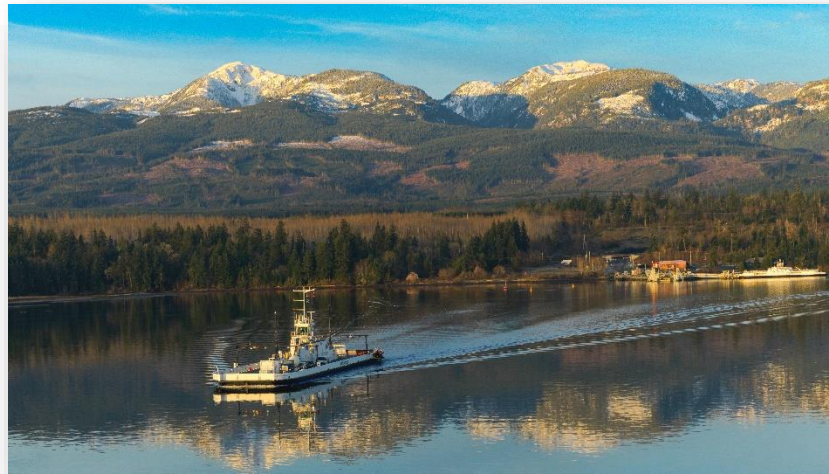

British Columbia Ferry Services Inc.

Baynes Sound Connector Review February 16, 2023



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Baynes Sound Connector Review

PURPOSE

This report summarizing BC Ferries' review of the *Baynes Sound Connector* ("BSC") capacity and propulsion upgrades is provided FOR INFORMATION.

BACKGROUND

The BSC is a cable ferry serving Route 21 between Vancouver Island (Buckley Bay) and Denman Island (Denman Island West). This is the sole cable ferry in BC Ferries' fleet and, since its introduction, it has presented unique technical challenges related to its design and systems. While it meets the requirements for service delivery, mechanical reliability remains a concern and the vessel is prone to service speed reductions (especially during summer), primarily due to extreme hull fouling.

Maintenance costs for this vessel have been significantly higher than anticipated in the business case and are driven by a number of factors. Since vessel introduction, several modifications have improved performance or reduced costs, including:

- Development of the drive tunnel roller system;
- Use of a hull cleaning robot;
- Redesign of the guide sheaves and sheave bearings; and
- Redesign of the bull wheel and seawater strainer modifications.

These efforts have reduced fuel usage, increased vessel performance or reduced restrictions on deck space.

While targeted technical modifications have achieved some improvements, costs remain above business case estimates. In addition, the following unresolved vessel issues are under investigation and there are solutions under development that are anticipated to improve vessel reliability and transit times, including:

- Overheating of the hydraulic motors;
- Bolt cracking on the bull-wheel (impacting utilization of the brake system); and
- Hull fouling.

BC Ferries' Performance Term 6 submission includes \$17.9M to address mechanical reliability concerns as well as expand the capacity of the BSC to support anticipated vehicle traffic growth on the route. The broad community continues to be unsupportive of the vessel and reactions to potential increased investment remain highly negative. Islanders, the Ferry Commissioner and the BC Ferry Authority have questioned vessel reliability and the proposed investments.

Prior to proceeding with planned investments, BC Ferries engaged a consultant to undertake a review of vessel operations to date and assess alternative options to accommodate future demand. This review considered service options to meet the long term forecast demand for Route 21 based on required capital expenditure and known and projected operating and maintenance costs. A 25-year financial analysis summarizes the anticipated capital and operating expenditures into a net present value ("NPV") figure that can be compared across the current plan and options. The review also conducted an analysis of the anticipated performance to assess expected relative improvements in service delivery.

DISCUSSION

The Performance Term 6 submission to support growing demand on Denman and Hornby Islands includes \$17.9M to expand and repower the BSC in 2026. The larger ship increases capacity at peak times; although during shuttling operations, this increase comes at that expense of frequency due to increased loading and

unloading time. The original business case for the cable ferry envisioned decommissioning the conventional ferry berths; however, the plan now anticipates keeping both conventional berths as well as the cable ferry berths to support operations and refits (four berths in total).

Base case deployment and seasonal service capacity analysis anticipated over the planning horizon is summarized below and a comparative table is provided for each option.

Base Case		F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	
Vessel Deployment	Denman Island	BSC	Expanded Baynes Sound Connector																						
	Buckey Bay (Peak Only)	KAH																							
Average Vehicle Capacity Available	Off Peak (Thanksgiving to mid-May)																								
	Shoulder (Labour Day to Thanksgiving / mid-May to late-June)																								
	Peak (late-June to Labour Day)																								
Average Vehicle Space Capacity Available		0 to 5%	5 to 15%	15 to 30%	30 to 50%	50 to 75%	>75%																		

Option Assessment

The review considered five alternatives that are technically practical and operationally feasible. Options that consider maintaining the BSC include the maintenance and replacement of the conventional berths on the route to support seasonal supplementary service and refit relief. Options that consider expanding the BSC include an investment to increase carrying capacity from 45 to 64 automobile equivalents and repowering.

All service options were analyzed using a range of annual growth projections from 0.41% to 2%; those presented in this report use 1% annual growth for all vehicle types.

Option 1: Defer Expansion until 2034

This alternative reduces the scope of investment in 2026 to \$5.4M to support repowering. Supplemental vessel service during the peak season would continue until 2034, at which time the BSC would be expanded at an estimated cost of \$15.9M. The supplemental vessel is expected to be required more frequently in the peak season beginning in 2030 and can transition from five to seven days per week operation. Remaining components are consistent with the base case.

Defer expansion until 2034		F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	
Vessel Deployment	Denman Island	BSC					Expanded Baynes Sound Connector																		
	Buckey Bay (Peak Only)	KAH (5days)					KAH (7days)																		
Average Vehicle Capacity Available	Off Peak (Thanksgiving to mid-May)																								
	Shoulder (Labour Day to Thanksgiving / mid-May to late-June)																								
	Peak (late-June to Labour Day)																								
Average Vehicle Space Capacity Available		0 to 5%	5 to 15%	15 to 30%	30 to 50%	50 to 75%	>75%																		

Option 2: Replace BSC with Conventional Ferry

This alternative avoids any further investment in the BSC and instead \$91.9M is allocated to replace the BSC with a newly-built conventional vessel and rebuild the terminal berths by 2028. A larger conventional vessel requires a larger number of highly qualified crew (three licensed - Master, Mate, Chief Engineer) with an incremental workforce of nine positions (three per watch). The BSC would be offered for sale (no material proceeds anticipated) and the remaining two berths would be decommissioned.

Replace BSC with Conventional Ferry		F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	
Vessel Deployment	Denman Island	BSC	NEW CONVENTIONAL VESSEL (~70 AEO)																						
	Buckey Bay (Peak Only)	KAH																							
Average Vehicle Capacity Available	Off Peak (Thanksgiving to mid-May)																								
	Shoulder (Labour Day to Thanksgiving / mid-May to late-June)																								
	Peak (late-June to Labour Day)																								
Average Vehicle Space Capacity Available		0 to 5%	5 to 15%	15 to 30%	30 to 50%	50 to 75%	>75%																		

Option 3: Supplement the BSC Indefinitely Rather Than Expand

This alternative reduces the scope of investment in 2026 to \$5.4M to support repowering of the BSC. Supplemental vessel service during the peak season would continue indefinitely, starting with the Kahloke (21 automobile capacity) and transitioning to an Island Class (47 automobile capacity) in 2035. Instead of expanding the BSC, an investment of \$65M is required to procure a dedicated Island Class vessel. This approach allows for the dedicated vessel to be available to support operations not only in the peak season but year-round, as required in the future.

Supplement the BSC Indefinitely Rather Than Expand			F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46						
3	Vessel Deployment	Denman Island	BSC																												
		Buckey Bay (Peak Only)	KAH (5days)							KAH (7days)							Incremental Island Class (7days peak)														
	Average Vehicle Capacity Available	Off Peak (Thanksgiving to mid-May)																													
		Shoulder (Labour Day to Thanksgiving / mid-May to late-June)																													
		Peak (late-June to Labour Day)																													
Average Vehicle Space Capacity Available			0 to 5%	5 to 15%	15 to 30%	30 to 50%	50 to 75%	>75%																							

Option 4: Supplement the BSC Indefinitely Rather Than Expand

This alternative is a very similar to Option 3, but relies upon an existing Island Class vessel to provide supplemental service post 2034. Because the Island Class vessel is required to provide maintenance relief across the fleet, it is only available to provide supplemental service on this route in the peak season.

Supplement the BSC Indefinitely Rather Than Expand			F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46						
4	Vessel Deployment	Denman Island	BSC																												
		Buckey Bay (Peak Only)	KAH (5days)							KAH (7days)							Relief Island Class (7days peak)														
	Average Vehicle Capacity Available	Off Peak (Thanksgiving to mid-May)																													
		Shoulder (Labour Day to Thanksgiving / mid-May to late-June)																													
		Peak (late-June to Labour Day)																													
Average Vehicle Space Capacity Available			0 to 5%	5 to 15%	15 to 30%	30 to 50%	50 to 75%	>75%																							

Option 5: Expand the BSC in 2034 and Supplement the BSC Indefinitely

This alternative reduces the scope of investment in 2026 to \$5.4M to support repowering of the BSC, with \$15.9M allocated in 2034 to expand the vessel. Supplemental vessel service during the peak season would continue indefinitely, starting with the Kahloke (21 automobile capacity) and transitioning to an Island Class (47 automobile capacity) in 2035. Similar to Option 4, because the supplemental vessel is required to provide maintenance relief across the fleet, it would be restricted to peak season use.

Defer Expansion Until 2034 and Supplement Indefinitely			F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46						
5	Vessel Deployment	Denman Island	BSC											Expanded Baynes Sound Connector																	
		Buckey Bay (Peak Only)	KAH (5days)							KAH (7days)							Relief Island Class (7days peak)														
	Average Vehicle Capacity Available	Off Peak (Thanksgiving to mid-May)																													
		Shoulder (Labour Day to Thanksgiving / mid-May to late-June)																													
		Peak (late-June to Labour Day)																													
Average Vehicle Space Capacity Available			0 to 5%	5 to 15%	15 to 30%	30 to 50%	50 to 75%	>75%																							

OPTION SUMMARY

The following table summarizes the base case plan and each of the five options, including the results of the 25-year net present value analysis of anticipated capital and operating expenses:

Option	Vessel Deployment	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	25-Year NPV
(Base Case)	Denman Is	BSC		Expanded Baynes Sound Connector																				(\$81 M)	
	Buckley Bay (Peak Season)	KAH																							
Option	Vessel Deployment	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	25-Year NPV
1	Denman Is	BSC										Expanded Baynes Sound Connector										(\$77 M)			
	Buckley Bay (Peak Season)	KAH (5days)					KAH (7days)																		
Option	Vessel Deployment	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	25-Year NPV
2	Denman Is	BSC			NEW CONVENTIONAL VESSEL (~70 AEQ)																				(\$149 M)
	Buckley Bay (Peak Season)	KAH																							
Option	Vessel Deployment	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	25-Year NPV
3	Denman Is	BSC																							(\$113 M)
	Buckley Bay (Peak Season)	KAH (5days)					KAH (7days)					Incremental Island Class (Potential Year-Round)													
Option	Vessel Deployment	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	25-Year NPV
4	Denman Is	BSC																							(\$73 M)
	Buckley Bay (Peak Season)	KAH (5days)					KAH (7days)					Relief Island Class													
Option	Vessel Deployment	F24	F25	F26	F27	F28	F29	F30	F31	F32	F33	F34	F35	F36	F37	F38	F39	F40	F41	F42	F43	F44	F45	F46	25-Year NPV
5	Denman Is	BSC										Expanded Baynes Sound Connector										(\$82 M)			
	Buckley Bay (Peak Season)	KAH (5days)					KAH (7days)					Relief Island Class													

RECOMMENDATION

BC Ferries is pursuing immediate maintenance and operational enhancements to the BSC and plans to introduce supplemental vessel service on Route 21 during the upcoming peak season.

The review recommends proceeding with Option 1, 4 or 5, all of which defer the major capital investment in the BSC for up to 10 years, or longer if demand does not warrant it. This approach provides an opportunity to assess the outcomes of the operational enhancements and inform the feasibility and suitability of using supplemental vessel service on a longer term basis.

If traffic demand or operational needs dictate the need for expanded capacity beyond what can be accommodated with this service strategy, it can be achieved by accelerating the timing of the expansion of the BSC or through the deployment of a larger supplemental vessel.