MULTI-DAY FISHING VESSEL

Fuel Analysis of Bulbous Bows

On a typical Sri Lankan multi-day vessel

	Trip 1	Trip 2	Trip 3	Trip 4
	without bulbous bow	without bulbous bow	with bulbous bow	with bulbous bow
Departure from Wellamankaraya harbour	1/10/2023	5/12/2023	17/02/2024	
Arrival at fishing grounds	1/10/2023	16/12/2023	29/02/2024	
Wellamankaraya to fishing grounds (nm)	734	854	1392	
Fishing grounds to Wellamankaraya (nm)	843	972	1333	
Total distance	1578	1666	2752	
Fishing period	13/10/2023-05/11/2024	16/12/2023-17/01/2024	29/02/2024-25/03/2024	
Total fishing day		31	24	
Hours spent fishing		744	576	
Non-operational hours	23	116	72	
Total hours of engine use	529	628	504	
Average speed during fishing days	3.351	3	3	
Total distance while fishing	1754	1884	1512	

Total distance	3332	3550	4264	
Fuel consumption	8400	8750	9300	
Average litres/ nm	2.52	2.46	2.18	

Workings

Without Bulbous Bow

Trip#2 started on 05th December 2023

Departed Wellamankaraya harbour to the fishing grounds = 854 mn
Fishing grounds to the Wellamankaraya harbour – 972 nm
Total distance travelled = 1666 nm

Date of arrival at fishing grounds – 16.12.2023 (according to the VMS Data)
Fishing period – 16.12.2023 to 17.01.2024
Number of fishing days – 31
Total hours fishing – 31x24 = 744 hrs
Non-operational hours – 116
Total hours of engine use – 628
Average speed during the fishing days - 3 knots

Total distance covered while fishing – 628 x 3 = 1884 nautical miles

Total trip distance = 1884+1666 = 3550 nautical miles
Fuel consumption = litres 8750
Average litres / nm = 2.46 litres

Trip#1 started on 1st October, 23

From Wellamankaraya harbor to the fishing grounds = 734 mn
Fishing grounds to the Wellamankaraya harbor – 843 nm
Total distance traveled = 1578 nm

Date reach fishing grounds – 01.10.2023 (according to the VMS Data)
Fishing period – 13.10.2023 to 05.11.2024

With Bulbous bow

Trip#3 started on 17th February 2024

Departed Wellamankaraya harbour to the fishing grounds = 1392 mn
Fishing grounds to the Wellamankaraya harbour – 1333 nm
Total distance travelled = 2752 nm

Date of arrival at fishing grounds – 29.02.2024 (according to the VMS Data)
Fishing period – 29.02.2024 to 25.03.2024
Number of fishing days – 24
Total hours fishing – 24x24 = 576 hrs
Non-operational hours – 72
Total hours used the engine – 504

Average speed during the fishing days – 3 knots

Total distance covered while fishing – 504 x 3 = 1512 nautical miles

Total trip distance = 1512+2752 = 4264 nautical miles
Fuel consumption = litres 9300
Average litres / nm = 2.18

Number of fishing days – 23
Total hours fishing – 23x24 = 552 hrs
Non-ops hours – 23
Total hours used the engine – 529

Average speed during the fishing days - 3.315 kn

Total Distance travelled while fishing – 529 x 3.315 = 1754 nm

Total distance for whole trip = 1754+1578 = 3332 nm
Fuel consumption = litres 8400
Average litres / nm = 2.52 litres

Conclusion and Notes:

1. Fuel savings with bulbous bow compared against Trip#1(litres / nm) – 2.52 -2.18 = 0.34 litres per nautical mile
   As a Percentage saving = **13.49% Saving**
2. Fuel savings with bulbous bow compared against Trip#2 (litres / nm) – 2.46 -2.18 = 0.28 litres per nautical mile
   As a Percentage saving = **11.38% Saving**
3. Considering only travel to and from the fishing grounds, excluding the distances while fishing **would** further improve the percentage saving.
4. Optimum performance of the bulbous bow is between 6.5 to 7.5 knots.
5. Fuel savings can be made on the legs to and from the fishing grounds.
6. Cost savings are as follows. Average saving per Nm 0.34l+0.28l=0.62/2=**0.31L/Nm**. Average trip distances 3332+3550+4264=11,146/3=**3715.3Nm**. Hence fuel saving per typical fishing trip is 3715.3 x 0.31=**1151.7Litres** @USD1.11/liter(SLR333) = **1278.4 USD per trip**
7. Multiday fishing vessels make 4 to 5 trips per year, equating toa saving of 5000 to 6000 USD per year.
8. Investment for a bulbous bow using the existing moulds as follows:

Item/Activity	Cost USD	Details
Bulbous bow construction & fitting	5,000:00	Materials, labour and consumables
Slipping the vessel + up-to waterline surface prep	1,000:00	Lifting, lowering and antifouling
Total	6,000:00	

Investment for design of bulbous bow, construction of plug and moulds. (for a series of sister vessels)

Activity	Cost USD	Details
Design /lines verification	2,000:00	
Model development testing and BB design	45,000:00	
Construction of Plug and a mould set	7,000:00	
Miscl /contingencies	1,000:00	
Total	55,000:00	

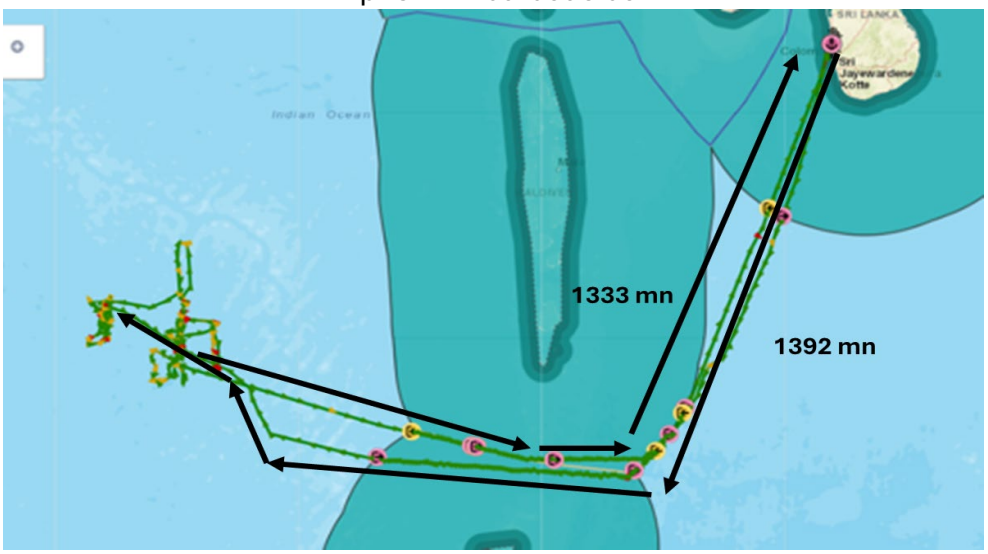
This cost amortised over10 boats is 5,500: per boat and 2750:00 over20 boats.

Recovery over 2 to 3years just from the fuel savings.

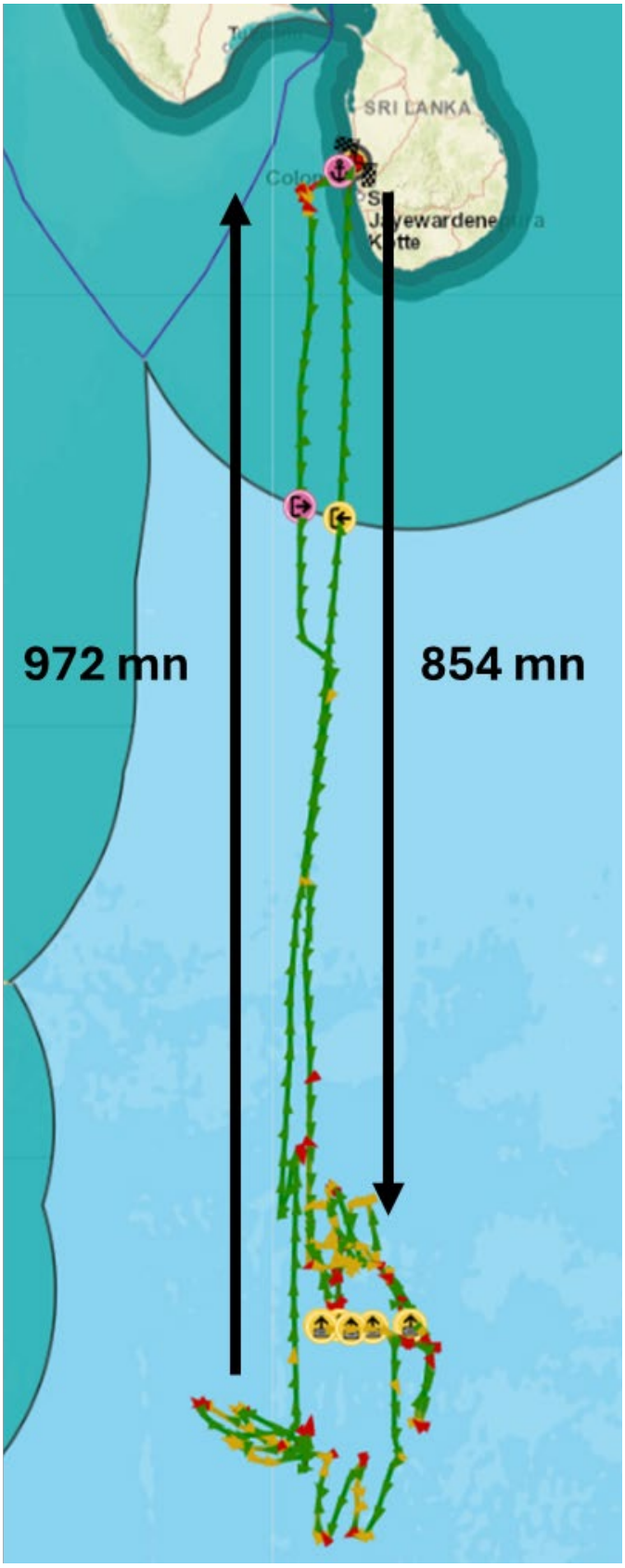
Vastly improved seakeeping, stability and crew comfort are further incentives for implementing change.

Attachments

Trip#3 with bulbous bow



Trip#2 without bulbous bow


SRI LANKA
Jayewardene
Kotte
972 mn
854 mn

Trip#1 Without bulbous bow