

# Accident Report

Loss of Control of Vessel

*Milford Sovereign*

30 September 2005 & 20 November 2005

Class B



## SUMMARY

While on a routine scenic cruise in Milford Sound, on 30 September 2005, Real Journeys vessel **Milford Sovereign** was struck by a very strong gust of wind reaching 65 knots on the starboard quarter of the vessel. **Milford Sovereign** heeled to port and the Skipper lost control of the vessel as it was blown down the Sound "Not Under Command". Despite the Skipper's best efforts it was 3-4 minutes before he managed to regain control of the vessel. **Milford Sovereign** then returned safely to her berth at Freshwater Basin.

This incident caused some concern from the skippers employed by Real Journeys regarding the directional stability of the vessel. After the second similar incident on 20 November 2005, Real Journeys took a number of steps to address the issues raised. As an initial first step, ballast was added to the vessel and a Naval Architect was commissioned to undertake a review of the directional performance of the vessel.



*Milford Sovereign*

REPORT NO's.: 05 3872 & 05 3899

## *MILFORD SOVEREIGN* – Loss of Control of Vessel

### Details of Vessel, Owner & Management, Classification, Navigational Equipment, Manning & Crew:

<b>Name of Vessel:</b>	<i>Milford Sovereign</i>
<b>Vessel Type:</b>	Enclosed water limits passenger vessel – 400 passengers
<b>Port of Registry:</b>	Invercargill
<b>Flag:</b>	New Zealand
<b>Maritime New Zealand No:</b>	130848
<b>Built:</b>	2003
<b>Construction Material:</b>	Steel
<b>Length Overall (m):</b>	40
<b>Maximum Breadth (m):</b>	8.6
<b>Gross Tonnage:</b>	483
<b>Net Tonnage:</b>	177
<b>Power (kW)</b>	746
<b>Draft (max)m:</b>	1.8
<b>Safe Ship Management (SSM) Company:</b>	Fiordland Travel Limited
<b>Accident Investigator:</b>	Zoe Brangwin

## Owner Details

*Milford Sovereign* is owned by Fiordland Travel Limited and operated by Real Journeys. They own and operate a fleet of eighteen vessels ranging in length from 16 to 40 metres.

## SSM Certificate

*Milford Sovereign* holds a valid Safe Ship Management Certificate issued by Fiordland Travel Ltd. The Certificate was issued on 21 January 2005 and expires on 27 September 2007.

## Skipper Details

The Skipper (during both incidents) holds a Mate Deep Sea Fishing Vessel (MDSFV) Certificate obtained in 1978. He has over 30 years experience in the maritime industry. He has been employed by Real Journeys as a Skipper for 10 years and has been the Skipper of **Milford Sovereign** since it was built in 2003. The Skipper is experienced with Milford conditions and has spent the majority of his time with Real Journeys working on their larger vessels.

## Navigational Equipment

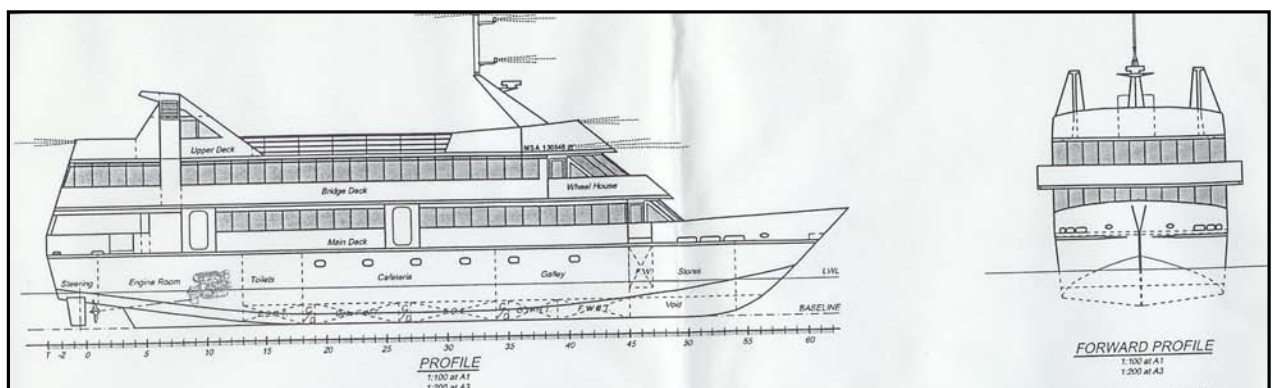
**Milford Sovereign** was equipped with a magnetic compass, radar, depth sounder, GPS/Satellite navigation and an electronic chart plotter.

## Vessel Characteristics

**Milford Sovereign** is one of three sister vessels built in Invercargill for Fiordland Travel Limited. She was the last vessel to be built.

**Milford Haven** was the first vessel of this type to be built and **Milford Monarch** was the second vessel built. **Milford Sovereign** and **Milford Monarch** are sister vessels.

Unlike **Milford Sovereign**, **Milford Monarch** was built with a 100mm keel bar.



**Figure 1**  
Profile plan of **Milford Sovereign**

# FIRST INCIDENT – 30 SEPTEMBER 2005

At about 0800 hours, New Zealand Standard Time (NZST), on 30 September 2005, the Skipper of the restricted passenger vessel **Milford Sovereign** boarded the vessel, which was berthed at Freshwater Basin, Milford.

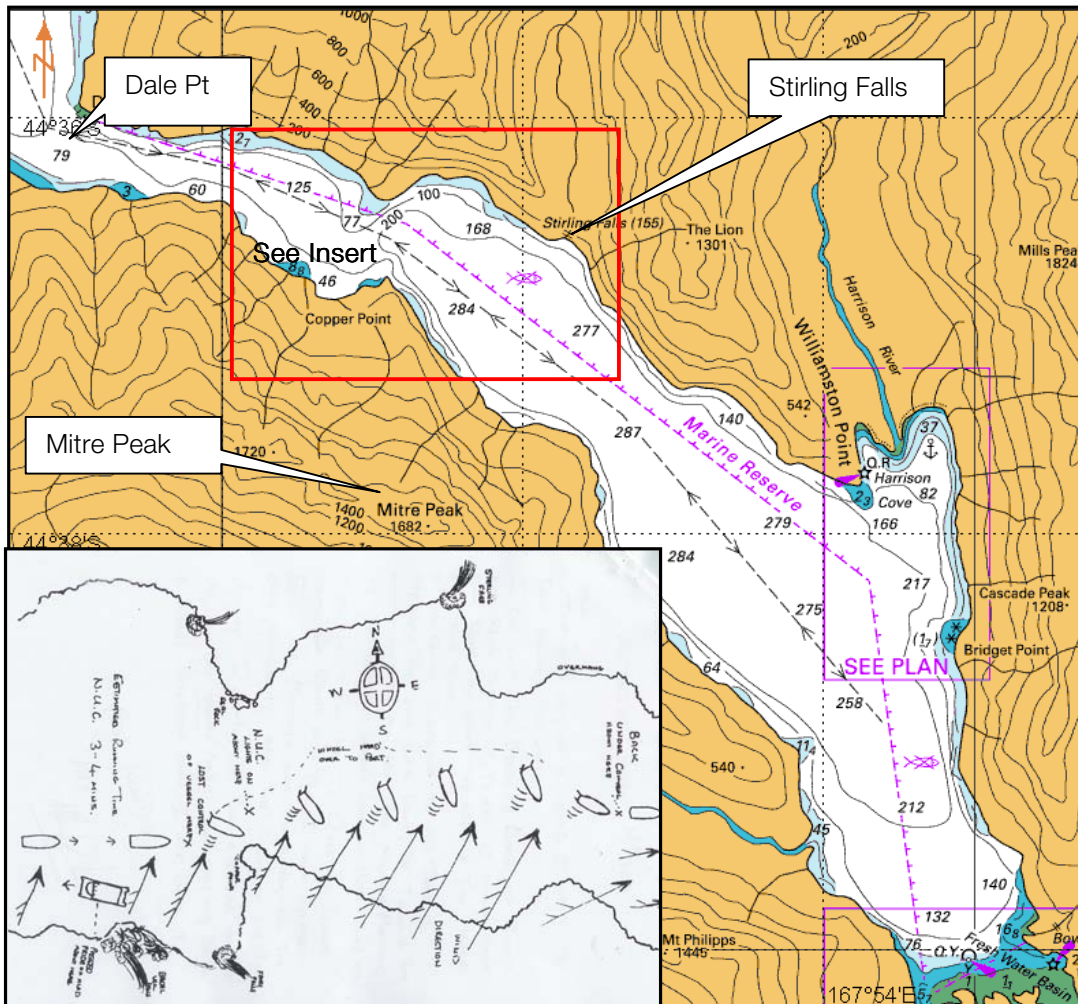
The weather forecast for the day was for northwest winds 35-40 knots.

At 1100 hours, **Milford Sovereign** sailed with 130 passengers onboard. There was no wind in the harbour at this time.

At about 1130 hours, the wind came up from the northwest reaching 30-40 knots. This was not unusual for Milford Sound and had no effect on the handling of the vessel. The Skipper continued the cruise, sailing past Dale Point, before returning to the Sound (Figure 2).

When in the Sound, the wind continued to freshen reaching 50 knots and at times gusting 60 knots.

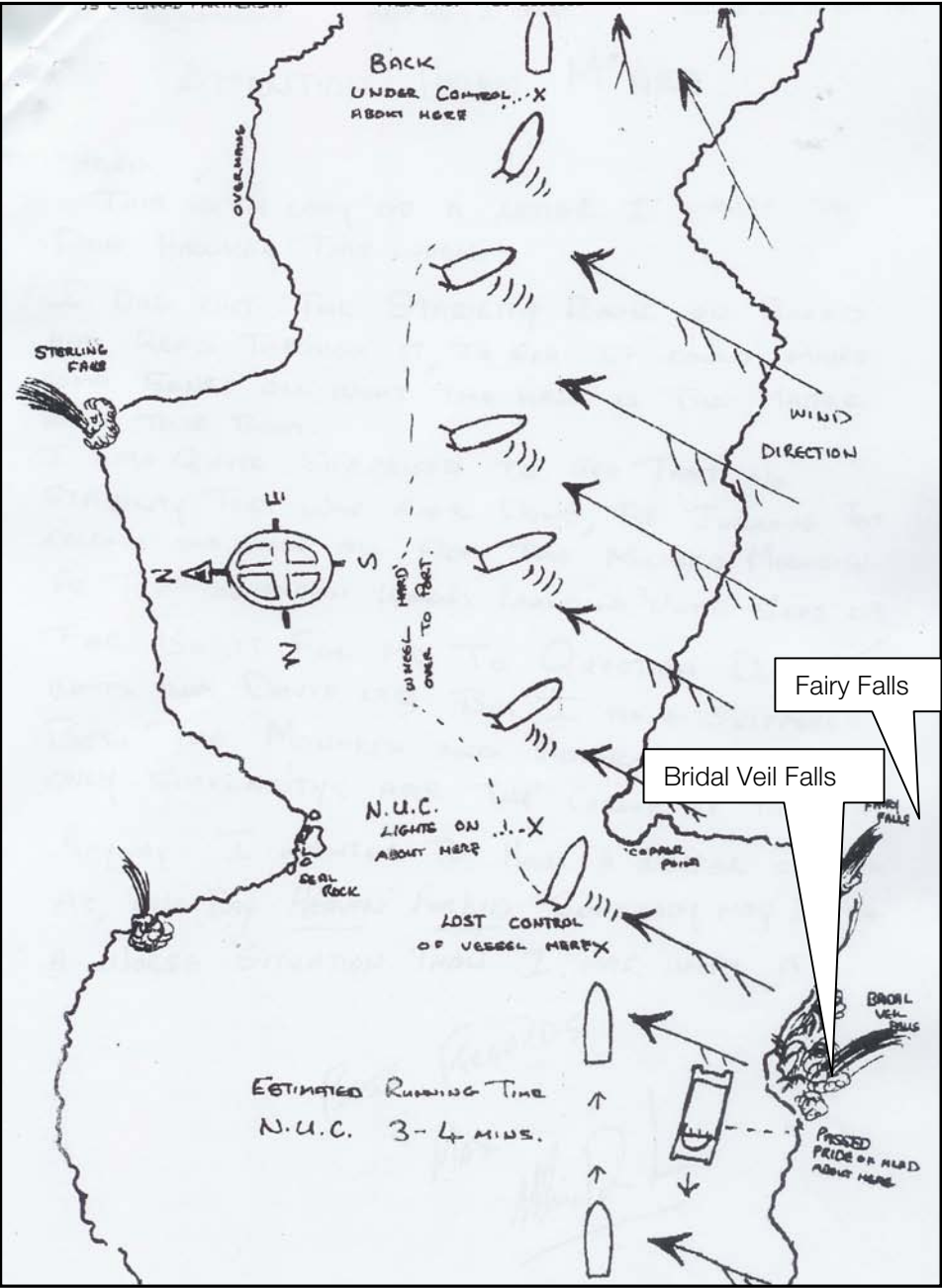
As the wind was “gusty” the Skipper found that the strongest winds were bouncing off the southern side of the Sound (Peak) and blowing across to Stirling Falls (See Figure 2). Because of this the Skipper favoured the southern side of the fiord as he headed back to Freshwater Basin.



**Figure 2**  
Milford Sound – Chart extract from Land Information New Zealand (LINZ) Chart 7622  
Insert – Diagram drawn by the Skipper of **Milford Sovereign** at the time of the incident.  
*The diagram does not necessarily accurately reflect the actual times and distances as portrayed above.*

While off Bridal Veil falls *Milford Sovereign* passed *Pride of Milford* which was heading for the entrance to Milfrd Sound (See Figure 3). *Milford Sovereign* was travelling at about 11.5 knots at this time.

As the vessel passed abeam Fairy Falls *Milford Sovereign* was struck on the starboard quarter by a large gust of wind measuring 65 knots on the vessel's anemometer. The vessel heeled over approximately 18-20 degrees to port. When this happened the Skipper found that he had no control over the vessel. The Skipper had the helm hard over to port and the propulsion at full ahead equating to a speed of about 11½ knots. Notwithstanding this action, the vessel did not respond and continued to drive down the Sound under the influence of the wind (See Figure 3).



**Figure 3**  
Diagram of the incident drawn by the Skipper of *Milford Sovereign* at the time of the incident.

The diagram does not necessarily accurately reflect the actual times and distances as portrayed above.

**Milford Sovereign** was “Not Under Command” (NUC - unable to manoeuvre due to exceptional circumstances) for about 3-4 minutes as it ‘skidded across’ the water heeling to port and slowly turning to starboard. The Skipper exhibited the NUC lights to indicate to other vessels that he had no control of the vessel and could not manoeuvre in accordance with the Maritime Rule for preventing collision.

Three to four minutes after the wind gust struck the vessel, it eased off and the Skipper was able to regain control. He headed straight back to Freshwater Basin where the vessel berthed and the passengers disembarked safely.

**Milford Sovereign** was ‘blown’ a total distance of about 7-8 cables (0.7-0.8 nautical mile or about 1300 to 1500 metres) down the Sound.

## SECOND INCIDENT – 20 NOVEMBER 2005

At about 0900 hours, New Zealand Standard Time (NZST), on 20 November 2005, **Milford Sovereign** departed her berth at Freshwater Basin, Milford. During the first trip of the day the weather was calm in the harbour but there was a northerly wind of 20-30 knots after the vessel passed Copper Point (See *Figure 4*).

The weather forecast was northerly winds 25-35 knots tending northwest 20 knots in the afternoon.

On the second trip, which departed at 1100 hours, the weather was much the same, being calm in the harbour and northerly winds at 20-30 knots toward the seaward end of the Sound. During the trip the rain started to set in.

At 1300 hours, **Milford Sovereign** departed for the afternoon cruise. When they reached Cooper Point the wind increased to 45-55 knots from the north. As the vessel proceeded past Copper Point towards the heads at Dale Point, they were struck by a gust of 70 knots on the forward port side. The vessel heeled over to starboard and the bow swung to starboard, allowing the wind to strike the port side of the vessel (See *Insert on Figure 4*).

At the above time, **Milford Wanderer** was entering the Sound from seaward and was directly opposite **Milford Sovereign** on the northern side of the fiord (See *Figures 4 & 5*). The Skipper of **Milford Sovereign** was concerned that his vessel would be blown into the path of the **Milford Wanderer**, but was able to regain control of the vessel before this occurred. The Skipper then headed down the Sound towards Freshwater Basin.



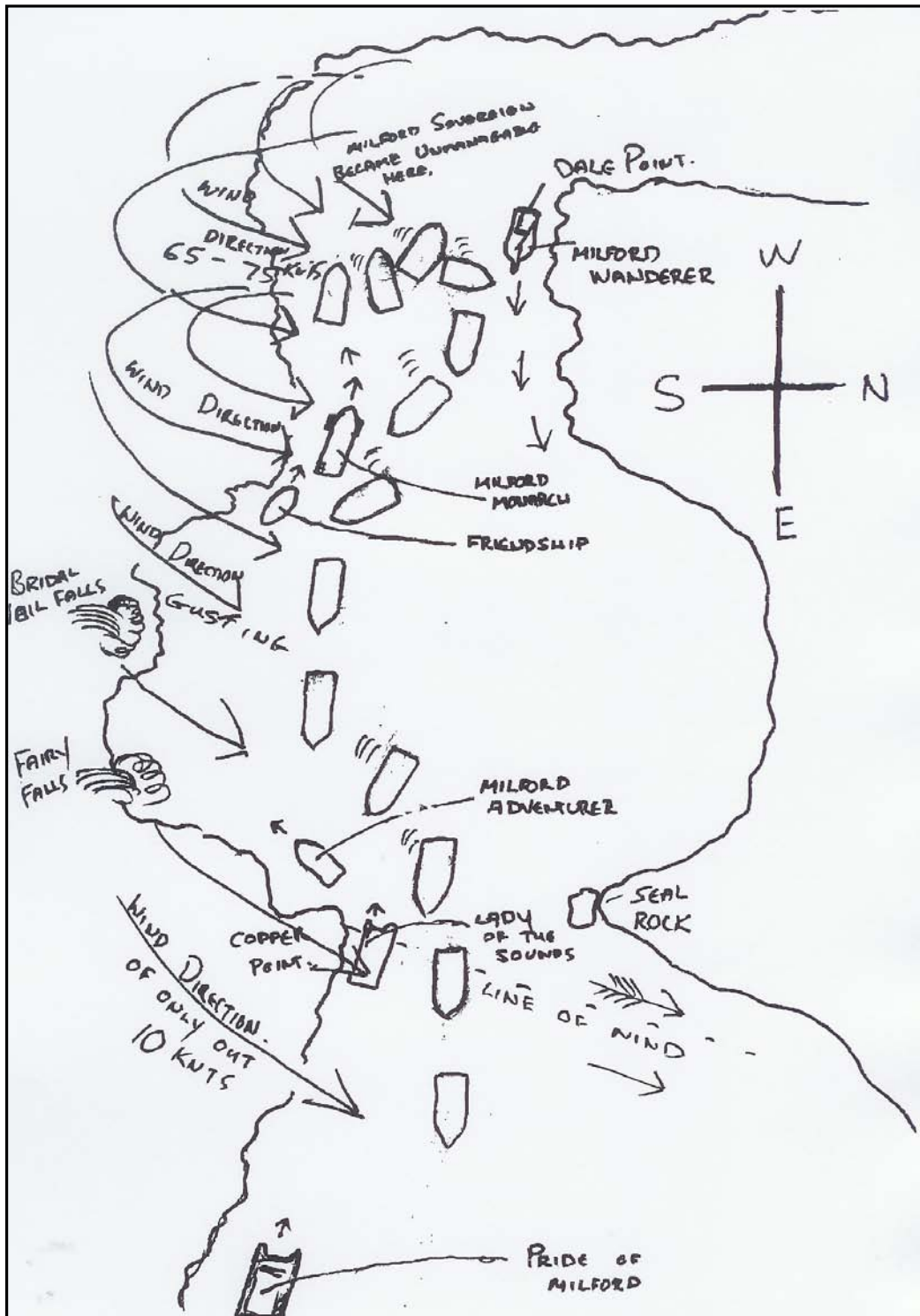


Figure 5  
 Diagram drawn by the Skipper of *Milford Sovereign* at the time of the incident.  
 The diagram does not necessarily accurately reflect the actual times and distances as portrayed above.

# FINDINGS

## Environmental Conditions

The Marine weather forecast issued by *Meteorological Service of New Zealand* (MetService) for the morning of 30 September 2005 was as follows:

*“Marine weather bulletin for New Zealand coastal waters  
Forecast issued by meteorological service of New Zealand at 0431hrs 30-Sep-2005 valid until  
midnight tonight 30-Sep-2005 South Island:*

*MILFORD*

*\*STORM WARNING IN FORCE\**

*Northeast 35 knots rising to 50 knots this morning. A change to northwest 40 knots about  
midday. Sea becoming high for a time. Southwest swell easing to 1 metre. Northwest swell 4  
metres developing. Poor visibility in rain developing this morning.*

*Outlook following 3 days: Becoming mid-Saturday southwest 20 to 30 knots*

*Amend/updated marine weather bulletin for NZ coastal waters issued approx 0916hrs, valid  
until midnight tonight 30-Sep-2005 South Island:*

*MILFORD*

*\*STORM WARNING IN FORCE\**

*Northeast 50 knots becoming northwest 40 knots early afternoon. High sea easing. Southwest  
swell easing to 1 metre. Northwest swell rising to 4 metres. Poor visibility in rain.*

*Outlook following 3 days: Becoming mid-Saturday southwest 20 to 30. “*

MetService record weather observations at Milford. The instruments are situated at the Milford Sound Airstrip.

### 30 September 2005

Observations taken at Milford Airstrip:

Time	Wind Direction	Wind Speed (kts)	Max gust over previous hour
0800	NW	12.2	30
0900	NNW	13	25
1000	NW	7.4	No data
1100	NNW	13	25
1200	N	31.5	38
1300	N	20.4	29

The observations for Milford on 30 September 2005 recorded the maximum sustained wind gust between 1100 and 1200 in the inner Milford Sound as 38 knots.

Visibility was average. It was raining intermittently at the time of the accident.

## 20 November 2005

Time	Wind Direction	Wind Speed (kts)	Max gust over previous hour
1000	SW	7.4	No data
1100	NNW	5.6	No data
1200	ESE	7.4	No data
1300	SE	14.8	No data
1400	SE	16.7	No data
1500	SE	16.7	No data

## Real Journey's Internal Investigation

Real Journeys internal investigation into this incident found the following:

*"There were several factors relating to this incident that meant the difficulty in handling experienced by the Skipper were almost to be expected.*

*The factors in that decision were:*

- The weather forecast had a storm warning in force - although it wasn't blowing hard when he (the Skipper) sailed, increasing wind was forecast. Trouble started when he experienced a gust of 65 knots.*
- The vessels are by necessity, shallow draft and hard chined. Because they need to manoeuvre positively in the very confined space of Fresh Water Basin, the engines (and therefore propellers) are spaced as widely as possible to create the maximum lever arm for twin screw turning ie one ahead, one astern.*
- The diameter and pitch of the props are also substantial to create positive slow speed handling.*
- The compromise is that when the vessel is struck on the beam by a strong wind gust, it tends to heel and in doing so lifts the windward propeller closer to the surface which makes it less effective if trying to go ahead on that engine.*
- The Skipper did not attempt to bring the vessel under control other than by going ahead with both engines with the helm hard over in an attempt to drive the vessel downwind. At the same time the wind was probably trying to make the vessel round up, the opposing actions may have created, in effect, a wind stall. "*

## Second Incident

The second reported wind related incident on 20 November 2005 gave raise to renewed discussions on the topic of stability and handling of **Milford Sovereign**.

It was highlighted during a meeting with the skippers of the vessel after this incident that the handling characteristics of the **Sovereign** are quite different to the **Monarch** although they are apparent sister ships. The stability of **Milford Sovereign** was questioned by the Skippers as an inclining test was not carried out at build due to the sister ship relationship with the **Milford Monarch**, relying instead on the **Monarch's** stability calculations.

A meeting was held with the Naval Architect, the SGS M&I Surveyor who issued the Fit For Purpose Certificate, the Company Engineer (who supervised the build), the Area Manager who organises the sailing schedules, Chief Executive Officer (CEO), four regular skippers who operate the vessel and the Safe Ship Management Manager.

## Parameters/Guidelines for Operation

The Real Journeys parameters/guidelines for their operation of the vessel - section 3.5.5 (a) of the Safety Management Manual states that:

*"The Master has full and complete authority to take such actions as the Master solely considers necessary in order to ensure the safety of life at sea and protection of the marine environment"*

During communication with Real Journeys the Safe Ship System Manager stated,

*"The decision to sail rests with the Master and shore based management have not, and will not, put pressure on a master to sail in conditions he considers adverse. As a company we have left the discretionary decision to the masters, as they have differing skill levels and operate in an environment where the local weather is extremely fickle - ranging from 35 knot forecasts that does not eventuate or make their way into the fiords to severe gusts in excess of 70 knots off the rock wall where wind of only half that velocity is being experienced elsewhere. The only person who can accurately judge / see what is happening is the skipper on the helm, on the spot. We have traditionally relied on our skippers experience and ability to make informed decisions."*

## Outcome of the Real Journeys Meeting

Following the meeting after the second incident, Real Journeys concluded:

- They would trial introducing additional ballast and positive trim into the vessel to determine whether this improves handling. This will be based on calculations undertaken by the ship's Architect.
- If the response from the additional ballast is not satisfactory they will fit a bar keel to the vessel.
- The Naval Architect will calculate what impact an additional 200 revolutions would have on the vessel with the existing shaft/ propeller ratio.

## Interim Operating Limits

After the second incident the management of Real Journeys placed an interim operating limit on the vessel.

Real Journeys management have stated that:

*"Trying to operate on the Marine Forecast for the 'sea area Milford' is very difficult because the conditions on the coast are often less severe than they are in the fiord and we are therefore going to put an interim operational parameter of 45 knots on the vessel. If the skipper experiences wind in excess of this he is to abort the trip and return to the wharf. This will not take away the Skippers discretionary decision making, it simply puts an interim upper limit on the conditions he can operate in, until we can hold the planned meeting and take any action found to improve the vessel handling. "*

*“Forty-five knots has been chosen for the parameter as a forecast wind speed can give expected gusts of 50% more than forecast, so stopping a trip at 45 knots should minimise the risk of getting caught in 65 - 70 knots.”*

After the additional ballast was added to the vessel, the upper wind speed limit for operating the **Milford Sovereign** was been removed in order to enable better evaluation of the vessel’s handling.

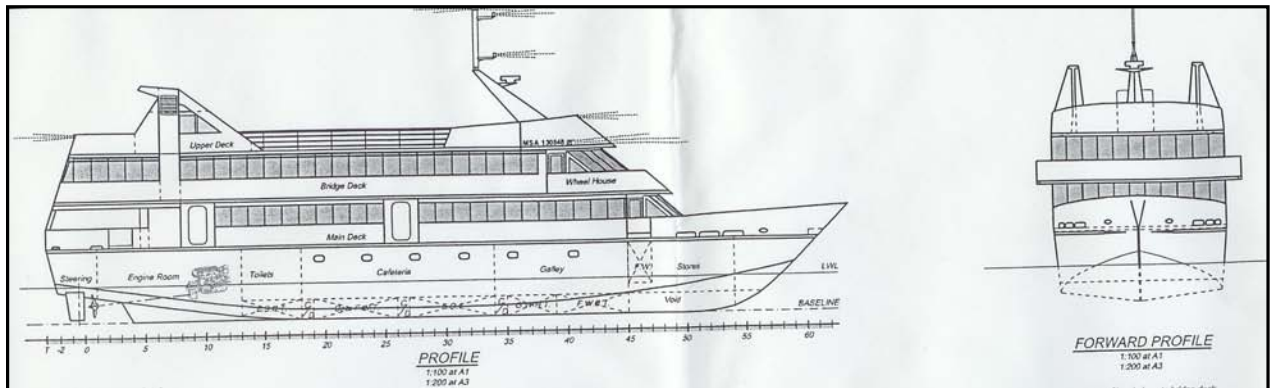


Figure 1

## Naval Architect’s Report

A Naval Architect was commissioned to carry out an investigation and report into the directional control aspects of **Milford Sovereign** and **Milford Mariner**.

Real Journeys carried out a subsequent investigation and instructed Duffill Watts and King Limited (DWK) to comment on the report received from the above Naval Architect. They then commissioned a joint report, which was prepared by the Real Journeys Company Engineer and the designers DWK, it was then endorsed by the Senior Launchmaster following observations, trials and subsequent analysis. The following pertinent extracts from the report are set out below:

The following trials were conducted:

### Steering

*“In steady wind conditions it was possible to leave the helm “hands off” for several minutes and the vessel held a straight course. When clearing the headlands which briefly exposed the forepart of the vessel to higher wind speeds, the heading was changed by up to 5 degrees by gusts in excess of 30 knots. When the gusts eased and when the full length of the vessel was in the wind corridor, the heading remained steady. This test very clearly demonstrates that the vessel was directionally stable.”*

### Turning Trails

1. *“The entry and exit points of the 180 degrees turning trials were located by GPS and show that the radius of the turn at full speed with full helm is 50 metres. The 180 degree turns were completed in an average of 44 seconds. This is very satisfactory for a 40 metre 320 tonne displacement vessel at full speed.*
2. *In each of the tests, the Skipper steered the vessel out of the turn and onto the reciprocal course without and difficulty or oversteer.”*

*“These tests positively demonstrate that the vessel has excellent steering capability and adequate rudder area. They also prove that the hull design is conducive to high manoeuvrability and there are no potential problems with direction stability and control.”*

## *Drift Test*

*“A drift test was conducted by taking power off the vessel and allowing it to drift freely from an initial position where it was stationary, head to wind. The wind speed varied between 17 and 24 knots.”*

*“This test supports the findings of a previous drift test carried out on 28 February 2006 and indicates that the vessel’s behaviour is consistent with that expected for this purpose designed vessel with relatively low draft and high windage.”*

## *Further Observations*

*“At the conclusion of the trial, the Launchmaster simulated the specific manoeuvres which are the source of the concerns regarding the difference in handling of the Monarch and Sovereign. There are two features and these are closely related:*

- 1. “The ship, when rotated within its own length, tends to continue rotating when power is reduced and not to come to rest as quickly as would be expected.”*
- 2. “The ship at slow speeds, five knots or below, with the wind on the beam or on the forward quarter, tends to drop the bow more than other ships in the fleet.”*

*This characteristic demands a higher level of care by the Skipper when berthing.”*

## *Computer Analysis*

*“To obtain accurate parameters for the vessels hydrostatics in the pre ballast condition the static drafts were carefully measure in still water with the fuel and freshwater tanks topped up. This information was loaded into the computer programme Hyrdomax (stability software) along with the 3D as-designed hull to allow accurate analysis of Sovereign’s current hydrostatic status.”*

*“The computer analysis clearly shows that increasing the trim, ie: increasing the aft draft and lessening the forward draft, results in only minor increase in drag and minor reduction in the predicted hull speed.*

*In other words, drag and hull speed are relatively insensitive to changes in trim.*

*However, the computer analysis shows that drag is sensitive to displacement meaning that draft and as a consequence, fuel consumption, increase significantly as displacement is increased.”*

## *Indicated Action*

*“The above findings indicate that the preferred action to be taken to reduce the fuel consumption from its present level is to reduce the displacement. This can be done by removing some or all of the fixed ballast.*

*The fixed ballast was installed for the purpose of increasing the immersed lateral plane and thus reduce the tendency for the vessel to side-slip.*

*It is noted that since the fixed ballast was installed there have been no reports of difficulties in the handling of Milford Sovereign in severe wind conditions. It is not possible therefore to be conclusive in any assessment of the effect of the ballast under these conditions.*

*However the Senior launchmaster has confirmed that except for berthing as described above, there were no difficulties in handling Sovereign in winds up to 80 knots in the pre ballast condition.*

*Removing the ballast is therefore acceptable if, when extreme winds are likely, the vessel is operated by skippers experienced in handling conditions beyond those normally encountered.*

*Removing the ballast and restoring the vessel to its previous condition will mean that an alternate to increase the lateral resistance will be required. The only practical alternative is the fitting of a vertical bar to the underside of the flat keel plate so as to act as a fin giving a similar lateral plane to the Monarch.*

*The fitting of the fin will slightly reduce the overall manoeuvrability but as referred to earlier in this report, the turning trials have shown that the vessel is highly manoeuvrable and a minor reduction in this capability is acceptable.*

## *Recommendation*

*It is our recommendation that a vertical fin bar be fixed to the flat keel bar on Milford Sovereign. This bar to be the same depth as the structural keel bar on Milford Monarch but being non structural should be of a minimum thickness and attached with sufficient welding for its purpose as a "spoiler" to break up the lateral flow of water under the hull. This will achieve as near as practicable, low speed handling characteristics similar to those of Milford Monarch.*

*It is a further recommendation that the fixed ballast be removed completely."*

## Initial Action Taken

Real Journeys removed 3 tonnes of ballast from the bow of **Milford Sovereign** to lift the bow a small degree. They now have 7 tonnes of ballast forward and 12 tonnes of ballast aft.

## Subsequent Action Taken

**Milford Sovereign** has been removed from every day service and is used as a back up to **Milford Monarch**.

The additional ballast was removed from the vessel.

The vessel has been fitted with a keel bar and inclining tests have been carried out.

The vessel will return to Milford once the sea trials have been successfully carried out.

# SAFETY RECOMMENDATIONS

1. Maritime New Zealand endorses the recommendations outlined in the summary of the Real Journeys report. In line with this report it is recommended that Real Journeys:
  - a. Continue with the fitting of a keel bar to **Milford Sovereign**. *This Recommendation has been implemented.*