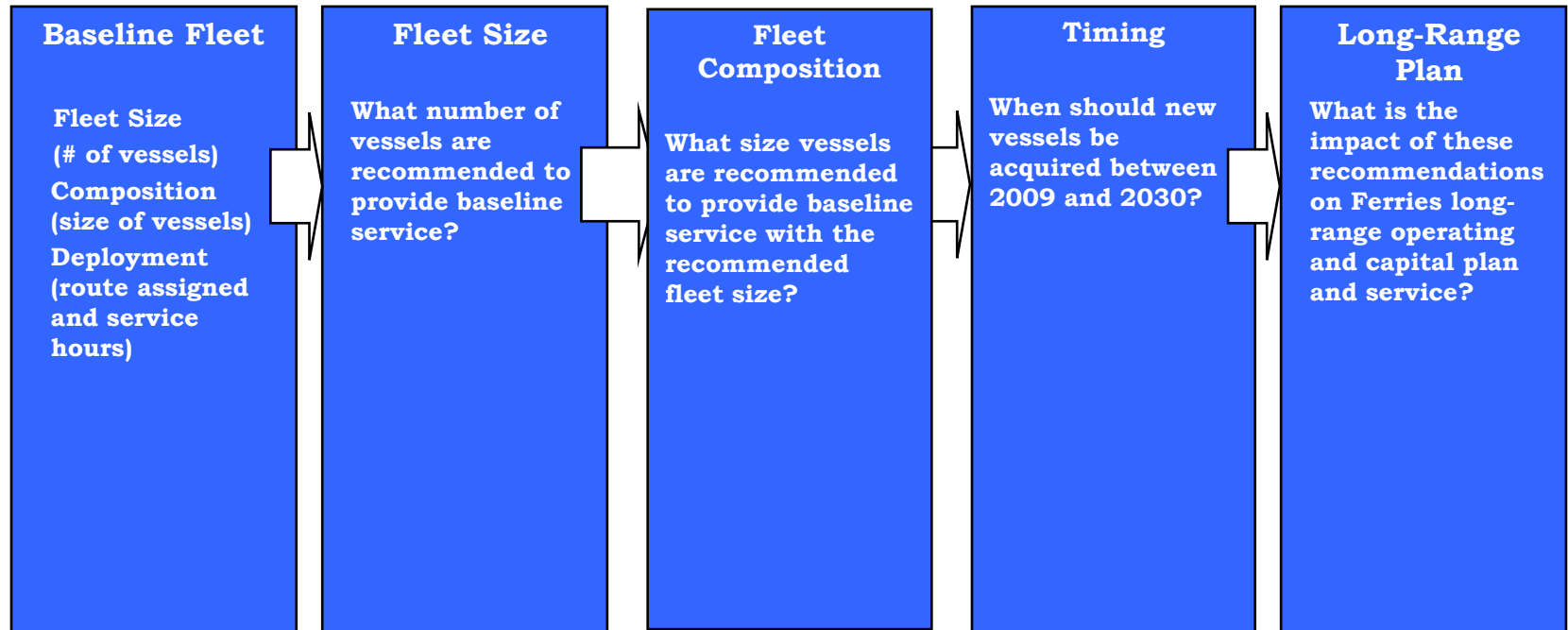
- Make recommendations regarding the most efficient timing & sizing of future vessel acquisitions beyond those currently authorized by the legislation.
 - Up to 3 144-vehicle auto-passenger ferries
 - 2 Island Homes
- Base vessel recommendations on the work of the study, including:
 - Updated ridership projections
 - Level of service standards
 - Operational and pricing strategies
- Document impact of vessel recommendations on:
 - Terminal capital investments
 - WSF's operating and capital finance plans

Legislative Direction

Other legislative direction:

- Ferries shall continue to provide service to Sidney B.C. (ESHB 2878 (224) (3))
- Legislative approval required to add or eliminate a route. (ESHB 2358 (8) (2))
- In planning for vessel acquisitions, ferries must evaluate the long-term operating costs related to fuel efficiency and staffing. (SSB 6932 (6) (2) (h))

Fleet Planning Model



Long Range Plan

- Study coordinated with Ferries long-range planning
- Vessel acquisition and preservation is a critical component of Ferries' long-range plan & future financing

Financial Assumptions

- Uses 2008 dollars in order to make timing recommendations
- Will update in final report to year of expenditure dollars to compare more easily with Ferries' long-range plan

Costs Analyzed

- **Fixed costs** – Capital and operating costs that do not change with route assignment or service hours. Examples are engine room crew, insurance, maintenance.
- **Vessel acquisition costs** – Costs to design and construct vessels in the 2009-2030 period.
- **Vessel reserve capacity** – Capacity needed to fill in on routes when regularly assigned vessels are out-of-service due to planned maintenance or emergencies.
- **Service hours** – The number of hours a vessel operates on an assigned route.
- **Variable costs** – Operating costs that change with route assignment and service hours. Deck labor and fuel.
- **Fixed and variable costs per service hour** – Annual fixed and variable costs are divided by service hours as a measure of cost-efficiency.
- **Terminal requirements and costs** – Impact on terminal capital program.

Indicators – Systemwide and by Route

- **Percentage of auto capacity utilized** – Auto capacity is the prime determinant of vessel size and the system's ability to carry riders. (There is ample capacity for walk-on passengers.)
 - Change from peak period vehicle level of service standard previously used by Ferries
- **Percentage of sailings in which auto capacity is sold out or fully reserved.** An additional measure of how fully the vessels assigned to a route are utilized.
- **Variable costs per auto carried** – Variable costs are divided by the number of autos projected to be carried as a measure of cost efficiency.

2030 Ferries' Baseline Fleet

	Ferries' Baseline 2030 Fleet
Jumbo (188-202 auto)	5
Large (144-auto)	7
Medium (124-auto)	5
Mid-Size (87-90 auto)	3 (1-90 auto & 2 87-auto)
Small (34-64 auto)	3 (2 64-auto & 1 34-auto)
Total	23

2030 Fleet Size: What number of vessels are recommended to provide baseline service?

- **Recommended size** - 21 vessels
- **Key difference reserve vessels** – Ferries has 2 de-crewed emergency reserve vessels, recommended has none. (De-crewed vessels are not assigned an engine room crew.)
- **Out-of-service time** – Consultants recommend reducing out-of-service time of crewed vessels to provide emergency capacity.
 - During 2003-06 Ferries had a 24 vessel fleet with 3 de-crewed vessels –maximum use of the de-crewed vessels was 8 weeks.
 - A 5% reduction (or 2.5 days) in the average annual out-of-service time per crewed vessel would allow the 21 crewed vessels to provide 8 weeks of emergency response.
 - Consultants recommend Ferries reduce average annual out-of-service time by 1 week or 14% by 2030.
- **Additional back-up capacity:** As additional back-up Ferries could deploy vessels that are in maintenance in the event of emergency.

2030 Fleet Size Recommendations

Recommendation #1: Ferries should reduce average planned out-of-service time from seven weeks per vessel per year to six weeks. This can be achieved by

- consolidating Eagle Harbor work with other shipyard work
- reducing time spent on topside painting
- designing vessels with aluminum superstructures and other features that reduce required maintenance
- requesting the Coast Guard to allow underwater inspection in lieu of dry docking.

Recommendation #2: The legislature should recognize that in order to reduce out-of-service time and reduce the fleet size, the per-vessel expenditure on maintenance and preservation may increase. It will be necessary to provide adequate maintenance and preservation funding for each vessel in the fleet in order to minimize service disruption.

2030 Fleet Size Recommendations

Recommendation #3: Assuming a six-week average annual maintenance period per vessel, Ferries should plan on a 21-vessel fleet to provide the baseline 2030 service hours.

- Will provide adequate maintenance relief
- Will have 46 weeks of crewed vessel emergency capacity
- Additional vessel acquisitions could then be used to expand service, not to deliver the baseline service.

Recommendation #4: Ferries should implement a system to use vessels that are in maintenance for emergency response.

2030 Fleet Size Recommendations

- **Reducing out of service time would result in:**
 - **Better emergency response time** – Crewed vessels can respond 12-18 hours faster than de-crewed vessels.
 - **Improved overall fleet condition** – Historically Ferries has not been able to fund preservation of reserve vessels.
- **Summer:** There could be greater risk of service disruption in the summer when 19 vessels are deployed. To make this work Ferries must minimize summer planned out-of-service time.

2030 Fleet Composition: What size vessels are recommended to provide baseline service with a 21 vessel fleet?

Ferries Baseline Deployment:

- No. of vessels varies by season
 - 17 fall-winter-spring (30 weeks)
 - 18 shoulder (8 weeks)
 - 19 summer (14 weeks)
- Systemwide performance at 2030 projected ridership level:
 - Percentage of auto capacity used: 68% (61% winter, 76% summer)
 - Percentage of sailings in which auto capacity is sold or fully reserved: 36% (25% winter, 51% summer)
 - Variable costs (i.e. deck crew and fuel) per auto carried: \$6.91 (\$7.43 winter/\$6.50 summer)

Ferries' Baseline Fleet - 2030 Route Performance

Route	% Vehicle Capacity Used Summer/Winter	% of Sailings Vehicle Capacity Sold Out Summer/Winter	Variable Cost Car Carried (08\$)/ Summer/Winter
Bainbridge	102%/ 83%	55%/35%	\$ 5.62/\$6.82
Bremerton	59%/ 49%	9%/ 6%	\$15.24/\$18.26
Clinton	84%/ 70%	44%/20%	\$ 3.19/\$ 4.16
Kingston	108%/ 83%	66%/33%	\$ 5.06/\$ 6.08
Pt. Defiance	54%/ 46%	5%/ 2%	\$ 7.89/\$ 9.37
P. Townsend	146%/101%	99%/50%	\$ 7.47/\$ 7.53
San Juans	109%/ 61%	49%/11%	\$10.04/\$17.89
InterIsland	47%/ 26%	0%/ 0%	\$49.37/\$66.96
Sidney <small>(spring)</small>	93%/ 56%	39%/ 7%	\$28.10/\$50.40
Triangle	46%/ 41%	8%/ 7%	\$ 4.45/\$ 5.05

2030 Recommended Route Assignment

Route Deployment

- **Same # of vessels deployed to routes by season as Ferries' baseline fleet:**
 - 17 fall-winter-spring
 - 18 shoulder
 - 19 summer
- **Route Alternatives Considered**
 - Switching assignment of 24-hour & 16-hour vessels on four routes: Bainbridge, Clinton, Kingston & Triangle
 - Assigning smaller, more fuel-efficient vessels to five routes: Bremerton, Point Defiance, Anacortes-San Juans, Interisland & Sidney
 - Switching with other routes: San Juan route vessels to Triangle route in the non-summer seasons

2030 Recommended Route Assignment

Recommendation #5: Ferries should plan on the following active vessel deployments by route for the delivery of the baseline services:

Route	#	Ferries' Baseline 2030 Fleet			Recommended 2030 Fleet		
		F-W-S	Sh.	Sum.	F-W-S	Sh.	Sum.
Bainbridge & Bremerton	4	2 Jumbo		3 Jumbo	2 Jumbo		
		2 Large		1 Large	2 Large		
Clinton	2	1 Large			1 Large		
		1 Medium			1 Medium		
Kingston	2	2 Jumbo			2 Jumbo		
Pt. Defiance	1	1 Mid-Size			1 Small		
Port Townsend	1-2	1 Sm.	2 Small		1 Sm.	2 Small	

2030 RECOMMENDED ROUTE ASSIGNMENT

		Ferries' Baseline 2030 Fleet			Recommended 2030 Fleet		
Route	#	F-W-S	Sh.	Su	F-W-S	Sh.	Su
San Juans & Sidney	4-5	2 Large		4 L.	1 Large		3 Large
		1 Medium			1 Medium		
					1 Mid-Size		
		1 Mid-Size		1 Small			
Triangle	3	2 Medium			2 Medium		
		1 Mid-Size		1 Medium		1 Mid-Size	
Total Assigned		17	18	19	17	18	19

2030 Recommended Route Assignment

At 2030 projected ridership level, changes from Ferries' baseline fleet:
(systemwide annual)

- Percentage of auto capacity used: -1% (-5% winter, +2% summer)
- Percentage of sailings in which auto capacity is sold or fully reserved: +1% (-1% winter, +3% summer)
- Variable costs (i.e. deck crew and fuel) per auto carried: \$-0.32 (\$-0.30 winter/\$-0.39 summer)

Recommended - 2030 Route Performance Change

Route	% Vehicle Capacity Used Summer/Winter	% of Sailings Vehicle Capacity Sold Out Summer/Winter	Variable Cost Car Carried (08\$)/ Summer/Winter
Bainbridge	6%/5%	4%/3%	\$0.08/(\$0.32)
Bremerton	11%/No change	14%/No change	(\$2.42)/No change
Clinton	1%/1%	(2%)/(2%)	(\$0.08)/(\$0.10)
Kingston	2%/1%	No change/(1%)	(\$0.05)/(\$0.13)
Pt. Defiance	20%/16%	13%/16%	(\$1.95)/(\$2.32)
P. Townsend	No change	No change	No change
San Juans	1%/14%	No change/20%	\$0.05/(\$0.69)
InterIsland	16%/9%	No change (still 0%)	(\$9.97)/(\$13.52)
Sidney <small>(spring)</small>	15%/No change	22%/No change	\$0.46/No change
Triangle	(3%)/(5%)	No change/(4%)	\$ (0.03)/\$0.06

Recommended Fleet Composition

- Route assignment determines the size of the 19 route vessels.
- Size of the other 2 vessels based on best size for:
 - Maintenance rotation (i.e. moving vessels to a route to replace vessels during planned maintenance or preservation work)
 - Emergency reserve needs

2030 Recommended Fleet Composition

Recommendation 6: Ferries should plan for a 21-vessel fleet composed of.

	Ferries' Baseline 2030 Fleet	Recommended 2030 Fleet
Jumbo (188-202 auto)	5	5
Large (144-auto)	7	6
Medium (124-auto)	5	5
Mid-Size (87-90 auto)	3 (1-90 auto & 2 87-auto)	1 (90-auto)
Small (34-64 auto)	3 (2 64-auto & 1 34-auto)	4 (64-auto)
Total	23	21

Annual Fixed Cost Change

Route	Ferries' Baseline Fleet (\$ 2008 millions)	Recommended Fleet (\$ 2008 millions)	Change (\$ 2008 millions)
Fixed Operating Budget Costs	57.7	56.9	(0.8)
Fixed Capital Budget Costs*	32.1	32.1	(0.0)
Total	89.8	89.0	(-0.8)
Depreciation	22.2	19.6	(-2.6)
* With allowance for a 5% increase in capital preservation costs per vessel in the smaller recommended fleet.			

Annual Variable Operating Cost Change

Route	Ferries' Baseline Fleet (\$ 2008 millions)	Recommended Fleet (\$ 2008 millions)	Change (\$ 2008 millions)
Bainbridge	18.8	17.7	(1.1)
Bremerton	13.7	13.0	(0.7)
Clinton	10.4	10.1	(0.3)
Kingston	18.0	17.6	(0.4)
Pt. Defiance	4.6	3.5	(1.1)
P. Townsend	4.2	4.2	0
San Juans	14.6	14.2	(0.4)
InterIsland	4.1	3.3	(0.8)
Sidney <small>(spring)</small>	2.8	2.7	(0.1)
Triangle	12.5	12.6	0.1
Total	103.6	98.4	(4.8)

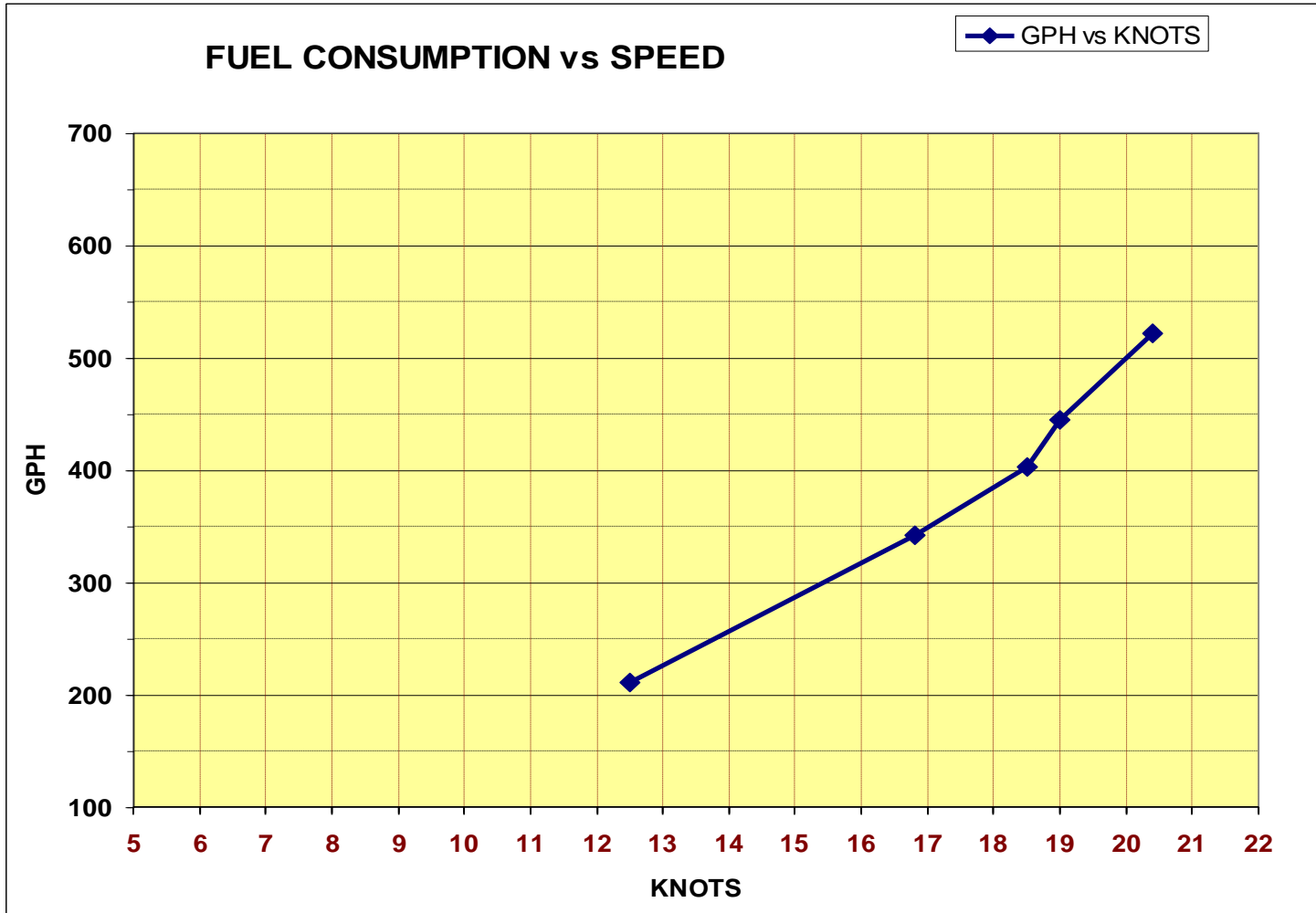
Fleet Fuel Costs

- Fuel costs are 6 percent lower with the recommended fleet composition. (\$51.1 million per year from \$54.2 in 2008 \$)
- Fuel costs are lower because smaller, more fuel efficient vessels are assigned to routes.
- Potential strategies for further reductions in fuel costs:
 - *Speed* – Minor changes in speed result in large fuel savings.
 - ✓ Annual savings in 2008 \$ from an average 1 knot reduction in speed = \$6.0 million or 12 percent for the recommended fleet

Recommendation # 7: Ferries should analyze the potential for slowing vessel speeds an average of 0.5 to 1.0 knots in order to reduce fuel consumption.

- Include a route-by-route review, including the impact on the number of sailings.

Fuel Costs



Fuel Costs

- *Docking* – Slowing docked revolutions per minute (RPM)
 - ✓ Savings in 2008 \$ from slowing at dock RPM from 30 to 60 is \$27.4 million in the 2009-2030 time period.

Recommendation #8. Ferries should assess the feasibility of slowing at-dock RPMs from 60 to 30 in order to conserve fuel.

- *Design* – Design changes such as aluminum superstructures and longer length-to-beam ratio will increase fuel efficiency.

Recommendation #9. As part of the pre-design process for constructing 144-auto vessels in the 2021-2030 time period (four (4) vessels in the baseline fleet or six (6) in the recommended fleet), Ferries should provide the legislature with a cost-benefit analysis of an aluminum superstructure and other design modifications that might increase fuel efficiency.

Timing: When should new vessels be acquired between 2009 and 2030?

• Number of Vessels Acquired 2009-2030

- Ferries' baseline fleet – 12 new vessels
- Recommended fleet – 10 new vessels

• Timing – Consideration

- Existing vessel retirement schedule
- Restoration of Keystone service
- Vessel acquisition costs
 - ✓ decrease costs per vessel if more than 1 in a class built
- Fleet uniformity
 - ✓ more uniform fleet results in lower maintenance

Recommendation #10 – *Ferries' should acquire vessels in two waves:*

- ✓ 2009-12 – 4 new 64-auto (Island Home) vessels
- ✓ 2021-30 - 6 new 144-auto vessels

2030 Recommended Timing

	Ferries' Baseline 2030 Fleet	Recommended 2030 Fleet
2009-12	3 144-auto vessels – build	4 64-auto vessels - build
	2 64-auto vessels – build	
2021-30	4 144-auto vessels – design and build	6 – 144-auto vessels design and build
	2 87-auto vessels- design and build	
	1 34-auto vessel – design and build	
Total	12	10

Timing:

- **Phase down to 21 vessels**

- 22 vessels in recommended fleet 2011-2024
- Provide time to reduce planned out-of-service time

- **Vessel class acquisition**

- Recommend two class purchases
- Ferries baseline fleet - 5 class purchases
- Savings (national average)
 - ✓ 2nd vessel 82% of cost of first
 - ✓ 3rd vessel 77% of cost of first
 - ✓ 4th vessel 73% of cost of first
 - ✓ 5th & beyond vessels – 69% of cost of first

- **Fleet Uniformity**

- Recommended fleet more uniform than Ferries' baseline fleet
 - ✓ 5 classes of vessels rather than 7
 - ✓ All new vessels have same engines – reduces maintenance and staff training costs

Impact: What is the impact of these recommendations on Ferries long-range operating and capital plan and service?

Capital Budget – Program W (2008 \$) 2009-30

•Vessel Acquisition

- Acquiring 2 fewer vessels
- Reduces acquisition costs by \$298.9 million (from \$1,095.0 million to \$796.1 million)

•Vessel Cost Estimates

- Reviewed vessel cost estimates in Ferries' long-range planning
- Concur with all estimates except the new 144s - estimated cost for 144s (each of three)
 - ✓ Ferries - \$115.0 million in 2008 \$
 - ✓ Revised - \$134.9 million in 2008 \$
 - ✓ Allow \$4 million each for aluminum superstructure
- Reduces total acquisition savings to: \$133.0 million

Recommendation #11 – *Ferries should review the cost estimate of the 144-auto vessels as it finalizes its long-range plan.*

Capital Budget Impact

•Vessel Acquisition – National Competition

- Requirements to build in Washington for policy reasons and on assumption lead to better in-state maintenance
- Consultants estimate a 20 percent reduction in vessel construction cost if bid nationally
 - ✓ Potential cost reduction of \$166.6 million in 2008 \$ with recommended fleet
- Potential for federal funds if bid nationally

Recommendation #12 – *The legislature should consider opening vessel construction to national competition by determining the appropriate balance between Ferries' new vessel construction costs, the potential for federal funding, and the policy goals of the State.*

Capital Budget Impact

- **Vessel Preservation & Improvement**

- \$28.6 million less
- Results from phasing in of smaller 21-vessel fleet

- **Terminal Capital Program**

- Ferries' baseline fleet – Pt. Defiance terminal impact due to larger vessel
- Terminal capital costs to be reviewed in JTC capital cost study

Operating Budget (Program X) Impact (2008 \$) 2009-30

- **Fixed Operating Costs**

- Fixed operating costs are engine room crews, insurance, vessel maintenance
- \$15.4 million cost reduction
- Due to reduced number and size of vessels

- **Variable Operating Costs**

- Variable operating costs are deck labor and fuel
- \$73.6 million cost reduction
- Due to reduced number and size of vessels

- **Additional Variable Operating Costs**

- Fuel savings from slowing 1 knot and docking RPM reduction - \$159.4 million

Summary Cost Reductions (2008 \$) 2009-30

Route	\$ Saved 21-Vessel Fleet	\$ Other Potential Savings	Total
Capital Cost (Program W)			
Vessel Acquisition	-133.0	-166.6	-299.6
Vessel Preservation & Improvement	-28.6		-28.6
Sub-total Capital	-161.6	-166.6	-328.2
Operating Cost (Program X)			
Fixed Operating Costs	-15.4		-15.4
Variable Operating Costs	-73.6	-159.4	-233.0
Sub-total Operating	-89.0	-159.4	-248.4
Total	-250.6	-326.0	-576.6

Service Impact

•Delay in Service Capacity Increases

- 20 auto capacity increase delayed from 2009-2020 time period to 2021-2030
 - ✓ Bremerton
 - ✓ Clinton
- Could implement 20-auto capacity increase sooner on either the Bremerton or the Clinton route by switching with San Juans per consultants deployment recommendations

Service Improvement Approach

• Vessel Options to Improve Service

- Add sailings within existing service hours
 - ✓ Least cost – add fuel costs only
- Add service hours to existing vessels
 - ✓ Next least cost – add fuel & deck labor costs only
- Add vessel
 - ✓ Most expensive – capital costs + fuel & labor + fixed operating costs

Recommendation 13: Ferries should consider additional sailings and/or modification to service hours as ways to improve service before considering adding vessels to the fleet to improve service.