

Heavy pack ice traps polar ships

Ship operations in Antarctica last season were seriously affected by the heaviest concentration of pack ice around the continent for at least 20 years. Southern Quest sank while attempting to reach Cape Evans in support of the Footsteps of Scott Expedition, and two, the British Antarctic Survey's Royal Research Ship John Biscoe and the Australian National Antarctic Research Expedition's chartered resupply ship Nella Dan, had to call for help from ice-breaking ships of other nations.

Major changes in the Australian Research programme had to be made as a result of the besetment of the Danish ice-strengthened Nella Dan, which was trapped for 52 days on her first voyage of the season. Some of the marine research projects planned could not be completed, a survey of fish resources around sub-Antarctic Heard Island was not possible, plans for a survey of the Tottan Glacier near Casey Station were deferred, and HMAS Stalwart, the 10,965-tonne destroyer tender and flagship of the Royal Australian Navy, had to be chartered at a cost of \$A270,000 to resupply sub-Antarctic Macquarie Station.

When the Nella Dan sailed from Hobart on September 16 on a two-month's marine research cruise to Heard Island and the continental ice edge off the coast of Enderby Land, the pack ice was at its winter maximum, extending more than 500 nautical miles north from the coast of Antarctica. The voyage was the earliest an Antarctic Division chartered ship had ever ventured into the icebound Southern Ocean.

Fifty-one scientists and technicians, including three New Zealanders, Jeni Bassett and Paul Ensor, of Christchurch, and Dr Lynn Williams, of Sydney, were aboard Nella Dan. The three main objectives of the expedition, led by Dr Knowles Kerry, were to study the breeding habits of the

Crabeater seal and the winter habitat of krill, survey bottom living fish in the 200nm exclusive economic zone around Heard Island, and conduct a census of the island's elephant seal population.

Between October 1 and 14 Nella Dan placed field parties on Heard Island at Atlas Cove and Spit Point. On October 8 she entered the pack ice to begin seal research. At first she worked in the pack north of Mawson Station but as few seals were found she searched further to the south and west.

PROBLEMS BEGIN

Nella Dan's problems began when she was north of Amundsen Bay off Cape Ann in the Enderby Land region 520nm west of Mawson Station. She was making easy progress when the ice closed in under the influence of wind and currents. This happened on October 23 and by October 28 no further progress was possible.

Some attempts were made to free the ship. The anchor was dropped on the ice to break it up, and crew and passengers attempted to break the ice from around the hull, using crow bars and pick axes. Eventually a small pool of water was created around the hull and Nella Dan was able to make slow progress towards open water. But at best she could do little more than 100 metres a day, and was using valuable fuel reserves in the process.

After reviewing the weather and the condition of the ice near Nella Dan the Antarctic Division decided to divert the West German chartered polar ship *Icebird* from her resupply voyages to Mawson and Davis Stations so she could pick up the 14 scientists on Heard Island. She sailed from Hobart on November 12, picked up the field parties on November 25 and then headed for Amundsen Bay to assist Nella Dan.

Although she is a more powerful ship than the 25-year-old *Nella Dan*, *Icebird* could not get any closer to the trapped ship than 9nm. Briefly she too was squeezed in the pack ice and was unable to move for several hours. Finally on December 3 the decision was made to transfer 20 of Nella Dan's passengers to *Icebird*, using the helicopters carried by both ships, and the attempt to break out the Danish ship was abandoned.

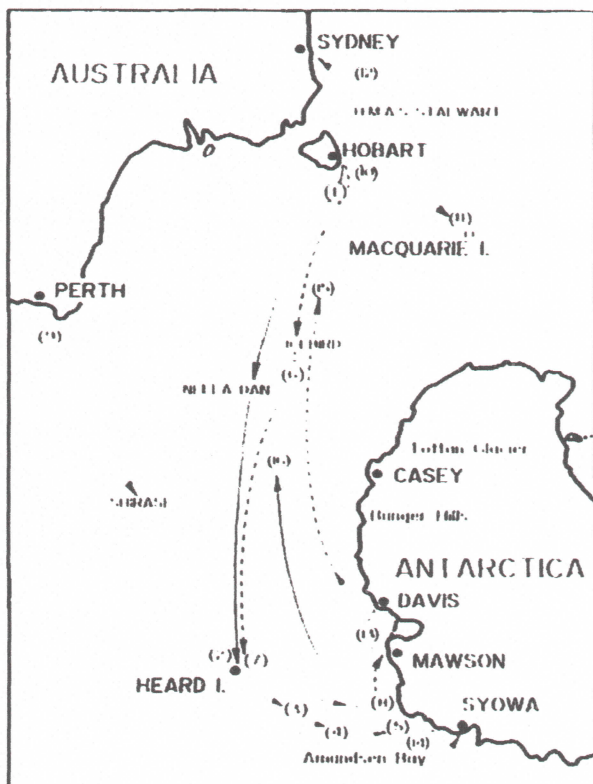
Icebird resumed her voyage to Mawson and Davis, completing the changeover between December 7 and 12. The *Nella Dan*

passengers remained aboard and returned to Hobart on December 23, 99 days after they had left there.

Before *Icebird* left Nella Dan the Minister of Science (Mr Barry Jones) announced that the Japanese Government had agreed (at no charge) to send the research ship and icebreaker *Shirase* to make a second attempt to rescue the imprisoned ship. The *Shirase*, which can break ice 1.5m thick at a speed of three knots, was in Fremantle loading for her relief voyage to Syowa Station which is about 400nm west of Nella Dan's position.

A few extra items of cargo were loaded on *Shirase* before she sailed on December 3. They included fresh fruit and vegetables, spare parts for one of the helicopters, special items for Christmas, and 60 tonnes of marine diesel fuel which was needed so *Nella Dan* could return to Hobart at full speed if freed from the pack ice.

Shirase was in Amundsen Bay 10 days later. She broke the ice around Nella Dan



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MAP SHOWING LOCATION OF PRINCIPAL EVENTS CONCERNING THE NELLA DAN'S BESETMENT

1. 16 September: *Nella Dan* sails from Hobart.
2. 1-4 October: *Nella Dan* deploys field parties on Heard Island.
3. 8 October: *Nella Dan* enters the pack ice to commence seal research.
4. 13 October: *Nella Dan* continues the search for Crabeater seals by heading further south.
5. 28 October: *Nella Dan* encounters heavy ice and is finally beset.
6. 12 November: *Icebird* sails from Hobart and is diverted to Heard Island.
7. 25 November: Heard Island parties picked up by *Icebird*, which then diverts to assist *Nella Dan*.
8. 3 December: 20 passengers from *Nella Dan* transferred to *Icebird* after it was decided to abandon the attempt to free *Nella Dan*.
9. 3 December: *Shirase* sails from Fremantle to assist *Nella Dan*.
10. 4 December: *HMAS Stalwart* sails from Hobart.
11. 8 December: Resupply of Macquarie Island completed by helicopter from *HMAS Stalwart*.
12. 12 December: *HMAS Stalwart* arrives in Sydney.
13. 7-12 December: *Icebird* completes changeover of Mawson and Davis stations.
14. 14 December: *Shirase* frees *Nella Dan* from pack ice after being trapped for over 7 weeks.
15. 23 December: *Icebird* arrives in Hobart with 20 passengers from *Nella Dan*.
16. 29 December: *Nella Dan* returns to Hobart after 104 days.

which had gripped her for 52 days, taking nine hours to force her way through the last 2nm of 4m-thick ice barring the way out. On December 14 Nella Dan was once again able to make her own way.

Until both ships were in open water, Shirase escorted Nella Dan through the pack ice. The two ships travelled in convoy as the ice continually moved in behind Shirase blocking Nella Dan's progress. Shirase took Nella Dan in tow when breaking through the worst of the pack, and the fresh food, helicopter spare parts and fuel were transferred once relatively open water was reached.

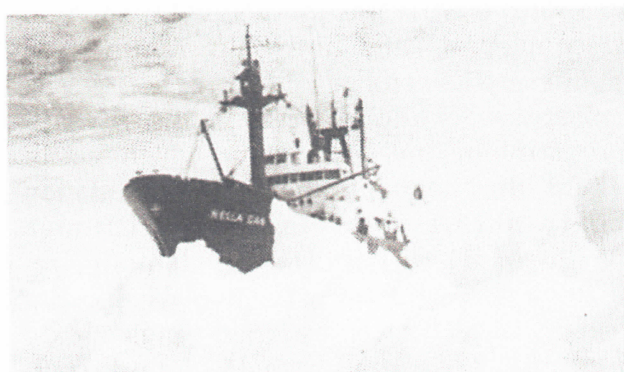
COOK'S DEATH

After 104 days in the Southern Ocean, Nella Dan returned to Hobart on December 29. On board were her Danish crew of 31, 16 of the original 36 Australian and New Zealand scientists and technicians and the body of a ship's cook, 21-year-old Kim Retlef Nielsen. He died on October 20 in international waters from head injuries sustained in a fall during rough weather north of Mawson before Nella Dan was trapped.

Nella Dan's return nearly six weeks behind schedule meant that the Antarctic Division had to rearrange its shipping plans for the remainder of the season. Nella Dan was to have returned on November 20 for the Heard Island cruise and left again on November 25 to carry out the changeover of winter and summer teams at Macquarie Island Station. Negotiations with the Royal Australian Navy resulted in the charter of HMAS Stalwart to do the job. She was diverted while returning from exercises in South-East Asia and sailed from Hobart on December 4.

HMAS STALWART

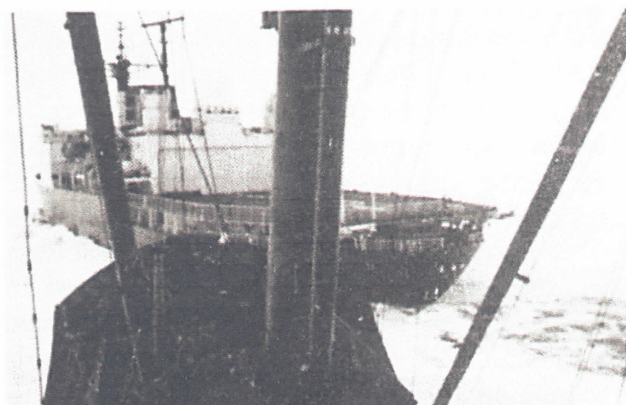
With this winter's team of 14 scientists, weather observers, and support staff, and supplies and fuel the Stalwart arrived at Macquarie on December 6. Cold fronts with winds gusting to 50 knots and rough seas forced curtailment of the operation at one stage. The Stalwart's four helicopter pilots were forced to fly in winds of 50 to 60 knots when transferring supplies from ship



The Nella Dan trapped in the ice in Amundsen Bay. Photo: Paul Ensor.



Expeditioners attempt to free Nella Dan. Photo Paul Ensor.



The Nella Dan follows the Shirase out of the ice after 48 days. Photo: Paul Ensor.

to shore, but the mission was completed on December 8, and the ship returned to Sydney on December 12.

Because of the changes in the ANARE programme, the field party which established the new summer research station Edgeworth David in the Bunger Hills area of Queen Mary Land in mid-January, remained there for an extra two weeks. But Icebird, which was assigned originally to pick up 22 scientists and support staff, cracked her main drive gear in February and had to turn back to Australia.

Nella Dan was recalled from Hobart to collect the party early in March. Heavy pack ice prevented her from approaching closer than 50nm to the station, and the summer team was flown out by three helicopters two days ahead of schedule. Nella Dan ended her eventful season when she returned to Hobart in the second week of March.

SHIP ABANDONED

Almost a month after Nella Dan was first caught in the ice, a BAS polar ship was in trouble. The RRS John Biscoe was caught in 10/10ths pack ice off the westcoast of the Antarctic Peninsula and had to be abandoned on November 18. She drifted in the pack dangerously close to grounded icebergs and was heading to rapidly shoaling waters some 2nm from the Amiot Islands off the south-west corner of Adelaide Island when the decision to abandon ship was taken.

With 31 crew and 133 BAS scientists and support staff, John Biscoe under the command of Captain Chris Elliot, was on her way to Rothera Station on Adelaide Island. Ice observation on November 12 from a BAS Twin Otter indicated a good wide lead through the pack but on November 13 when only 4nm from the northern ice edge, the ship was held fast as the ice was tightened by northerly winds.

On November 14 the vessel was able to manoeuvre in the pack and attempted to return to the northern edge. But the next day she was held fast again by northerly winds. In the evening Captain Elliot advised BAS headquarters in Cambridge that the vessel was drifting towards some

icebergs about 3nm away.

As a result of this call the United States National Science Foundation's chartered research vessel Polar Duke immediately went to the assistance of John Biscoe. She arrived on the night of November 17. A severe northerly gale compacted the ice again and finally the ship was abandoned soon after 9.30 p.m. GMT.

PACK BROKEN

Sixty-four passengers and crew were transferred to Polar Duke which turned northwards to rendezvous with the West German research ship and icebreaker Polarstern in Bismarck Strait. Twenty officers and crew and four BAS staff were transferred to Polarstern which had also responded to the call for assistance, and Polar Duke took the remaining 40 to the United States Palmer Station on Anvers Island, arriving on November 20.

With her much greater power Polarstern broke through the pack, came close to John Biscoe on the morning of November 20, and was able to transfer 24 crew and BAS staff in a steel basket by crane. The trapped ship had sustained no damage and her engines were running within 30 minutes and she was able to move out of the ice under her own steam, escorted by Polarstern.

On November 21 John Biscoe arrived at Palmer Station, anchoring in Arthur Harbour. Arrangements had been made earlier for 16 of the 40 BAS staff to be airlifted to Rothera Station by a BAS Twin Otter which used the Palmer skiway. The transfer of the remaining 24 back to the ship was completed on November 21 and she departed on November 22.

Conditions in the Ross Sea were reported to be the worst in 20 years with fast ice twice as thick as in a normal summer. Only one of three expeditions, two of them private, which encountered the worst of the ice from mid-December to late January attained its objective. This was the first official Italian expedition which chartered the Norwegian ship Polar Queen, a vessel specially built for work in Arctic and Antarctic ice with an experienced crew. The Polar

Queen sailed from Lyttelton for Terra Nova Bay on December 11 and reached the area on December 22 although it had to push its way through ice two metres thick.

Southern Quest, the support ship for the Footsteps of Scott Expedition, and Greenpeace, flagship of the international environmental organisation, both headed for Ross Island in December. Greenpeace, a converted tug, sailed before Southern Quest but had extreme difficulty in finding a route through the pack.

Under the command of Captain Graham Phippen the converted Icelandic trawler Southern Quest sailed from Hobart on December 28. She was unable to reach Cape Hallet to land six Austrian mountaineers who had joined the 18 men and women on the expedition, but pushed her way through 200 nautical miles of loose pack and reached open water north of Beaufort Island in the first week of January. The first objective of the expedition was to assemble a Cessna 185 aircraft which was to be used to fly Robert Swan, Roger Mear and Gareth Wood back from the South Pole to the expedition's Jack Hayward Base at Cape Evans after the completion of their journey from Ross Island.

FIRST FLIGHT

As the way into McMurdo Sound was blocked the ship could not reach its base and launch the aircraft from stable sea ice at Cape Evans. So for nearly three days a team worked nonstop to assemble the aircraft on an ice floe 17nm from Ross Island. A short runway was hacked out through the pressure ridges and the Cessna 185 made a trial flight. But after it landed the runway split and another strip had to be prepared.

During these three days the ice closed in on the Southern Quest. On the morning of January 11 she tried to break through 100m of heavy pack to reach open water. But in the afternoon she was gripped tight between two heavy floes. She was then about 4nm from Beaufort Island at 76deg 56.8min S/67deg 13min E.

Although everyone worked for eight hours with picks and shovels in a vain attempt to free the ship the ice pressure was

increasing. Finally late at night the pack split the hull near the engine room. Water poured into the engine room holds and the ship began to list. Captain Phippen advised Scott Base and the Amundsen-Scott Pole Station of the situation at 11.37 p.m. and reported that the ship had been abandoned and the crew and passengers were on an ice floe.

Twenty-one men and women, including the six Austrians, had only half an hour to escape to the relative safety of the ice floe. But they were able to take emergency equipment and clothing with them, and then mark out a landing strip, set up tents, inflate life rafts, deploy flares and beacons, and erect a radio aerial.

U.S. AID

In response to the distress call helicopters from the United States Coast Guard icebreaker Polar Star flew everyone off the ice floe to Beaufort Island and then to Cape Bird on Ross Island. From there 18 men and three women were ferried by United States Navy helicopters to McMurdo Station. The rescue operation took four hours and was completed in the early hours of January 12.

As the crew set up its base on the ice a message came through that Swan, Mear and Wood had reached the Pole shortly before midnight. Only 11 minutes after receipt of the message the ship went down stern first in 80m of water.

Three members of the expedition were at its Cape Evans base when the ship sank. They were Captain John Tolson (radio operator/film cameraman), Dr Michael Stroud (medical officer) and his fiancée, Thea de Moel, one of four women on the ship who had been dropped off by Captain Giles Kershaw, pilot of the Cassna 185. He and his engineer, Rick Mason, had flown on to Williams Field 11km from McMurdo Station on the Ross Ice Shelf in readiness to pick up the Pole walkers.

By January 14 all 23 members of the expedition and the six Austrians were together at McMurdo Station, Swan, Mear and Wood having been brought back from the Pole in a Hercules aircraft by the United

States Navy. Except for three men, Wood, Steve Brodie and Tim Lovejoy, everyone was flown to Christchurch later in the week at a cost to the expedition of \$NZ30,000, the charge made by the US National Science Foundation.

WINTER TEAM

Wood and the two crew members, Brodie and Lovejoy, are at Jack Hayward Base this winter. They will prepare base buildings, stores and equipment, and the Cessna 185 for the summer when the expedition plans to send a ship to pick them up.

Greenpeace, which sailed from Melbourne on December 20 under the command of Captain Peter Bouquet, had early warning of what lay ahead before the ship could reach Ross Island where the 34 members of the expedition planned to set up a permanent base at which four men were to winter. The first ice was sighted at 52deg S and the first pack when the ship was 377nm from Ross Island.

By January 2 the ship was reported off Scott Island (67deg 24min S/179deg 55min W) and 310nm north-east of Cape Adare. Five days later she had made better progress but was still 8.5nm outside the northern edge of the pack seeking a lead. On January 11 the ship was almost caught in dense ice and had to change course and retreat north again.

By January 13 Greenpeace was back on course and heading west towards Beaufort Island. But the next day she encountered ice up to 2.5m thick and was forced to turn north again, still 97nm from Ross Island.

Captain Bouquet and Peter Wilkinson, leader of the expedition, decided on January 15 to stay between 27 and 34nm north of Beaufort Island and 59nm east of Cape Bird. They hoped that the ice barring the way into McMurdo Sound would break up and enable the ship to reach Cape Evans. By January 20 there was little change and time was running out for the establishment of the base before United States ships and aircraft left the area.

HELICOPTER FLIGHTS

There was some possibility that if the ship remained another week materials, equipment and other supplies could be unloaded at Cape Evans to give the expedition a head start when Greenpeace returns to Antarctica this summer. While the ship remained 21.5nm north and 9.9nm west of Ross Island the expedition's Hughes 300 helicopter did ice reconnaissance flights in McMurdo Sound and around Ross Island, using a video camera.

Between January 21 and 24 Captain David Walley, accompanied by a West German biologist, Ralph John who was to have been one of the four men to winter on Ross Island, made flights to Cape Bird and Cape Evans to survey the terrain, access etc and areas for scientific research. On January 24 the two flew to Scott Base from Cape Evans after discussions with the Footsteps of Scott winter team. They arrived at 5.50 p.m. and remained for two hours and a half to pick up mail at the post office, buy stamps, and hand over a considerable quantity of expedition mail for dispatch overseas.

After the helicopter returned Greenpeace headed west towards the Bay of Whales. On January 30 all 34 members of the expedition were on the ice together for the first time since their six-week voyage began. They raised the Greenpeace flag near an Adelie penguin rookery, proclaimed Antarctica a world park — one of the purposes of the mission — and read a declaration signed by 134 environmental groups from all over the world.

Reports that the ice in McMurdo Sound and at Cape Evans was breaking up caused the expedition to head back to the area. But when the ship reached the ice edge on February 2 the entrance was still blocked as the ice kept breaking up and reforming. After a reconnaissance flight on the morning of February 3 Captain Bouquet decided the time had come to head north again.

Greenpeace arrived in Wellington on February 12. A few days later she returned to Auckland where she has been laid up for the winter.