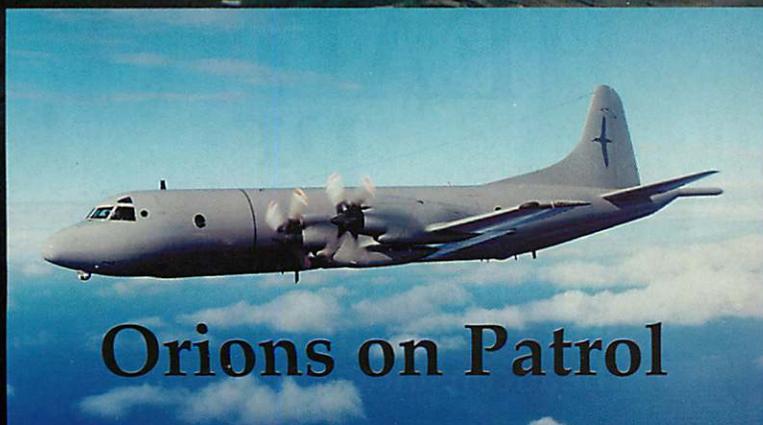


# ANTARCTIC



The Journal of the New Zealand Antarctic Society Vol 18, No. 2, 2001

## NZ Programme Update



**Orions on Patrol**

- **Cape Roberts Cleanup**
- **Thinning Glacier Studied**

# SHARPEN YOUR CUTTING EDGE

- Business profiles
- Advertising
- Magazine and newsletter publishing
- Corporate communications
- Marketing communications
- Media relations
- Event management
- Financial PR, annual reports

**HEAD**  
*pr*

P O Box 2369  
Christchurch  
New Zealand

Tel ++64-3-3650344  
Fax ++64-3-3654255  
[headconsultants@xtra.co.nz](mailto:headconsultants@xtra.co.nz)

## COVER PICTURE



The cover illustration of penguins on patrol is courtesy of © Colin Monteath of Hedgehog House and is sourced from his magnificent book 'Antarctica: Beyond the Southern Ocean', published 1996 David Bateman Ltd, reprinted 1997, 160pp. Price NZ \$50. The P3K orion picture is courtesy Royal New Zealand Air Force.

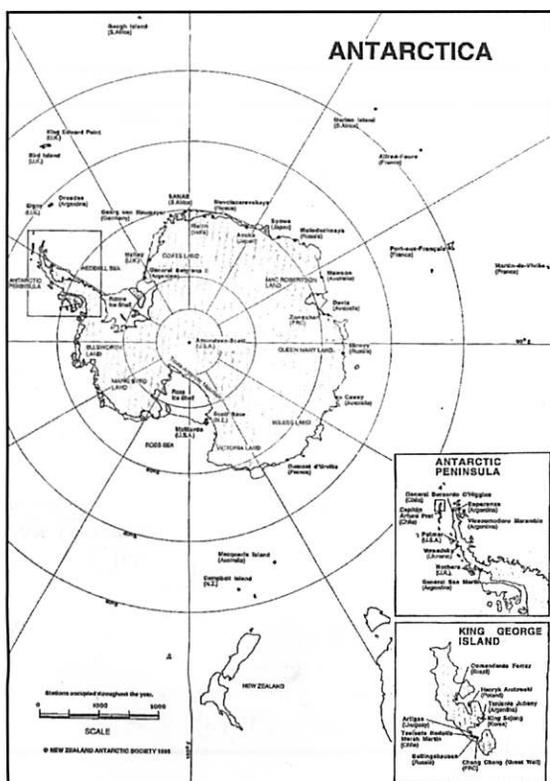
**Volume 18, No. 2, 2001**

**Issue No. 172**

ANTARCTIC is published quarterly by the New Zealand Antarctic Society Inc., ISSN 0003-5327. Please address all editorial enquiries to Warren Head, Publisher, 'Antarctic', PO Box 2369, Christchurch, or Tel 03 365 0344, facsimile 03 365 4255, email: headconsultants@xtra.co.nz Printed by Herald Communications, 52 Bank Street, Timaru, New Zealand.

## CONTENTS

	Page
Ross Sea Surveillance	28-29
Ross Sea Fisheries Vulnerable	30-33
Antarctic remediation at Cape Hallett	33
Brothers Honoured	34
Peninsula Traverse Injury	35
New Zealand Programme Review	36-41
Cape Roberts' Cleanup	41
Review - 'Mountains of Madness'	42-43
Norwegians' Unsupported Crossing	43
Thinning Glacier Studied by Scientists	44
South Pole Station Upgrades	45



# Ross Sea surveillance stepped up

New Zealand is to undertake surveillance in the Ross Sea for the fourth year running because of concern about illegal fishing in the Southern Ocean, says New Zealand's Trade Minister Jim Sutton.

"Ongoing concern about illegal fishing in the Southern Ocean requires a concrete response by Antarctic Treaty System states," says Sutton. "If New Zealand didn't undertake surveillance in the Ross Sea region, Antarctic waters immediately to our south off the Ross Dependency would likely suffer the same fate as other places fished to virtual commercial extinction."

Long range Orion surveillance flights will be used to find illegal, unreported and unregulated fishing for toothfish, and also monitor vessels approved to conduct limited "exploratory fishing" under the Convention for the Conservation of Antarctic Marine Living resources (CCAMLR).

Sutton says Southern Ocean Patagonian toothfish stock depletion is an example of what can happen. Its stocks have been substantially depleted by illegal, unreported or unregulated fishing to the point that its



*The P3K Orion is providing increased surveillance of Ross Sea fisheries.*

survival as a commercially viable target fish is in doubt.

He says the New Zealand Government remains concerned because unsatisfied international demand for Patagonian toothfish means continued illegal fishing for it is likely. For the last three years New Zealand has responded to concerns about potential illegal fishing for Antarctic toothfish in the Ross Sea region through its surveillance programme.

"Japanese whaling activities are also taking place this season in the Ross Sea and it's very appropriate to monitor this activity."

In addition, this year CCAMLR

has approved the opening of the area to vessels of other nationalities which allows for one Uruguayan, three New Zealand, and two South African vessels to fish in the Ross Sea.

Sutton says New Zealand has proposed a marine protected area be established around the Balleny Islands in the Ross Sea, where thousands of birds breed on remote ice-topped cliffs. Aerial surveillance monitoring – New Zealand's area of responsibility – is crucial to ensure the area's ecology is conserved and protected, and that only sustainable fishing activities take place.

## New Zealand's area of interest

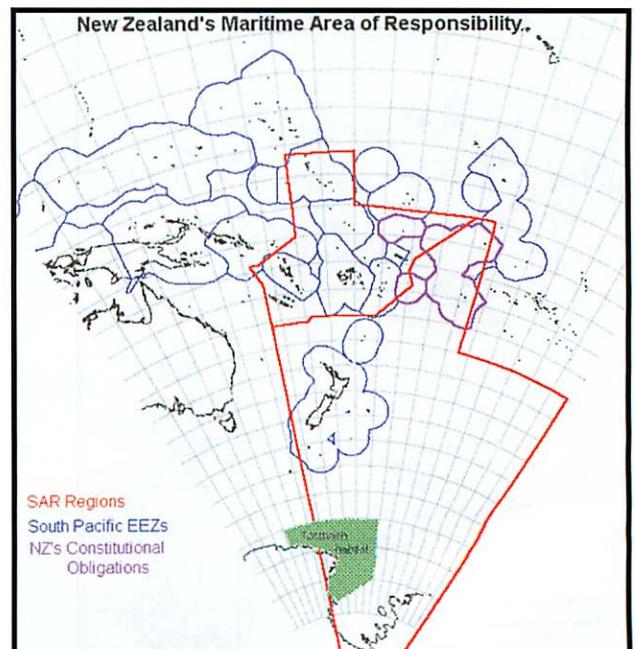
New Zealand's maritime area of interest extends from Antarctica to north of the equator, and mid-Tasman to east of the Cook Islands.

New Zealand is responsible for the largest Search and Rescue (SAR) area in the world and the Maritime Patrol Force (MPF) regularly surveys one of the largest Exclusive Economic Zones (EEZ) in the world.

Further afield, New Zealand's economic prosperity relies on the security and stability of regional trade routes through Asia and the Pacific.

The ocean approaches to New Zealand require regular monitoring and systematic surveillance to demonstrate New Zealand's commitment to protecting its resources.

New Zealand is a signatory to several conventions, which have binding obligations to maritime and aviation safety. For example, international agreements give New Zealand responsibility for air cover in the Nadi and Auckland search and rescue regions.



# First Orion surveillance flight completed

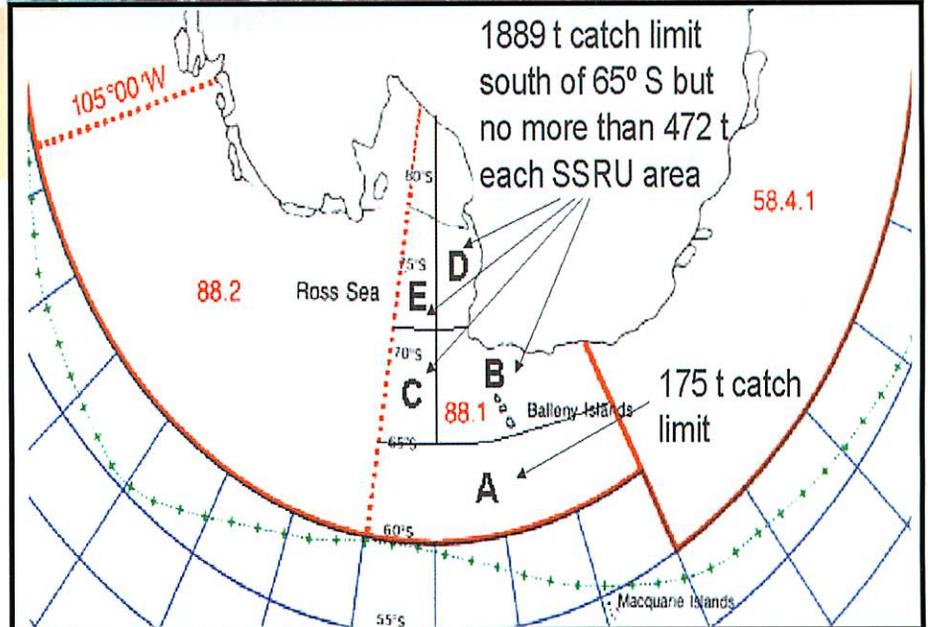
The first fisheries surveillance flight for the season over the southern oceans was completed on January 23, by a Royal New Zealand Air Force Orion aircraft.

The surveillance flight did not find signs of illegal fishing activity.

*Right: San Aotea 11, a New Zealand flagged ship operated by Sanfords, is one of three fishing vessels granted a permit to operate in the Ross Sea.*



*Right: Map showing the area needed to be covered by Air Force maritime patrols and the total catch allowed for each area of the Ross sea.*



## The Orion aircraft and No. 5 Squadron

New Zealand's Maritime Patrol Force consists of a fleet of six Lockheed P-3K Orion Long-Range Maritime Patrol Aircraft. The P-3K Orion is the only aircraft of No. 5 Squadron located at RNZAF Base Auckland.

The P-3K Orion is based on P-3B Orion airframes that were purchased in 1966. The RNZAF P-3B's tactical systems were partly modified in 1982 by Boeing under a project called Project Rigel and the aircraft was redesignated the P-3K Orion.

The P-3K Orion is an ideal platform for long range surveillance. It has a range of over 6000 kilometres and can remain on station for up to 8 hours at 1400 kilometre. It has a relatively high transit speed to operating areas and responds easily to changes in tasking once airborne.

New Zealand's baseline requirement for maritime surveillance of its Exclusive Economic Zone (EEZ) is to maintain a presence out to a point

1400 kilometres for up to 72 hours. The 1400 kilometres radius enables surveillance coverage of most areas of ocean within NZ's EEZ and those of its South Pacific neighbours, including NZ's constitutional responsibilities for Niue, the Cook Islands and the Tokelau Islands. Seventy two hours is the time required for a surface vessel to reach such areas of interest and relieve the Orion of its surveillance task.

The current on-board systems on New Zealand's Orion are a mix of 1966 and 1981 technologies. Following a systems upgrade programme (Project Rigel in 1982), the RNZAF commenced Project Kestrel to replace the wings and provide approximately another 20-25 years of airframe life. Currently, the Orion is receiving a new digital autopilot to replace the current PB-20N autopilot. The Government is presently reviewing New Zealand's maritime surveillance requirements.

## Women's traverse aborted

Dogged by initial delays reaching Antarctica from South Africa earlier in the season, Ann Bancroft and Liv Arnesen reached the South Pole on 16 January, part way through their traverse across Antarctica. Travelling from Dronning Maud Land (Blue Ice 1) to Ross Island they hoped to complete the first traverse made by women.

They reached the South Pole after 60 days, three days longer than scheduled, and despite light winds, were able to use their parasails on five days to travel up to 123km per day. After a brief stay at the Pole, during which they included a shower and a talk to the world media over their satellite phone, the two women collected their resupply and continued on towards Ross Island dragging 109 kg sledges.

*Continued on Page 34*

# Ross Sea Fisheries Vulnerable

The Ross Sea (adjacent to New Zealand's Antarctic territory, the Ross Dependency) is vulnerable to fishing exploitation, reports New Zealand's Ministry of Foreign Affairs and Trade.

New Zealand is a member of the Commission for the Conservation of Antarctic Marine Living Resources set up

under the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR). The CCAMLR Commission meets annually in Hobart and approves, by consensus, conservation measures which limit fishing activity by member states. If there is no agreement, there is effectively no internationally agreed limit to fishing activity.

There is a CCAMLR approved "exploratory fishery" in the Ross Sea for Antarctic toothfish, one of the two species of toothfish. Until now, New Zealand has been the only State fishing in the area.

At the most recent CCAMLR meeting however, despite New Zealand's protests, approval was given for two South African vessels and one Uruguay vessel, in addition to three NZ flagged vessels. The Total Allowable Catch (TAC) in the Ross Sea this season is 1889 tonnes of Antarctic toothfish (south of 65° south) and 175 tonnes of Patagonian toothfish (north of 65° south). This is a very precautionary catch limit.

Additionally, only one vessel may be in a "fine scale rectangle" at any one time (ie within an area of 0.5° latitude by 1° of longitude) and there is also a restriction on vessels catching more than 100 tonnes from any such "fine scale rectangle". Within larger areas, called "Small Scale Rectangles" (SSRU), there is also a total limit of 472 tonnes which may be caught by all vessels.

Current New Zealand legislation (Antarctic Marine Living Resources Act) prohibits all fishing in CCAMLR waters except in accordance with a



*The NZ Navy Frigate Te Kaha has patrolled the Ross Sea fisheries.*

permit issued by the Minister of Fisheries. The Act applies to New Zealand nationals and New Zealand flagged vessels. Last season (1999/00) three vessels received permits to fish for toothfish in the Ross Sea, consistent with CCAMLR's Conservation Measures (CM) and over 700 tonnes was taken.

Two of the vessels, however, (operated by Sandford Ltd and Sealord Ltd) were prosecuted in December 2000 for failing to conduct all the necessary "exploratory" research in contravention of the permits. The companies pleaded guilty and contributed to the costs of the prosecution, with the judge noting that the breach arose from a mistaken interpretation rather than weather conditions leading to an early departure.

Co-operation with New Zealand industry is very good. The industry recently established a joint Toothfish Working Group to improve co-operation further, and industry representatives are included on the CCAMLR delegation, together with a Greenpeace representative.

This season (2000/01), the Minister of Fisheries (with the Minister of Foreign Affairs and Trade) issued three permits to New Zealand vessels (*Janus*, *San Aotea II*, and *Sonrisa*). The first two vessels (operated by Sealord and Sanford respectively) left port on 2 January 2001 and entered the Ross Sea in mid January (steaming time to the Ross Sea is about 7-10 days). The third vessel, *Sonrisa*, is operated by a consortium of companies including Independent Fisheries, and departed

slightly later.

The entry of other vessels (ie from South Africa and Uruguay) inevitably creates a management issue requiring attention. At CCAMLR last year, officials were successful in having CCAMLR adopt measures under which all vessels operating in the Ross Sea are required to adopt

the same stringent environmental standards which New Zealand applied to its vessels (eg no dumping of offal or rubbish).

There is also a three bird limit for each vessel operating in the area so, that if more birds are killed, the vessel concerned is required to revert to night time setting of lines to further minimise risk. To date, no birds have been caught by the NZ industry in the Ross Sea.

New Zealand would like to see bilateral compliance arrangements concluded with South Africa and Uruguay, to help New Zealand effectively ensure that CCAMLR measures are being complied with. New Zealand and South Africa also have an agreement to exchange observers on their respective vessels.

## Illegal, unregulated and unreported fishing

Increasing lucrative toothfish markets have seen demand for toothfish rise and some stocks fished to near commercial extinction in the Southern Ocean.

Illegal, Unregulated and Unreported (IUU) fishing for toothfish (ie either by CCAMLR vessels without permits, or by non-CCAMLR vessels acting outside CCAMLR rules) has been the primary cause of stock decline. An estimated 90,000 tonnes was taken illegally in the past three years from throughout the CCAMLR area with hundreds of thousands of birds estimated to have been killed as a result of IUU fishing over the same pe-

riod.

The toothfish stock around South Africa's Prince Edward and Marion Islands has been severely depleted. Stocks around Kerguelan (France) and around Herd and MacDonald Islands (Australia) are under severe pressure with considerable IUU activity in some areas. Stocks around South Georgia (UK/Argentina) are tightly managed with UK and Argentinian enforcement patrols. Given the value of toothfish this leaves the Southern Ocean's last relatively pristine stock (in the Ross Sea) vulnerable.

Officials keep a wary eye on any toothfish vessels which make port calls in New Zealand. New Zealand also welcomed the recent decision by the Government of Mauritius, previously a port of convenience for IUU toothfish vessels, to take steps to address IUU activity.

## Japanese Fleet

The Japanese whaling fleet has departed Japan for New Zealand's area of interest, including the Ross Sea, to take minke whales. The fleet has been known to operate in the past around the Balleny Islands, an area New Zealand is currently proposing as an internationally recognised protected area. In addition, there are also two Japanese vessels conducting non-lethal research in the Ross Sea this season. Consequently, New Zealand believes it is appropriate to conduct some aerial surveillance, and monitoring, of these numerous Japanese and IWC vessels.

## Long Distance Surveillance

Long range aircraft are required to fly the distance involved from New Zealand to the Ross Sea. Aircraft used for fisheries surveillance by other countries commonly do not have the necessary range. Decisions are yet to be made about appropriate surveillance capacity in the Southern Ocean and elsewhere. No other CCAMLR party is, however, currently capable of, or has an interest in, conducting

surveillance in the Ross Sea. Without long distance aircraft the resources of this region risk being exploited by illegal vessels, with the likely result that fish stocks would be depleted, as occurred around Prince Edward and Mairon Islands and in other areas of the Southern Ocean, says MFAT.

## Toothfish Exploratory Fishing

There are two types of toothfish in the Southern Ocean, Patagonian toothfish and Antarctic toothfish. Patagonian toothfish is found in more northerly (and accessible) areas such as the Australian, South African and French sub Antarctic islands in the south Indian Ocean, between 33 degrees south and 68 degrees south. Antarctic toothfish is found around the Antarctic continent, generally south of 65 degrees south, and in particular in the Ross Sea.



*The South African fishing boat Eldfest, tied up in Bluff, New Zealand, before long-line fishing in the Ross Sea under permit. Photo: M.A.B.*

There is some intermingling of the Antarctic and Patagonian fish stocks. Until recently, New Zealand has been the only country currently fishing for Antarctic toothfish.

Little information is known about Patagonian toothfish, although it is known that they grow slowly to more than two metres, can live for 50 years and do not breed until at least 10 years old.

Even less is known about Antarctic toothfish. There have been problems applying what little is known about Patagonian toothfish to Antarctic toothfish in terms of stock assessment work. Both species are very valuable commercially.

New Zealand has participated actively in the international management of the waters of the Ross Sea region through the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), which forms part of the Antarctic Treaty System. The Convention is implemented in New Zealand by the Antarctic Marine Living Resources Act 1982, which prohibits the taking of any marine living resources by New Zealanders anywhere in the Southern Ocean except in accordance with a permit issued by the Minister of Fisheries. Permits are issued which are in line with CCAMLR decisions and environmental approvals are also required under the Antarctica (Environmental Protection) Act.

Until the 1996/97 season, the Ross Sea was closed to all fishing except – from time to time – krill fishing. (“Scientific whaling” is conducted by the Japanese under the separate IWC regime.)

At the October/November 1996 meeting of CCAMLR New Zealand advocated that the area be open to New Zealand longline vessels for a “new fishery” for toothfish. CCAMLR accordingly adopted a Conservation Measure (CM 115/XV) that fishing would cease if 1980 tonnes were reached. The provisions of Conservation Measure 29/XV, designed to prevent sea bird ensnarement on the longline hooks, was also applied. This specified

that there could be no day time fishing in the Ross Sea and elsewhere in CCAMLR waters.

The then Minister of Fisheries issued a permit that season to Sealord for two vessels but only one vessel (the *Lord Auckland*) operated. The problem for the industry was that there was little “night time” during the three months the Ross Sea was open and this necessitated a late departure, with the *Lord Auckland* able to undertake only a limited survey prior to ice closing the region to fishery.

At the following CCAMLR meeting in 1997, the Commission adopted

*Continued on page 32*

Continued from page 31

a Conservation Measure (CM 143 XVI) which similarly provided for an "exploratory fishery" by New Zealand vessels only, with a TAC of 1172 tonnes of Antarctic toothfish and 338 tonnes of Patagonian toothfish. CCAMLR also opened the eastern portion of the Ross Sea (for the first time) to New Zealand vessels only, setting a TAC of 25 tonnes of Patagonian toothfish and 38 tonnes of Antarctic toothfish (CM 139/XVI).

For that 1997/98 season Sealord Ltd and Sanford Ltd combined their resources into SS Fishing Ltd and received a permit for one vessel (*Lord Auckland*) which undertook the first extensive longline survey of the region.

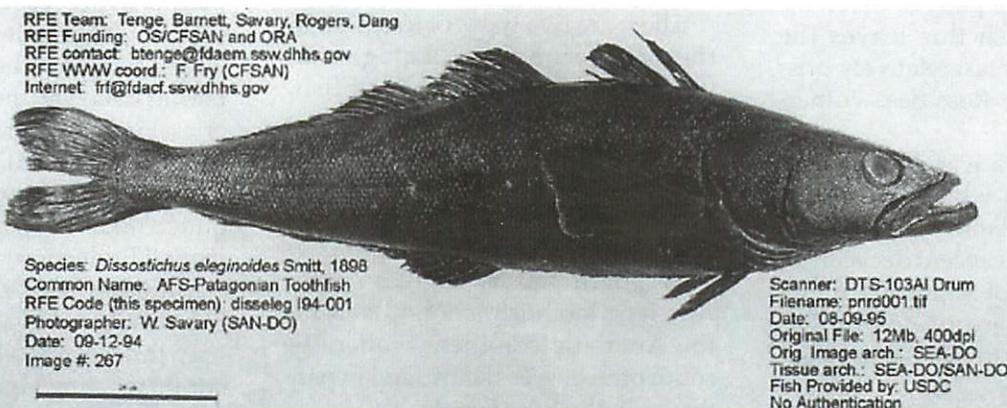
At CCAMLR In 1998, NZ notified its intention to fish in the western part of the Ross Sea and a conservation measure was adopted which opened the area to "no more than two New Zealand vessels" setting a TAC of 271 tonnes of Patagonian toothfish and 2010 tonnes of Antarctic toothfish. A special exemption was adopted which enabled New Zealand to conduct day time fishing if its lines were weighted with sinkers and demonstrated a rapid line sink so birds did not get entangled.

For that 1998/99 season, although a number of companies applied for permits, only SS Fishing was allocated a permit for two vessels (*Janus* and *San Aotea II*). These vessels undertook extensive exploration across the Ross Dependency, catching some 398 tonnes of toothfish. No birds were caught during this season.

At CCAMLR in 1999, New Zealand, Chile and Portugal all notified their intention to fish in the Ross Sea and a Conservation Measure was adopted opening the area to an unspecified number of vessels from these states, with a TAC of 175 tonnes of Patagonian toothfish and 1915 tonnes of Antarctic toothfish. CCAMLR agreed to a process for

"managing the stock under uncertainty", and set a highly precautionary TAC. Additional research requirements were adopted including the establishment of 4 "small scale research units" with a 478 tonne limit in each within the total TAC.

For the 1999/00 season SS Fishing was again allocated a permit for two vessels (*Janus* and *San Aotea II*). A permit was also issued to Independent



The Ross Seas' treasure: the patagonian toothfish.

Fisheries Ltd (and its consortium partners Latitude South Ltd, Vela Fishing Ltd, Antons Seafoods) for one vessel (*Sonrisa*). The total amount of toothfish caught was over 700 tonnes. Again no birds were caught during the season. In the event New Zealand welcomed the decisions of Portugal and Chile not to fish in the area.

At CCAMLR in 2000, the Commission approved "exploratory fishing" in the Ross Sea by three New Zealand vessels, two South African vessels and one Uruguay vessel. The TAC was set at 1889 tonnes of toothfish with a total of 472 tonnes to be caught in any Small Scale Research Unit (SSRU). The Minister of Fisheries has subsequently issued permits to the *Janus*, *San Aotea II* and *Sonrisa* for the 2000/01 fishing season. These vessels have also received Ministerial approvals under the Antarctica (Environmental Protection) Act.

The New Zealand industry has operated in the Ross Sea without any incidental bycatch of marine mammals or seabirds, unlike many other toothfish longline fisheries where non-fish bycatch is a major concern. New Zealand has been successful in having CCAMLR adopt stringent measures to avoid bird and mammal bycatch in the Ross Sea. So far this is the only longline fishery within

CCAMLR or associated EEZs that has completed 4 seasons of fishing with not a single seabird or marine mammal being captured or killed. This is a record New Zealand hopes to see maintained in the Ross Sea.

The New Zealand exploratory fishing is the only one outside of an EEZ that has also provided significant scientific data to CCAMLR over recent years. A major part of the region has

now been surveyed, and in 1999/00 there was more data collected than in any other year.

## Patagonian Toothfish hit by fishing

Patagonian toothfish has been hard hit

by illegal, unregulated and unreported (IUU) fishing. Several areas, particularly in the Indian Ocean, have been so heavily illegally fished that commercial viability of those fisheries is questionable. CCAMLR conservatively estimated that some 10,700 tonnes of toothfish was taken illegally from CCAMLR waters during the 1998/99 year. The previous year's estimate (1997/98) was of some 33,500 tonnes and 38,000-42,800 tonnes the year before that (1996/97). By comparison, some 14,338 tonnes of toothfish was caught legally in CCAMLR-managed fisheries during 1998/99.

To date no firm evidence of any IUU fishing in the Ross Sea has been discovered. However, with good catches reported by the New Zealand industry this past season (more than 700 tonnes) there is concern that others will actively seek to enter the fishery, either legally or illegally. Having a physical presence in a fishery, backed up by effective surveillance activity, is the only effective means of achieving compliance.

RNZAF Orions can operate in the Ross Sea region. New Zealand conducted its first surveillance flights in the Ross Sea in 1998. In 1999 the frigate *Te Kaha* was deployed for the first

time to demonstrate national intent and some 13 sorties were flown in 1999. Further surveillance flights were conducted in 2000 and have taken place in the 2000/01 season. The annual programme is coordinated by the Operation Mawson Taskforce, chaired by the New Zealand Defence Force.

Several approaches have been developed by CCAMLR to address the problem of IUU fishing. These include compulsory port inspections of vessels fishing for toothfish, approaches to non-parties to encourage compliance with CCAMLR conservation measures, and strengthening flag State responsibilities. The most significant, however, has been the development of a catch documentation scheme (CDS). On 11 May 2000 new Fisheries Regulations and Customs prohibition orders entered into force implementing the catch documentation scheme designed to track the origin of catches of toothfish and their movement in international trade through a certificate of origin system.

Assessment of the CDS has been somewhat mixed. Greenpeace has expressed the view that the CDS will be ineffective in that IUU fishers will declare their catch was caught on the high seas north of CCAMLR waters, or continue to use flags of convenience of states which will not participate in the voluntary scheme. They believe new markets in countries such as China (not a CCAMLR member) will develop to evade CCAMLR member states. On the other hand, the New Zealand fishing industry views the scheme as an effective means of protecting the toothfish resource from IUU fishing.

Initial practical experience shows the CDS is proving effective. New Zealand has refused to issue CDS documents when the legality of toothfish catch has been in question and this has enabled catches to be investigated where necessary. A CDS was declined for the landing of toothfish by the *Polar Viking*, a previously New Zealand flagged vessel which maintains no link with New Zealand and was not authorised to fish under New Zealand fisheries legislation.

Article courtesy Ministry of Foreign Affairs and Trade.

# Antarctic remediation at Cape Hallett

A joint New Zealand and US environmental team has completed an initial survey of a former Antarctic research station at Cape Hallett (approximately 600 kilometres north of McMurdo Sound).

The four person team, which included Antarctica New Zealand's Environmental Manager Emma Waterhouse, two US environmental specialists and a biologist. The visit took place in late January 2001 and lasted three weeks. The objective was to assess what measures were needed to complete a cleanup of the station that had been begun by New Zealand in the mid 1980s.

As the assessment was being conducted, the team discovered a number of Ade'lie penguin chicks whose feathers appeared to be contaminated with oil. The source of the contamination appears to be petroleum residue in about a dozen small melt pools on the site. The source of the petroleum is as yet unknown.

The team has recommended steps to safeguard Ade'lie penguin chicks at a nearby rookery from melt pools contaminated with oil from an unknown source.

Although no longer an active research station, Cape Hallett is a frequent stop for tour ships. Tourists are drawn to the area because the Ade'lie colony contains as many as 50,000 breeding pairs of adult penguins and their chicks. Only a small number of penguin chicks were observed to have been contaminated with oil.

In the mid-1990s a US remediation team returned to Cape Hallett, and, over a two year period, a 20,000 litre fuel tank and several smaller tanks that had been left when the station closed in 1973, were pumped dry and the fuel removed from the site.

Emma Waterhouse says the remediation team reported no evidence of contaminated melt pools or of oiled birds at the time. She adds that materials will be sent to Cape Hallett at the earliest opportunity to fence off the pools during the penguin breeding season when the chicks are most likely to become fouled.

Additional steps will be taken to remediate the fuel contamination.

Hallett Station, on the eastern side of Cape Hallett, was operated jointly by New Zealand and the United States from the International Geophysical Year (IGY) in 1957 to February 1973. It was operated as a year round research station until 1964 when the main scientific laboratory was destroyed by fire.

## HALLETT QUICK FACTS

- Hallett Station was built by the United States in 1957 at approximately the same time that Scott Base was under construction. It is of similar size to Scott Base and its huts were of similar construction.
- The station operated as a joint US/NZ station with up to 50 scientists and support personnel in residence over summer months and about 20 personnel during winter.
- It was occupied year round as a station from 1957 to 1964, and as a summer station only until 1973 when it was closed due to difficulties with logistical support.
- The station was originally occupied for the study of geophysics, but after the IGY, Cape Hallett was primarily used to study biology and Ade'lie penguins in particular.
- From 1984 to 1987 New Zealand work parties undertook various decommissioning and clean-up activities including dismantling the bulk of the station buildings and cleaning up site rubbish.
- Four buildings remained after the 1980s clean-up programme as well as a large bulk fuel storage tank, a number of smaller tanks and some miscellaneous machinery including a D4 tractor.

Source - Antarctica New Zealand.

# Brothers Honoured

There has been recognition at long last of Irish brothers - and Antarctic Veterans - Mortimer and Timothy McCarthy, by the town of their birth, Kinsale County Cork.

Mortimer served as an able seaman on the *Terra Nova*, 1910-1913 under Scott and later settled in Lyttelton where he raised a family of three sons.

He followed a seagoing career all his life, but in 1967 died tragically in his Lyttelton home from a fire.

Timothy, the younger brother served on the *Endurance* under Shackleton and was a member of the crew of the *James Caird* during its historic 800 mile journey from Elephant Island to South Georgia.

He died at his gun station after his ship *Narrangansett* was struck by a torpedo on 16 March 1917.

The memorial chosen by the citizens of Kinsale takes the form of a two level wall with the busts of the brothers on top.

It was unveiled by Gerard McCarthy, son of Mortimer, who flew with his son Andrew from New Zealand.

It sits in Kinsale Harbour where both brothers spent their younger days. Their seamanship skills were put to good use in the frozen Southern Ocean in their later years.

— *Baden Norris, Antarctic History Curator, Canterbury Museum.*

*L to R: Jonathan Shackleton, Gerard McCarthy, Falcon Scott (R.F. Scott's grandson) and Andrew, son of Gerard McCarthy. The busts in the background: Timothy McCarthy (L) and Mortimer (R).*



# Women's traverse aborted

*Continued from Page 29*

Bancroft and Arnesen reached the Ross Ice Shelf at the bottom of the Shackleton Glacier on 12 February, dangerously late in the season, with 780 km remaining ahead of them and only eight days left before their chartered pick up by the Australian ice-strengthened ship, the Sir Hubert Wilkins. Over the previous two weeks they had averaged only 20km a day, much less than originally planned, and light winds and soft snow prevented their use of parasails.

To reach the ship on time they would have needed to average 100km per day. On 18 February, Bancroft and Arnesen were picked up from the Ross Ice Shelf by an Adventure Network International Ltd (ANI) Twin Otter, having reached a point 700 km from Ross Island. They were flown to Williams Field, and the next day were moved to the Sir Hubert Wilkins by the ship's Hughes 300 helicopter, three days before the official Ross Island 'close-out'.

# Governor General Launches Trust's Plans

At a function hosted by the New Zealand Prime Minister at Parliament, the Governor General of New Zealand, Sir Michael Hardie-Boys launched the Antarctic Heritage Trust's ground-breaking conservation strategy for safeguarding the historic huts in Antarctica.

The function was attended by the Governor General, the British High Commissioner, the United States Ambassador, Ministers of the Crown and a number of other key diplomats. New Zealand's Prime Minister, Helen Clark, spoke of the fascination and inspiration the heroic era expeditions evoke:

"The legends of the early explorers continue to fascinate and to capture the imagination of new generations. I am told that a visit to the historic huts of these early expeditions can be a very moving experience..."

The focus of the event was on the need for significant conservation work at the historic sites in the Ross Sea region of Antarctica. The Trust's chairman, Rob Fenwick, told attendees that although the dry cold of Antarctica had seen the historic huts of Scott, Shackleton and Borchgrevink last for the past century, increases in human visitors and the imminent end of the material's ability to withstand the severe Antarctic climate meant they were now starting to decay rapidly.

The Antarctic Heritage Trust seeks to obtain seed-funding from the New Zealand Government so that it can raise the estimated US \$5-10 million required to undertake the major conservation work necessary to prevent the loss of this important heritage.

Sir Edmund Hillary noted in a personal letter to the Prime Minister and other attendees at the presentation:

*Continued on Page 45*

# Serious Injury on Peninsula traverse

Australian adventurer Peter Bland was seriously injured when an avalanche carried him over a fifteen metre ice fall into a crevasse on 30 January 2001 when he and his companion Jay Watson were descending from the plateau above Charcot Bay in the north-western Antarctic Peninsula.

After a complicated rescue, Bland is now recovering in a Chilean hospital in Punta Arenas after suffering a fractured skull, pelvis, ribs and ankle.

The incident occurred when Bland and Watson were three weeks into an unsupported sledging journey down the spine of the Antarctic Peninsula from Hope Bay in the north-east to Charlotte Bay on the west coast (220 km), that was to be followed by a 70 km kayak trip (Expedition Antarctic Peninsula or EAP).

The start of the trek had been delayed six days until 12 January when the support ship *Tooluka*, a 14.2 m steel sloop, was late leaving Ushuaia, Argentina, after the two men's kayaks that were also going to be used as sledges went missing en route from Australia. The trekkers' already tight schedule became even tighter because of the *Tooluka's* commitment to pick up three New Zealand kayakers after their own pick up on 7 February.

Bland and Watson man-hauled their kayak/sledges up the Depot Glacier from Hope Bay and down the Mondo Glacier to Duse Bay. After

starting out over fast ice, they changed to kayak mode when water opened up in front of them. Rapid changes in the pack ice led to 'a desperate overnight paddle to reach Vega Island', the nearest land. After camping on the Island, the pair island-hopped towards the Victory Glacier on the coast of the Antarctic Peninsula. Wary of their previous troubles with pack ice, they man-hauled most of the night to ensure they reached the mainland before there were any further changes in ice conditions.

The first three days of the climb up the glacier towards the 1800m high Detriot Plateau was relatively easy going and the glacier's 'enormous crevasses' were easily skirted. The final push onto the plateau took two 'arduous days' using packs and a pulley system to relay loads of equipment up near-vertical ice falls before both men and their equipment were safely on the plateau. Soon after their arrival a sixty knot blizzard pinned the men down for several days.

By now the men had realised that they would not be able to reach Charlotte Bay in time to meet the *Tooluka*. They decided that after trekking southwards down the plateau, they should descend to sea level near Charcot Bay, well north of Charlotte Bay, and relayed this change to *Tooluka* by HF radio.

From 25 January, Bland and Watson made good progress southwards along the plateau, although most of the journey was in whiteout conditions, the pair relying on their GPS (global positioning system) navigation units for location.

The two men commenced their descent to Charcot Bay on 30 January in continuing poor conditions. They were forced to camp at 1,200m in strong winds and heavy snow, concerned about finding a path around an ice cliff ahead of them. While they were setting up camp, with Watson inside and Bland about ten metres away outside, an avalanche swept through the area, missing the tent but carrying Bland down-slope over the 15m ice cliff.

It took Watson some time to real-

ise what had happened because of the high winds, and after sighting Bland, it took him four hours to find a route down to where he lay unconscious in a crevasse. Watson returned up slope to retrieve enough equipment to set up a shelter over his companion. Realising Bland was badly injured Watson called *Tooluka* over the radio for assistance. The yacht had been waiting near Charcot Bay and landed three of its crew in Linblad Cove, just to the south-west of Auster Point, early on 31 January who then climbed to the accident spot.

By good fortune the *Marco Polo*, the only tour ship working the Peninsula area that season with a helicopter, was in the general vicinity and was contacted earlier that day and asked to assist. The ship had been en route from Port Lockroy to Paradise Harbour, but immediately diverted to Charcot Bay and arrived there that afternoon after a 200 km dash. Enveloping cloud prevented a helicopter rescue, but a fully charged radio was delivered to the *Tooluka* rescue party, still climbing to the accident site, as their batteries were running low. The injured trekker was reached on the afternoon of 1 February and initial first aid was provided.

*Marco Polo* remained on standby in Charcot Bay until mid-morning 1 February when a helicopter and a Twin Otter aircraft from the Chilean national programme arrived from Tenente Marsh airfield on King George Island 150km to the north to assist with the rescue. Despite several attempts, the Chilean helicopter was unable to reach the accident site that day due to continuing cloudy conditions, and the four men on the mountain carried Bland down the ice slope overnight to 800m in the hope of getting below cloud level by the next morning. The helicopter was able to reach the party early the next day when conditions dramatically improved.

The helicopter ferried Bland, and Andrew Watson, brother of Jay, and one of the rescuers who had become ill during the rescue, from Charcot

*Continued on Page 43*

## Cape Roberts Cleanup

*Continued from Page 41*

core recovered. It was also conducted in a highly 'environment friendly' manner, showed an excellent health and safety record, developed new technologies for drilling off fast sea ice, and serves as a model of project management for future international projects in Antarctica. Special credit must go to Jim Cowie as Project Manager and to Professor Peter Barrett as Scientific leader.

# New Zealand Programme Review

## SCOTT BASE STAFF

Scott Base staff for the 2000-2001 season were flown south on 7 October 2000. Following a custom begun in 1957, the New Zealand flag was raised by the youngest person present, New Zealand Army Engineer Glenn Baker.

Peter Brookman, Emma Waterhouse and Julian Tangaere successively shared the Scott Base Manager's position, as in previous years. The remaining positions were (\* indicates wintering staff):

Services Manager - Paul Drysdale

Operations Manager - Peter Cleary

Senior Science Technician - Jamie

Plowman\*

Engineering Manager - Kevin Rigarlsford

Telecom Technician - Anthony Powell\*

Base Engineers - John McGregor, Steve

Plant\* and Jonathon Leitch\*

Carpenter - Kevin Duignan\* and Steve

Brown

Field Support Officer - David Brice\*

Electrician - Doug Bell\*

Mechanic - Mark Herrick\*

Science Technician - Herm Binnie

Canteen Manager - Jenna Stanish

Chefs - Aaron Lock\* and Jeff Reid

Field Training Instructors - Dean Arthur,

Kevin Nicholas, Jim Spencer and Rachel

Brown.

Cargo Handler - Paul Renshaw

Plant operators - Bruce Dobson and Craig

Redman

Domestics - Nicki Fairbairn\*, Lana Hastie

and Helen Brown

Communications operators - Michael

Fitzgibbon, Katy Graham, Adam

Magnussen, Louise Paton, Jonathon

Watkins and Jonathon Bostock.

## FIELD EVENTS

Poor weather that brought unseasonably large amounts of snow to Ross Island has seriously delayed several of 31 science events planned by New Zealand for this season.

## Geological Studies

After long and frustrating waits at Christchurch and Scott Base, a University of Otago geology party was lifted by helicopter into the Mulock Glacier. Their landing coincided with a magnetic storm, which prevented radio contact with Scott Base, so the disappointed group had to return to McMurdo. They were reflown into the field, north of the Darwin Glacier, a few days later.

The aim of the party, led by Associate Professor Alan Cooper and accompanied by John Cottle, Alanna Simpson and Andy Thompson, was to study granitoid intrusions associated with the Neoproterozoic to early Palaeozoic Ross Orogeny. Intrusions

of alkaline or 'A'-type magmas which occur in the southern Royal Society Range and the Skelton Glacier area require an extensional or trans-tensional tectonic regime for their production. Similar age intrusions in the Central Transantarctic Mountains and the Dry Valley region have a different composition (calc-alkaline) and were produced along a convergent (compressive) Palaeopacific margin where there was subduction.

By studying the area south of the Skelton Glacier, the party hopes to define the transition between the convergent and extensional/trans-tensional sections of the Transantarctic Mountains with the aim of producing a better palaeotectonic reconstruction of the Antarctic segment of the Gondwana margin and its relationship to fold belts in New Zealand and Australia. Overhanging ice cliffs and intensely crevassed glacial terrain produced several challenging moments for the team.

A Canterbury University geology party destined for northern Victoria Land was also delayed when the inclement weather created a backlog of US and NZ field flights. The four man party, led by Associate Professor John Bradshaw and accompanied by Professor Steve Weaver, Dr Kari Bassett and Duncan Ritchie, was eventually flown in by a Bassler converted DC3 aircraft, chartered from World Logistics International.

The plane was piloted by American David Russell and co-piloted by New Zealander Max Wenden. The party worked in the Carryer Glacier studying the sedimentology and boulder content of a Cambrian conglomerate that resembles rocks of similar age in northwest Nelson, New Zealand. Poor weather and radio problems in the Bassler prevented the party being moved to Reilly Ridge to study a second Cambrian conglomerate. Eventually a Twin-Otter had to lift the party out of the field in a complicated operation that also repositioned much of the field equipment for a second project later in the season (see Ice Studies).

## Fish Ecology

Dr John Macdonald, University of Auckland, continued a study of the bottom-dwelling fish *Trematomus bernacchii* using mark and recapture and underwater video observations. He was accompanied by Michael Taler, of the Auckland University of Technology, and postgraduate students Neill Herbert and Daniel Bassett, of the University of Auckland. The team had planned originally to sample four sites, but slow fishing at the first location (Cape Roberts) made it clear that more time was needed at each site. A large early break-out of ice in northern McMurdo Sound also made it advisable to change the location of the second site from Backdoor Bay (Cape Royds) to Cape Evans, to ensure a safe return route to Scott Base. Fishing stations were set up in a grid pattern on the ice over water depths of 20-30 m and fish were caught by angling and in baited traps. Each station was recorded as a differential GPS location, so that sampling can be repeated at the same locations in following years.

After weighing and measuring each fish, a sample of scales was taken for age estimation and the fish was injected with a fluorescent marker (calcein) for calibrating growth rings. Finally the fish was marked with a numbered tag and returned to the bottom. A total of 636 fish were tagged over the season, with 29 recaptures. A rough preliminary estimate suggests that each set of fishing holes was sampling from a local population totaling between 9000 and 17000 fish. In successive seasons, standard fisheries formulae will be used for more precise estimates of population size, while an analysis of recaptures at the respective holes in each grid will indicate the mobility of fish. The results will provide a basis for assessing the effects of human activities on Ross Sea fish populations, and for evaluating the potential impact of any proposed commercial fishery. Future work is planned to include Cape Armitage, which has been used as a source of

fish for a variety of scientific studies for 40 years. A comparison of the Cape Armitage population with previously unsampled sites will permit assessment of the impact of scientific fishing on populations of this common species.

Professor Bill Davison, University of Canterbury, continued his research on the Antarctic fish *Pagothenia borchgrevinki* in conjunction with Craig Franklin, University of Queensland, Australia, Jonathon Hill, University of Birmingham, England, and Michael Axelsson and Jordi Altimeras, University of Göteborg, Sweden. These fish live in a constant thermal environment of  $-1.8^{\circ}\text{C}$ , but despite their isolation in very cold water, diseases and parasites are widespread. One disease, known as X-cell disease, affects the gills of a large number of the fish, reducing oxygen uptake and consequently the ability of the fish to function. The programme examined the hypertension created by increased resistance to blood flow through the gills.

Dr Craig Marshall, Otago University, undertook a study of Antarctic fish to determine the evolutionary events that led to their physiological adaptation to a cold water environment. There were significant climatic changes leading to cold conditions after the separation of Antarctica from neighbouring Gondwana fragments. Many organisms were unable to adapt, but the Notothenioid fish (Icefish) were able to resist freezing by developing a new blood protein – the antifreeze glycopeptide. With this they were able to exploit the new conditions. The relatively recent divergence (~15 million years ago) and complete molecular evolutionary history of this fish group make it an ideal system for investigating the specific molecular events responsible for evolutionary adaptation both in these Antarctic fish and in vertebrates generally. Craig reports "This season we investigated the route by which antifreeze glycopeptide, synthesized in the pancreas and apparently secreted into the gut, are transported to the blood. This was done by putting isotopically labelled antifreeze glycopeptide into the gut of fish and taking blood samples to determine if the



Education event (K391A) doing sea ice training on route to Cape Royds, November 2000. Photograph courtesy Rebecca Gee, Antarctica New Zealand

glycopeptide was somehow crossing the gut and appearing in the blood."

### Penguins, seals and mini bugs

Dr Joseph Waas and Dudley Bell from the University of Waikato, along with their colleagues Charles Litinan (Macquarie University) and Mark Hindell (University of Tasmania), are completing the final year of a four-year study on the mating system of the Weddell seal, an animal that breeds under fast ice. Final genetic samples were collected from sites near Scott Base and Turtle Rock to assess the mating success of individual males. The study will determine how male seals compete for access to mates by examining how their individual quality (rate of energy expenditure, changes in condition and behaviour measured during their 1997-99 breeding season) relates to paternity registered using microsatellite genetic markers from samples collected in 1997-2000.

Dr Peter Wilson, Kerry Barton, Brian Karl and Jacqueline Beggs, of Landcare Research NZ continued a joint New Zealand and American project on Adelie penguin population dynamics at three different sized colonies on Ross Island - Cape Royds, Cape Bird and Cape Crozier. The study aims to distinguish the relative importance of key resources, such as nesting space and food, that constrain the growth of colonies, and behavioural mechanisms, such as breeding

effort and success, immigration/emigration, that may influence colony size. Factors responsible for colonisation and growth of the colonies will be modelled to help understand population regulation, the present effects of climate and to predict future trends.

Working alongside the Landcare NZ project was this season's Kelly Tarlton's Antarctic Scholar, Emma Marks, University of Auckland. Emma was doing fieldwork for her Ph.D "Factors Influencing the vocal behaviour of Adelie penguins at Cape Bird, Antarctica". Her thesis will do much to explain how an adult penguin can recognise the cry of its chick (and *vice versa*) in the noisy confines of an Adelie rookery.

On Ross Island and locations along the Victoria Land Coast, there are stratified deposits of subfossil bones of Adélie penguins, which underlie existing colonies. Some penguin remains have been carbon dated to more than 13,000 years. The Antarctic environment represents an ideal one for the preservation of DNA. Using DNA technology, Professor David Lambert's research group at Massey University have been analysing samples from both extant and extinct penguin populations, and will radiocarbon date the bones in conjunction with Professor Carlo Baroni, University of Piza. The research aims to directly measure, for the first time, the rate of evolutionary change in mitochondrial genes over a substantial time frame and to investigate the mode of evolution of nuclear genes. The results will provide fundamental knowledge about the genetic processes that underlie evolution in the Antarctic. As part of the same event, Assoc Prof Peter Metcalf from the University of Auckland is investigating the evolution of avian influenza virus in Adelie penguins. A three man party comprising Prof Lambert, Dr John Macdonald and Assoc Prof Peter Metcalf travelled on the US Coastguard *Polar Sea*. They sampled

*Continued on Page 38*

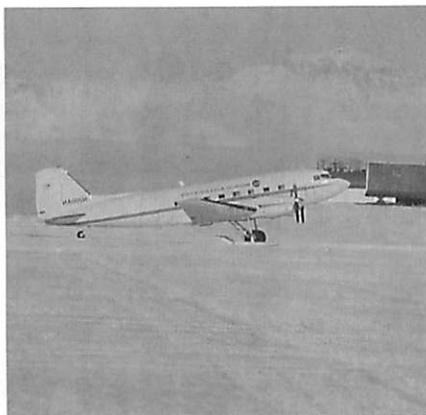
*Continued from Page 37*

living penguins and faecal samples (flu virus) from colonies at Port Martin and from the Balleny Islands (Sabrina Island). The party also spent 11 days at Cape Adare and collected similar samples there. This component of the trip was particularly exciting because they were able to collect a large number of subfossil penguin bones as well as flu samples. The party was picked up by the *Kapitan Khlebnikov* and delivered to Scott Base.

The University of Waikato is undertaking a two-pronged research project on Antarctic terrestrial biodiversity across the entire latitudinal range of the Ross Dependency. Sites studied in 2001 included Scott Base, Cape Crozier, Botany Bay and Marble Point. Dr Ian Hogg is evaluating the biodiversity of terrestrial invertebrates (particularly springtails and mites) at these sites, using analyses designed to accurately assess existing levels of biodiversity and to provide information on the origin, evolutionary relationships and present day dispersal patterns of Antarctic invertebrate taxa. Dr Chrissen Gemmill will use DNA sequencing and microsatellite markers to obtain information about the genetic structure of moss populations at the same sites. Dr Hogg's team included Prof. Paul Hebert (from the University of Guelph, Canada) and Mark Stevens, and Dr Gemmill's team included Rhodri Harfoot and Catherine Beard.

### Ice studies

A significant number of this year's field events relate to the glacial history of Antarctica. Dr Paul Augustinus, University of Auckland, visited northern Victoria Land to decipher its glacial history. Glaciers that drain the East Antarctic Ice Sheet through the Transantarctic Mountains become constrained by ice when they reach the Ross Ice Shelf. This may explain why the East Antarctic Ice Sheet advances appear to be out of phase with global cold stages. Glaciers in northern Victoria Land however, such as those that drain the Talos Dome and other large névés, are unconstrained because they flow into the sea. For this reason, the northern



*The Bassler, a converted DC 3 was used extensively in Northern Victoria Land to support geological and glaciological parties. It is the only ski-equipped DC 3 in the world. Photo: M.A.B.*

Victoria Land glacial systems may respond more sensitively to global climate controls compared with the main ice sheet. The Morozumi and Helliwell Ranges were also visited. The party included Eric Saxby (Field Leader), Derek Fabel (Auckland University) and David Fink ANSTO (Australia).

Victoria University has three projects relating to climatic glacial changes in Victoria Land, two of them based on the Sirius Group, patches of glacial debris left behind from the last major expansion of the East Antarctic Ice Sheet over the Transantarctic Mountains millions of years ago. One party, led by Phillip Holme assisted by Carl Bronholdt and accompanied by Stephen Hickcock, University of Western Ontario, Canada, completed 3 seasons of mapping and sampling the deposits at Allan Hills. At this locality the pre-Sirius topography and the deposits themselves indicate several periods of transport from expanded inland ice that was much warmer than the present ice sheet. The party also spent shorter periods for comparative studies at Mount Feather and Table Mountain, the latter containing deposits that represent even warmer conditions.

A separate Victoria University group led by Dr Warren Dickinson and accompanied by Alex Pyne, Chris Hosie, Pat Cooper and two other drillers, used a portable diamond drilling rig to take shallow

cores of permafrosted glacial deposits at Allan Hills and Table Mountain. The deepest core was 8 m, and over 40 m of core was recovered in total. The cores at Allan Hills showed that the ancient glacial deposits are both more extensive and thinner than expected. The cores at Table Mountain sampled a new conglomeratic facies in the glacial sediments. Cores from both locations will be used to study the results of chemical changes in permafrost over the last few millions of years, and will also provide stratigraphic information for ground penetrating radar studies and outcrop maps of glacial sediments.

In a project led by Nancy Bertler of Victoria University, ice cores from the Wilson Piedmont Glacial System were analysed to determine the Holocene climate of south Victoria Land, using the Victoria Lower Glacier as a key indicator of the prevailing climate of the Dry Valleys and of the sea ice extent in McMurdo Sound. The ice core records display the dynamic climatic system created by the sensitive balance and strong contrasts between the Dry Valleys, the East Antarctic Ice Sheet and the Ross Sea and provide an ideal opportunity to study rapid, high frequency climatic variations. This year's field party also included Jordy Hendrikx, Bridget Ayling, and Hamish McGowan, from Victoria University and Matthew Watson from GroundSearch and Auckland University.

The glaciological and geological processes that occur beneath glaciers which have basal ice temperatures significantly below  $-10^{\circ}$  was investigated by Dr Sean Fitzsimons, University of Otago. He was helped by Sarah Mager, Paul Sirota and Marcus Van Der Goes, all of Otago University, and Veronique Verbecke and Reggie Lorrain of the Free University of Brussels, Belgium. Sites visited were the Suess Glacier, Lower Victoria Glacier and the Lower Wright glacier. From a 50m deep tunnel excavated into the ice, observations were made on moraine and sediment at the ice margin. The physical and chemical composition of the base of the glacier was also measured, and experiments were conducted on the motion

of the base of the glacier and its bed.

Collaborative research on sea ice with four New Zealand universities and international researchers was coordinated by Tim Haskell of Industrial Research Ltd. The research has direct relevance to southern hemisphere climate and fisheries of interest to New Zealand. The study had these objectives: Intermediate-scale properties of faults in sea ice, which focuses on aspects of sea ice that disturb its homogeneity; ocean wave/sea ice linkages relevant to climate, where the aim is discover how sea ice is changed by waves; and the processes relating the McMurdo Sound oceanography to the growth of platlet ice during the winter and spring.

The party was a large one consisting of, in addition to Tim, Simon Gibson, David Cochrane, Eberhard Duess, Paul Harris and Hokmeng Ung of Industrial Research Ltd, Inga Smith and Pat Langhorne of the University of Otago, and Colin Fox of the University of Auckland. Individual visits were staggered between 21 August and 14 November. In addition to the above field programme, measurements of the thermal properties of sea ice covering the period from June until December were carried out by Scott Base staff for Joe Trodahl of Victoria University.

### Atmospheric research

Organic pollutants have been documented in Antarctica, but their exact source was uncertain. Dr David Shooter, University of Auckland, believes that some of the pollutants may have been introduced into the Antarctic ecosystem by aircraft emissions. Aircraft engines emit organic-rich particles due to incomplete fuel combustion and these particulates contain organic compounds (polycyclic aromatic hydrocarbons - PAHs) that have been shown to damage the health of fragile ecosystems. The emissions show a fingerprint for the engine type that produced them. Dr Shooter and Dr Maria Uhle have been determining the distribution and nature of aircraft particulates in the Ross Island area. They are also bearing in mind that some of the organics may have been produced by incineration and base generators.

A programme of continuous monitoring of the middle atmosphere at altitudes of 60-100 km, using ground-based radar equipment at Scott Base and Arrival Heights, provides information on prevailing winds, atmospheric tides, atmospheric waves, and ionisation generated by high-energy particles in the solar wind. The programme is being run by Dr Grahame Fraser, Dr Andre von Biel and Graeme Plank of the University of Canterbury. The dynamic processes of the middle atmosphere are significant in controlling the circulation at lower altitudes, including the stratospheric ozone layer. This high-altitude circulation is dominated by pole-to-pole flow, from the summer pole to the winter pole, and is largely driven by atmospheric waves with time scales from 15 minutes to 15 days. The same group also operate the Scott Base ionosonde which provides ionospheric data to help forecast HF communication propagation conditions.

Professor Brian Fraser and Dr Fred Menk, University of Newcastle, Australia, monitored Magnetosphere-Ionosphere coupling and space weather at high latitudes from Scott Base and Arrival Heights. Near-Earth space, a plasma region populated by ionised gas embedded in the geomagnetic field, is of vital importance to the operation of modern technological systems. Ultra-low-frequency (ULF) waves will be used as tracers in the study of high latitude plasma dynamics and magnetosphere - ionosphere coupling.

NIWA (National Institute of Water and Atmospheric Research) again had a large team working on Antarctica data this season, including modelling, analysing and interpreting measurements in New Zealand, with a small team travelling south to undertake the measuring programme. Processes and interactions in the Antarctic atmosphere continue to be an important NIWA focus, particularly the evolution of ozone depletion over Antarctica, the effect of that depletion on New Zealand and globally, and the influence of the Antarctic region

on greenhouse trace gases. The Antarctic measurement team involved Steve Wood, Sylvia Nichol, Karin Kreher, Andrew Cunningham, and Andrew Matthew, all of NIWA. Their visits were spread over the period from 21 August to 5 February. This research programme now provides a dedicated technician at Scott Base to operate the measurement programme over the summer months, and Hermione Binnie ably filled the position this season.

A second important NIWA project relates to the monitoring of Antarctic aquatic ecosystems, to better understand how these sensitive systems respond to natural and anthropogenic changes. The programme centres on microbial mat communities that dominate many of these ecosystems. Dr Ian Hawes concentrated on lakes and streams in the Taylor Valley, and was joined by Professor Clive Howard-Williams, Derek Muller (Laval University, Canada) and Bettina Hitzfeld (University of Constance, Switzerland) for further work in the ponds at Bratina Island. The project explores temporal variability by continuing a time series begun in 1989 on the McMurdo Ice Shelf. The programme links with other national polar research programmes, including those of the USA, Spain and Canada.

NIWA also collected air samples from the MV *Greenwave*, Hercules aircraft and at Arrival Heights for precise measurements of CO<sub>2</sub> in Antarctica and surrounding latitudes. As a major contribution to the balance of greenhouse gases, uptake of excess atmospheric CO<sub>2</sub> by the Southern Ocean is assumed in predictions of future climate change, but remains poorly quantified and understood. Comparisons of 25 years of data indicate periods when the CO<sub>2</sub> concentration in New Zealand is less than that measured at the South Pole, and this is attributed to removal by a Southern Ocean sink. The Southern Ocean is expected to play a major role in CO<sub>2</sub> uptake for several reasons. The high degree of biological activity in the Ocean surface during summer months, the CO<sub>2</sub> solubility is higher in colder waters, high wind speeds

*Continued on Page 40*

Continued from Page 39

over the Southern Ocean drive rapid gas exchange across the air-sea interface, and deep ocean mixing in the high southern latitudes provides an efficient connection between the atmosphere and the very large carbon reservoir in the deep ocean. The project is being co-ordinated by Gordon Brailsford.

### Environmental

There is increasing concern about the impact of human activities on the Antarctic. In occupied regions there is evidence of terrestrial oil contamination. To assess the effects of fuel spills more effectively, and to determine whether amelioration measures are necessary, it has become apparent that information is needed on the properties of Antarctic soils and how they respond to hydrocarbon contamination. Dr Jackie Aislabie of Landcare Research New Zealand heads a team determining the impact of fuel spills on the biological, chemical and physical properties of Antarctic soil. Soil samples for analysis were collected from three long-term oil-contaminated sites and nearby control sites. Located at Scott Base, Marble Point and Bull Pass in the Dry Valleys, these sites represent contrasting soils of the Ross Sea Region. Climate stations were also installed, which allow continual monitoring of soil temperature and moisture in both oil-contaminated and control soils from these locations. This season Dr Aislabie's team began an oil spillage experiment at Scott Base to determine how quickly soil from around the Base responds to a spill of JP5 jet fuel. Historical soil data and information collected as part of this programme are being incorporated into an Antarctic soil database. This database, together with other information and knowledge, will ultimately be used to provide advice for visitors to the ice-free regions so that damage to particularly fragile soils can be avoided. Dr Aislabie's research team consists of Rhonda Fraser and Robert Gibb also of Landcare, Megan Balks, and David Holmes of University of Waikato, Doug Sheppard of Geochemical Solutions, Iain Campbell and Graeme Claridge of Land and Soil Consultancy, Don Huffman and Ron Paetzold of the US

Department of Agriculture, USA, and Simon Hunt of Caltex New Zealand.

Dr David Nobes and Jared Pettersson, University of Canterbury, tested the geophysical response of contaminants in a cold climate immediately surrounding Scott Base. Work done in temperate areas indicates that recent spills of petroleum products and organic solvents are electrically resistive and highly reflective for radar energy, whereas older spills are electrically conductive and severely attenuate radar energy. Using these methods, they hope to be able to map the extent of contaminated soil, both laterally and with depth, in the soils and permafrost surrounding the base, and possibly beyond. Michael Finnemore acted as field assistant for the second stage of the work in early February. The project will continue next year.

Professor Roberta Farrell, University of Waikato, Robert Blanchette, Ben Held and Michael Danson of the University of Minnesota, attempted to identify the cause of biological and non-biological deterioration of the Ross Dependency Historic Huts and artefacts. The bio-diversity of the biological organisms in the Historic Hut areas was also investigated, especially fungi and bacteria, using molecular DNA probes as well as traditional morphologically-based taxonomic approaches. The group also tested acceptable conservation materials for the hut's long-term preservation.

Dr Gary Steel, Lincoln University, continued his long-term research on the impact of expectations on actual experience in Antarctica, using a series of brief interviews and psychological scales. The interviews and scales will be assessed for the degree to which there is discrepancy between expectations and perceptions.

As part of a joint NIWA/LINZ hydrographic programme R.S. *Tangaroa* travelled south to the Balleny Islands, Cape Adare, Cape Hallett and Possession Island at the end of the season, using a newly fitted SIMRAD EM300 multibeam system.

Ongoing monitoring this year included climate data acquisition at Scott Base and Arrival Heights that has been continuous since 1957. The information is archived in NIWA's publicly accessible climate database. Scott Base is one of 47 reference climate stations for the New Zealand region that are managed by NIWA.

Automatic seismic data continued to be gathered by the Institute of Geological and Nuclear Sciences. The Scott Base-Dry Valleys seismograph system is one of only a few in Antarctica and makes a significant contribution to New Zealand and global earthquake sites.

### Sponsored visits

Antarctica New Zealand sponsored a joint University of Malaysia and British Antarctic Survey project to study the role of gravity waves in the dynamics of the Antarctic atmospheric boundary layer in the Ross Sea region. Gravity wave activities were detected in the British Antarctic Survey STABLE I/II programme associated with shear instabilities in the katabatic flow. The sponsored study investigated the role of gravity waves taking into consideration phenomena such as wave refraction and wave-mean flow interactions. The first phase of the study included the observation and detection of the gravity waves using an array of microbarographs and related flux measurements using sonic anemometers and two automatic weather stations.

Antarctica New Zealand also sponsored a familiarization trip to Cape Bird, in collaboration with Dr John Cockrem of Massey University, for three Swedish scientists from the University of Gothenburg interested in penguin research.

### Artists to Antarctica

Well known New Zealand photographer, Craig Potten, spent three weeks photographing the Dry Valleys in preparation for a new book as part of Antarctica New Zealand's Artists to Antarctica Programme. Antarctica New Zealand's two Antarctic Arts Fellows were dance choreographer

Bronwyn Judge and ceramic artist Raewyn Atkinson. Bronwyn intends to create a solo work from her Antarctic visit that will be performed throughout New Zealand. Raewyn will work in clay and glaze to capture the physical and visual environment.

## Media

Four journalists visited Antarctica as part of Antarctica New Zealand's Media Initiatives Programme. These were: Bernie Napp, Evening Post; Alan Coukell, Radio New Zealand; Gus Roxburgh, journalist; Annie Wright, RNZAF media.

Te Reo Television Ltd visited Hut Point, Cape Evans and Cape Royds to produce two films "Going to Extremes" for the "Inside New Zealand" series. The films will focus on the summer activities of New Zealand scientists and visitors, and the way that the summer programme is managed by Antarctica New Zealand support staff.

## Education

Antarctica New Zealand's Education Initiatives Programme enabled four educators from the Southland Museum, Auckland Museum, Antarctic Visitor Centre and Canterbury Museum to visit Scott Base.

Four Burnside High School students, accompanied by the Senior History tutor, undertook a living history project at Scott Base as part of the same programme. Their study focussed on the sole remaining Trans-Antarctic Expedition and IGY Hut.

## Antarctic Scholarships

Kelly Tarlton's Antarctic Scholarship was awarded to Emma Marks, University of Auckland for her Ph.D "Factors Influencing the vocal behaviour of Adelie penguins at Cape Bird, Antarctica".

Antarctica New Zealand's Educational Initiatives in Antarctica Scholarship was awarded to Rochelle Deans, Bird Curator at KellyTarlton's, to observed penguins in their natural settings. Kelly Tarlton's (Auckland) marine displays include live King Penguins.

*Programme summarised by Margaret Bradshaw with the help of individual researchers.*

# CAPE ROBERTS CLEAN UP



*The caterpillar bulldozers haul another load of sledges and containers over the sea ice on their 150 km journey back to Scott Base. Mt Erebus, in active mode, forms a spectacular backdrop. Photo: Jim Cowie.*

After seven years on the ice, the international geological Cape Roberts drilling 'township' and drill site were disbanded and returned to Scott Base. Cape Roberts has supported three successful drilling seasons, accommodating at various times the 80 people involved in each drilling season. During October and November 2000 Project Manager Jim Cowrie, assisted by Brian Howat, Jim Shankie, Scott Iremonger and Brian Ried, moved the Cape Roberts equipment 140 km across the sea ice to Scott Base. The Project's D5 and D6 caterpillar bulldozers were used for the haulage, with a Scott Base Hagglund all-terrain vehicle in support with heavy duty rescue gear 'just in case'. The D5 bulldozer, affectionately known as 'Duck's Sub' ever since New Zealander Garth Varcoe nearly lost it through the sea ice years ago, had already given the New Zealand Programme 30 years of reliable service. The D6 was much newer. The tractor train comprised over 40 sledge units that had a total weight of more than 300 tonnes.

The sea ice was kind with an absence of cracks, but some rough sections made for interesting route finding and demanding driving. A crack-bridging sledge was part of each train in case it was needed. The operation was completed in 3 x 50km stages – Cape Roberts to Marble Point; Marble Pt to a depot in the middle of McMurdo Sound and then Depot to Scott Base. Each leg required 9 trips. The heaviest five sledges, loaded with drill rod and surplus drilling 'muds', were over 20 tonnes each.

Project Manager Jim Cowie reports "Much of October was particularly cold this season and the D5 was unheated so it was a particularly good effort by the 'planties' to hang in

there. The Army supplied a further plant operator, Glen Baker - posted straight back from East Timor to the Cape Roberts Project - who fitted in with the rest of the experienced team very well. As part of our 'tripping back and forth' operation we were able to assist other science events by pre-positioning their equipment along the way thereby saving a considerable number of helicopter hours." The American programme contributed their heavy plant to haul some of the equipment part of the way.

In January 2001 a small party, composed of Jim Cowie, Brian Reid and Elizabeth Cowie, returned to Cape Roberts to carry out the final clean up of the site to return it to its pre-project condition. This last operational act of the Project involved a final rubbish collection and the raking over of the entire 300m<sup>2</sup> storage area to remove all signs of heavy plant operations. Jim Cowie reports "By rubbish I mean really small stuff - splinters of wood, the odd nail, screw or bolt, scraps of cloth etc. This was about 20 litres in volume of which half was rubbish pre-dating the project. For example, we found an old fire pit where rubbish had been burned and another pit full of decaying rags and canvas. The Cape is cleaner now than it was when the project began! Because we had large tarpaulins on site to lay on the ground we took the opportunity to scrape and paint the two Antarctica NZ huts at Cape Roberts, where flaking paint was becoming a problem."

The Cape Roberts Drilling Project has been a highly successful project. It produced very good science, demonstrated international scientific co-operation, and exceeded the target for

*Continued on Page 35*

# 'Mountains of Madness - a Journey Through Antarctica'

Published John Long, Allen and Unwin, St Leonards, NSW, Australia, 2000. A\$24.95

Reviewed by Dorothy Braxton.

Palaeontology is the study of 'things long dead and gone'. For Dr John Long of the West Australian Museum and other well respected palaeontologists like Dr Alex Ritchie and Dr Gavin Young, that can be translated as meaning looking for the fossilised remains of fishes in the Devonian Period (355-408 millions years ago), an age when the evolution of fishes was probably 'the most exciting thing happening around the world - when fishes evolved into land animals'.

In their efforts to throw light on the past of Gondwana, all three scientists have spent time looking into the dispersal routes of such fossils with Dr Long writing a superbly readable account for lay as well as scientific audiences in his new book 'Mountains of Madness'.

In recent months there have been a number of polar publications, written in the main by people trekking either across the frozen Arctic ocean or sailing through its waters or by those endeavouring to cross Antarctica on foot. John Long's book is different - it offers much more than pure adventure.

It was while he was in Christchurch in 1985 that John first met one of New Zealand's best known Antarctic geologists, Dr Margaret Bradshaw, then on the staff of the Canterbury Museum, and now a Senior Research Fellow in the Department of Geological Sciences at the University of Canterbury. She has made 11 visits to Antarctica and has been President of the NZ Antarctic Society for the past seven years. Being the team leader, and realising the Australian's research focus, Margaret suggested John should join a field trip she was planning as the team's fossil fish expert.

John jumped at the opportunity and three years later found himself undergoing the week long New Zea-

land survival training camp at Lake Tekapo before flying south. He was soon to discover that in those latitudes people quickly have to accept that the best of plans can go way out of sync. Margaret's field party ensconced on the Darwin Glacier could not be picked up on schedule so after waiting around for some days at Scott Base and fearing his time in Antarctica was not going to produce any scientific research, John was able to reorganise his plans and he and some colleagues headed out into the Wright Valley and around Lake Vanda. There they did some useful work which only whetted the Australian's appetite for a further research.

The opportunity for this came in 1990-91, when he arranged to join a deep-field trip, again with Margaret as the leader. They were to be accompanied by Dr Fraka Harmsen, a Dutch-born scientist who grew up and studied in New Zealand but who was then working at the California State University, and Brian Staite, another NZ Antarctic veteran who was to be their survival expert.

This time the mission was to map the geology of an area in and around the Darwin, McCleary and Mulock Glaciers, the Skelton N  v   and the Cook Mountains, including an unnamed peak which they called the Gorgon's Head because it had black tendrils of doleritic volcanic rock twisted through its buff coloured sandstone and greeny grey shales, so that it reminded them of the mythical gorgon, Medusa.

Myths and legends didn't end there. When John did an earlier reconnaissance flight in a 'whoop whoop bird', he was instantly reminded of a favourite book of his, the 1931 classic story written by H.P. Lovecraft called 'At the Mountains of Madness', about an expedition to the remote Transantarctic range which comes across an ancient still-living civilisa-

tion. John slipped a copy of it into his backpack and eerily, the team would sit in the exact location and at night take turns at reading the story aloud. Small wonder he used the title for his own journey through such a region.

Those who have experienced the intense polar cold, its diabolic winds, the danger of falling into crevasses, the blizzards which force people to remain cooped up in their tents and then experience the sudden exhilaration when the sun returns and there are spectacular sights of glistening rippled ice 'cascading like a frozen waterfall over a sharp drop', will feel they are walking with the team so vividly does John use the language. Those who can be excited as he was by the sheer grandeur of nature when he pondered in awe at the dynamic processes through which the Earth has gone in its evolution over billions of years will be able to share some of what, to him, was 'almost a mystical experience'.

And those whose curiosity is aroused by wanting to better understand what once inhabited this ancient remote part of the planet will find some of the answers as John details his professional achievements with the discovery in virgin territory of fossils such as the huge fin-spine he found in a large slab of sandstone, the remains of the a fish called *Gyracanthides* that characterised Gondwana deposits of the Devonian age. As he said, 'I simply had to have it', and while he went off to look for other remains, Brian Staite carefully chiselled it out for him.

During the weeks he was out John found fossilised remains of fishes such as the strange *Bothriolepis* which had two segmented arms coming from its shoulders somewhat akin to the legs of a crayfish and which scientists have now found existed on every continent. He also found

*Continued on page 43*

Continued from page 42

*Groenlandaspis*, and came across an important discovery, that of the ventral plate of a phyllolepid placoderm fish, 'the very same genus which I had earlier described from Mt Howitt in Victoria, called *Austrophyllolepis*'. It was the first record of the genus from Antarctica and a strong link with the fish faunas of this age in south eastern Australia.

The book is full of such discoveries so that it becomes incredibly satisfying for those seeking to read an account of an Antarctic expedition that is more than what are now becoming almost the customary trials and tribulations experienced by those trekking across the continent, admirable though such accounts undoubtedly are.

In his introduction to the book, the Australian broadcaster and author, Tim Bowden, himself no stranger to Antarctica, claims the book is at the cutting edge of adventuring and scientific exploration and says he 'has not read a finer account of a modern Antarctic field trip'. This reviewer, who is also not a stranger to the polar regions and popular scientific writing, would wholeheartedly agree.

*Dorothy Braxton is a well known journalist who was born in New Zealand and now lives in Australia.*

*She has visited Antarctica several times, and her book The Abominable Snow-Women describes her experiences when women were rarities in Antarctica.*

## Norwegians Complete Unsupported Crossing

Eirik Sønneland and Rolf Bae of the Norwegian Antarctic Expedition (NAE) arrived at Ross Island early on 5 February after successfully completing a 2,900 km, unsupported crossing of the Antarctic continent from Troll station in Dronning Maud Land in 107 days. They arrived to find the red tape of the world waiting for them.

The pair had left Troll Station 20 October (see *Antarctic* Vol. 18 no 1, p. 3) and for much of their journey their exact location was something of a mystery. Progress up the steep crevassed terrain onto the Polar Plateau from Troll appears to have been slow, but by 18 November they were at 2700 m experiencing winds from abeam that were not ideal for their parasails. Six days later they were 1185 km south of Troll approaching 83°S having averaged close to 70 km over the previous eight days. They arrived at the South Geographic Pole 20 December after only 60 days travelling, and were the first of the traverse groups to arrive. They had anticipated that they would need 70-90 days to reach the pole. After a single day's rest, they unexpectedly headed north for Ross Island, a change of plans made public for the first time. By 11 January their position showed them at the head of the

Axel Heiberg Glacier, but until they appeared at Ross Island their progress onto the Ross Ice Shelf was not known.

A number of national programmes had expressed concern that regular updates of the pair's location were not available during their traverse. The men had several Orbcomm satellite communication units with them, but these may not have been functioning properly, or they were not being used correctly.

The two trekkers arrived one day after the tour ship *Kapitan Khlebnikov* had left, on which they had hoped to leave Antarctica. For a week Sønneland and Bae were accommodated at New Zealand's Scott Base while negotiations took place to arrange transport from the continent.

The US national program has always distanced itself from private expeditions, but it is believed that an offer was made to repatriate the men to New Zealand provided all costs were reimbursed. However, it seems likely that the amount involved was well beyond Bae and Sønneland's means. Antarctic enthusiasts outside Antarctica then tried to arrange free passage for the pair with the owners of the *Archangelgracht*, a ship that was being chartered by the US national program to deliver cargo to McMurdo in a few days time. However, US authorities reportedly blocked the proposal.

In the end the men embarked on the tour ship *Akademic Shokalskiy* which is chartered by the New Zealand owned company Heritage Expeditions. The men were collected from Hut Point by the company's new ARGOS all-terrain vehicles which made a 50 km round trip across the sea ice.

Despite Sønneland and Bae's undisputed success, it seems likely that the Norwegian Expedition's performance in a number of key areas will trigger discussions about such adventure activities in Antarctic Treaty and other forums later this year.

(Photos inside back cover).

## Serious Injury in Peninsula traverse

Continued from Page 31

Bay to the hospital at Chile's Presidente Aduardo Frei station on King George Island. Watson and the two others in the rescue party returned down the ice slope to *Tooluka*. a Chilean Air Force C-130 Hercules flew the injured man and Andrew Watson to Punta Arenas on 7 February. The long-term prognosis is that Bland is expected to make a full recovery, although a long period of rehabilitation is likely.

Australian authorities are con-

cerned about many aspects of the planning and execution of the Expedition, particularly in view of fears expressed prior to the expedition's departure. The Australian national programme intends to conduct a full review of the venture to ensure that they understand what went wrong. They will then judge what steps may be required to ensure that nationals who are planning activities in Antarctica are suitably prepared for the activity.

# Scientists Study Thinning Glacier

A major glacier in Antarctica is thinning, a report in *SCIENCE* magazine has revealed. But questions still remain about the speed at which ice sheet thinning is taking place.

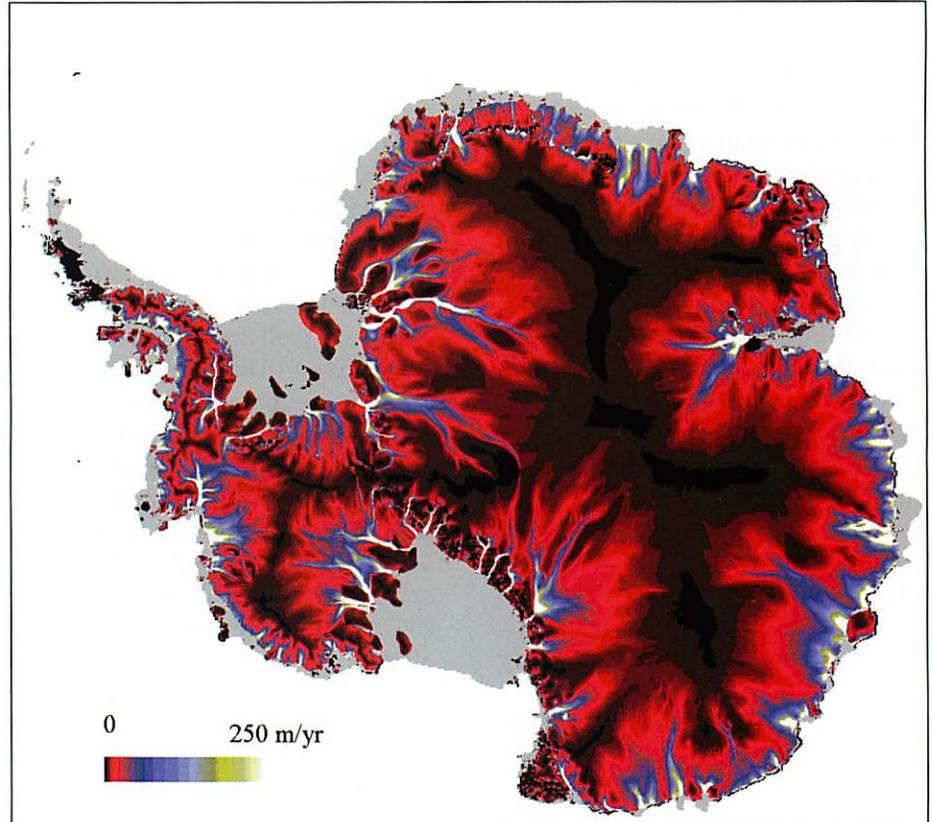
Scientists at University College London (UCL) and the British Antarctic Survey have used satellite data to show that since 1992, thirtyone cubic kilometres of ice has been lost from the fast flowing Pine Island Glacier - the largest glacier in West Antarctica - which transports ice from the deep interior of the ice sheet to the ocean.

Occupying one of the remotest spots in Antarctica - visits by man can be numbered by the handful - Pine Island Glacier is up to 2,500m thick with bedrock over 1500m below sea level. The glacier has retreated inland by over 5km as a consequence of the thinning. Data from another sensor aboard the same satellite indicates that the thinning is restricted to the area where the ice is flowing fastest, indicating that this is a change in flow of the ice sheet, and not simply changed snowfall.

Professor Duncan Wingham at UCL insists that the success of the research lies in the performance of the ERS satellite radar: 'The extreme precision which satellite measurements can now make of the Earth's surface allows us to see the internal changes in the Antarctic Ice sheet for the very first time.'

The scientific team believe that their results point unambiguously to thinning in this part of the Antarctic Ice Sheet and that it is associated with the flow of ice from the interior. If the present rate of thinning continues the team believe that the Pine Island Glacier will disappear within a few hundred years.

Dr Andrew Shepherd of UCL said: 'For the past 25 years there has been speculation about whether a retreat of a West Antarctic glacier could ac-



celerate ice flow from its interior producing rise in sea level. We have shown for the first time that such a retreat is indeed occurring. It is of paramount importance to determine whether the thinning is accelerating. Our present theoretical understanding is not sufficient to firmly predict the future evolution of the Pine Island Glacier.'

Glaciologists Hugh Corr and David Vaughan from BAS said. 'These are substantial results - they show that even the largest of Antarctic glaciers, may be changing. Sadly, we cannot yet tell what the root cause of this change was. There is an outside chance that it is linked to recent climate change, but more likely, it is due to internal changes in the glacier itself, or perhaps, climate change that occurred a long time ago whose effect is only now working through the system.'

*Above: Giant rivers of ice thread their way across the Antarctic Ice Sheet to the sea. The rivers, termed by scientists "streams", are the largest flows of ice in the world. Some streams are over 2km thick, 30km wide and travel at speeds up to 1km per year. Radar observations by polar orbiting, European ERS satellites have been used by CPOM scientists to map in detail the geography of the streams, many of which were hitherto unknown. A major task of CPOM is to determine if the speed of the streams is increasing; if so sea level will rise as a consequence. Image courtesy of J.L. Bamber, copyright Science magazine.*

Courtesy British Antarctic Survey  
Press Office: [www.antarctica.ac.uk](http://www.antarctica.ac.uk)

# New South Pole Station Power Plant and Satellite Link Online

Major construction projects to improve the electrical generating capacity and communications links at the National Science Foundation's Amundsen-Scott South Pole Station were completed this season, despite extreme weather conditions in Antarctica that hampered cargo flights.

The new power plant, which went online on January 20 2001, will increase the station's peak generating capacity to one megawatt of electrical energy, while providing three levels of backup redundancy. On January 18 personnel at the station conducted a successful test of a new satellite ground station. Employees of Raytheon Polar Services Company, NSF's logistical contractor in Antarctica, worked closely with a number of government agencies and sub-contractors to achieve these successes.

"These projects help set the stage for future generations of world-class scientific research at the South Pole," said Karl Erb, who heads the U.S. Antarctic Program. "The advantages

of the polar environment for research into the origins of the universe, as well as for studies of the ozone hole and a number of other topics of global importance, far outweigh the difficulties of working in this hostile environment."

The Pole's isolation and extreme environment make an adequate and stable power source and reliable communications crucial to safety. Because aircraft cannot land at Pole for eight months of the year, the station is in some respects more like an observatory operating on the moon than on earth.

The 9m satellite dish will connect the Pole with the commercial MARISAT-F2 and NSF's GOES-3 satellites. The system will transfer the large quantities of scientific data gathered each day in the year-round work at the South Pole, back to universities and laboratories in the U.S., for analysis. The new capability will supplement coverage provided by NASA and U.S. Air Force satellites.

The new telecommunications link will increase the number of hours that the station can communicate with the world outside Antarctica and double the available communications bandwidth. In addition to advancing the research these capabilities will help in mitigating any medical emergencies at the station during the winter months.



The exterior of the new station as it looked in late January 2001. Photo by John Rand, NSF

Apart from final testing, the transfer of generating capability to the new power plant completes part of a multi-year environmental and safety upgrade of existing facilities which also includes construction of new fuel storage, garage, and shop facilities. New housing and food service wings are to be added to the new elevated station, and the project will be completed by 2005.

The environmental and communications upgrades respond to recommendations made in 1997 by an independent panel chaired by Norman Augustine. The panel recommended that the U.S. invest in the safety and environmental upgrades and the subsequent reconstruction of the 25-year-old station for important scientific and geopolitical reasons.

"The U.S. would not send a ship to sea or a spacecraft to orbit in the condition of some of the facilities in Antarctica, particularly the one at the South Pole," noted the report "The United States in Antarctica." Report courtesy NSF.

Tunnels that house subsurface portions of the new South Pole station, including the power plant, with the dome of the existing Amundsen-Scott South Pole Station in the background. Photo by Peter West, NSF



## Governor General Launches Trust's Plans

Continued from Page 30

"These historic sites are the relics of some of the greatest adventures and expeditions of the twentieth century and we owe it to future generations to ensure they are preserved. The Antarctic Heritage Trust cannot

undertake this task alone. It must turn to its supporters – governments, organisations and individuals – at home and abroad for financial support." Executive Director Nigel Watson outlined the Trust's strategy

to attendees, showing visual representations of the Trust's objectives for the key hut sites. Bill Manhire gave an inspired reading of his poetry centred on Scott's and Shackleton's historic huts.

Story: Dec 2000 *Heritage Hearsay*

# Antarctic Environment Changes Affect krill stocks

Climatic changes in the Antarctic environment are likely to have significant impacts on the availability of krill (*Euphausia superba*), a small crustacean at the heart of the Antarctic food chain. Biologists from British Antarctic Survey have found that seals, penguins and albatross are having difficulty in rearing offspring successfully as demand for krill exceeds supply. The findings were published in February 2001 in the Proceedings of the Royal Society.

Long-term monitoring of seabirds and seals at the subantarctic island of South Georgia over the past 20 years has revealed an increase in the frequency of years when there is insufficient krill to feed seal pups and seabird chicks. Biologists Keith Reid

and John Croxall say the animals did well in the 1980s while stocks of krill were abundant but found that demand began to exceed supply in the 1990s.

The extent to which these changes result from a decrease in the amount of krill or an increase in predator demand is uncertain. However, the similarity between the supply and demand is a major finding and throws into question the apparent super-abundance of krill over all of the Southern Ocean. Seals and seabirds now consume such a large proportion of the krill population at South Georgia that they amplify the effects of gradual, underlying envi-

ronmental changes and provide a valuable insight into the potential future status of the Antarctic marine ecosystem.

The research has implications for the management of krill stocks.

Keith Reid said, "British Antarctic Survey provides scientific advice to international bodies for the sustainable management of Southern Ocean fisheries using an ecosystem approach. This means that rather than developing management plans for krill in isolation we have to take account of those species that are dependent upon krill and manage the ecosystem as a whole."

*Courtesy British Antarctic Survey  
Press Office: [www.antarctica.ac.uk](http://www.antarctica.ac.uk)*

## MEMBERSHIP

The New Zealand Antarctic Society Inc was formed in 1933. It comprises New Zealanders and overseas friends, many of whom have been to the Antarctic and all of whom are interested in some phase of Antarctic exploration, history, development or research.

By subscribing to Antarctic annual membership of the Society entitles members to: *Antarctic* which is published each March, June, September and December. It is unique in Antarctic literature as it is the only periodical which provides regular and up to date news of the activities of all nations at work in the Antarctic and Sub-antarctic. It has worldwide circulation.

Members also receive a regular newsletter called *Polar Whispers*, an annual *Polar Log*, which records the decisions made by the Society's Council at its AGM, catalogues of the Society's mail-order bookshop 'The Polar Bookshop' and occasional brochures from the Society's 'Sales Stall'. Occasional meetings are held by the Auckland, Wellington, Canterbury and Otago branches.

You are invited to join – please write to: National Secretary, P O Box 404 Christchurch 8015 NEW ZEALAND Telephone: +64 (03) 377 3173 Facsimile: +64 (03) 365 2252 [antarctic.soc@cyberxpress.co.nz](mailto:antarctic.soc@cyberxpress.co.nz)

All administrative enquiries, enquiries regarding back issues and Overseas Branch enquiries should be directed to the National Secretary.

Auckland Branch Enquiries:  
Mike Wing,  
3 Budock Road,  
Hillsborough,  
Auckland 1004.

Wellington Branch Enquiries:  
Secretary,  
New Zealand Antarctic Society Inc,  
P O Box 2110,  
Wellington 6000.

Canterbury Branch Enquiries:  
Secretary,  
New Zealand Antarctic Society,  
P O Box 404,  
Christchurch 8015.

Otago Branch Enquiries:  
Ron Topping,  
4 Tweed Street,  
Mosgiel.

Send Subscriptions to Antarctic:  
P O Box 404,  
Christchurch 8015,  
New Zealand.

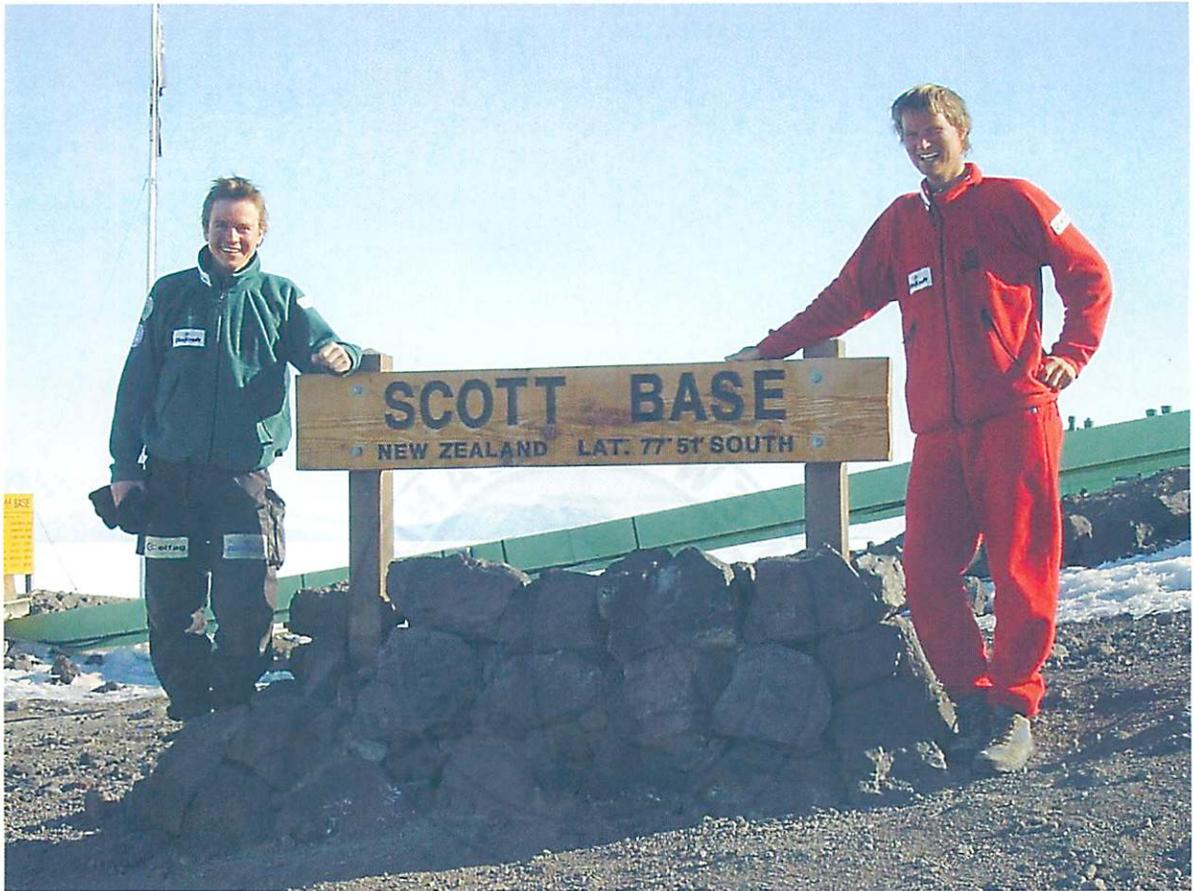
**Airmail –**  
NZ\$50 New Zealand.  
NZ\$55 A\$40 Australia / South Pacific  
NZ\$60, US\$32 North America / East Asia.  
NZ\$65, £20 Europe.  
NZ\$65, US\$35 Worldwide.

**Surface –**  
NZ\$45 New Zealand.  
NZ\$50, A\$35 Australia / South Pacific.  
NZ\$55, US\$30 North America / East Asia.  
NZ\$60, £18 Europe.  
NZ\$65, US\$35 Worldwide.

**How To Advertise:**  
Advertising Rates:  
Full Page Colour NZ\$700  
Half Page Colour NZ\$400  
Full Page Black / White NZ\$300  
Half Page Black / White NZ\$250  
Inserts NZ\$300  
Situations Vacant (20 lines) NZ\$50

**Advertising Enquiries:**  
Advertising Manager  
P O Box 2369, Christchurch 8015  
New Zealand.  
Telephone: +64 (03) 365 0344  
Facsimile: +64 (03) 365 4522

Deadline – 20<sup>th</sup> of preceding month.



*Norwegians Eirik Sonneland (left) and Rolf Bae at Scott Base after their epic unsupported crossing of Antarctica.  
Photographer unknown*



*Rodney Russ, owner of Heritage Expeditions, collects Sonneland and Bae from McMurdo Sound using the tour company's new ARGOS and sledge-supported Naiads. The two Norwegians were then carried across the sea ice to board the Shokalskiy, and on to New Zealand.  
Photograph: Michael Finnemore*

*(See article on page 43)*

