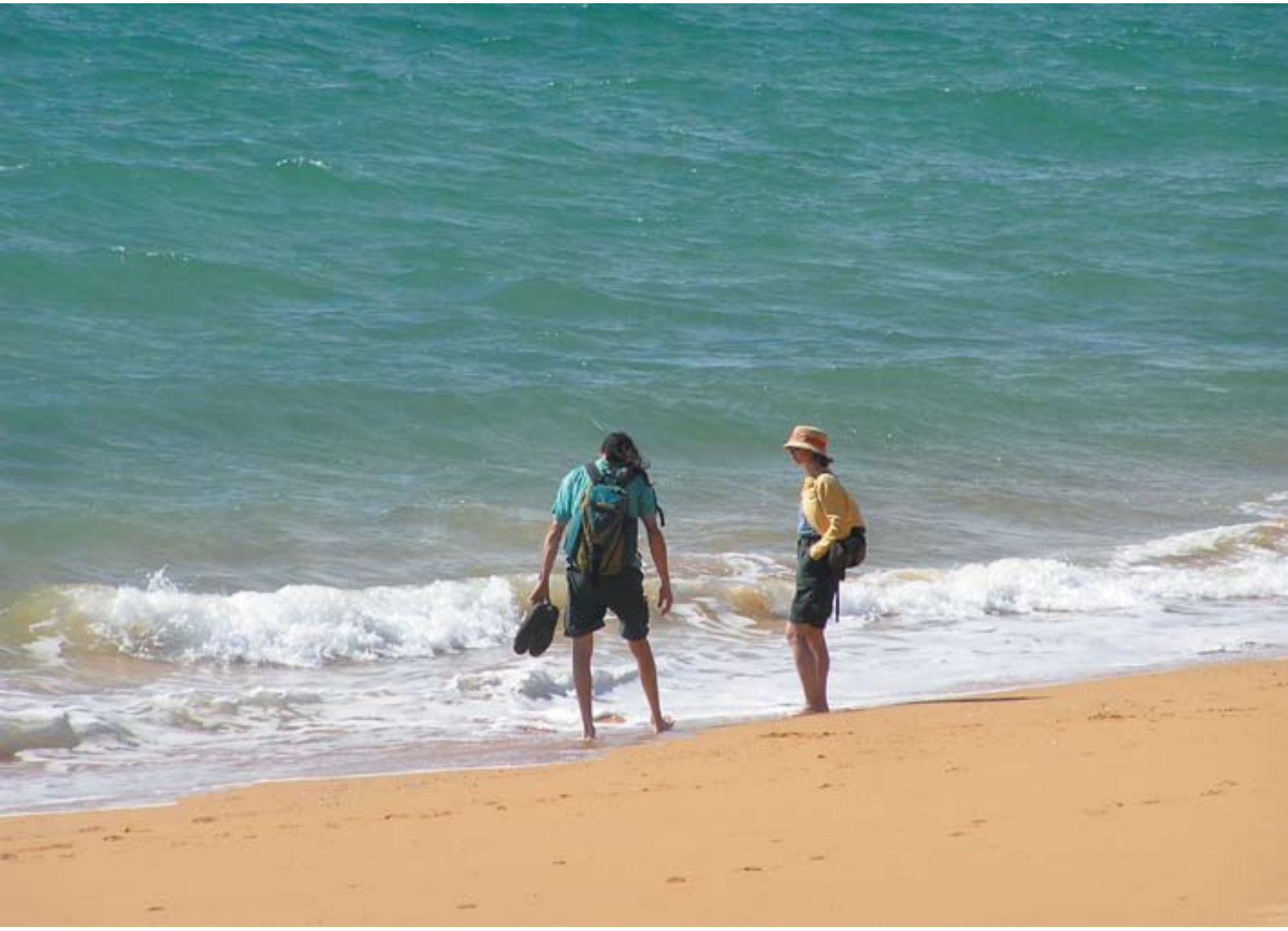
The value of conservation

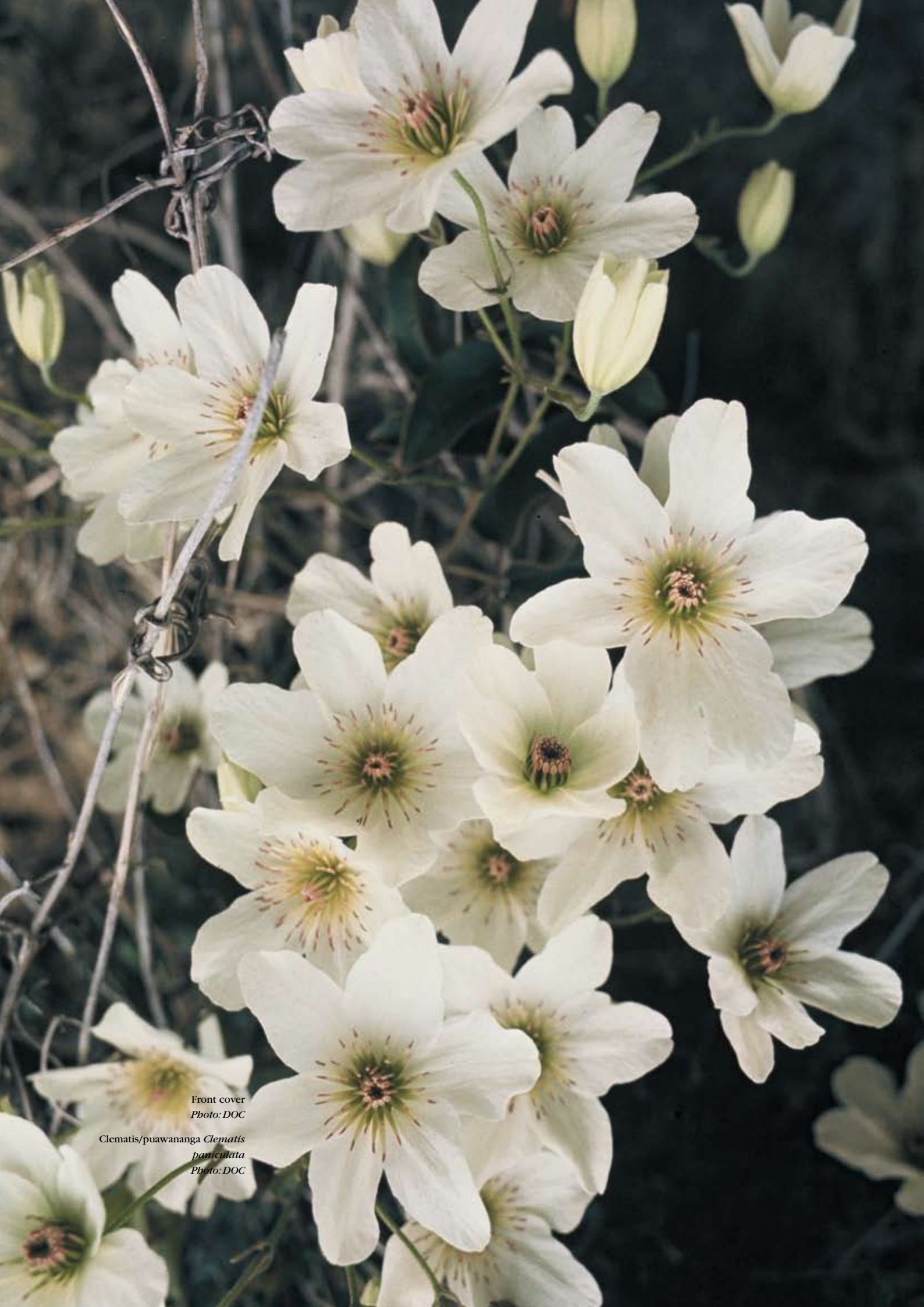
What does conservation contribute to the economy?

The economic impacts of public conservation lands in New Zealand with case studies on the West Coast of the South Island, Fiordland National Park, Abel Tasman National Park, Queen Charlotte Track, Tongariro National Park including the Mt Ruapehu skifields, Southern Lakes Ski Areas, Te Papanui Conservation Park, and Cape Rodney – Okaraki Pt marine reserve.

OCTOBER 2006



Department of Conservation
Te Papa Atawhai



Front cover
Photo: DOC

Clematis/puawananga *Clematis paniculata*
Photo: DOC

FOREWORD FROM THE MINISTER OF CONSERVATION

Chris Carter
Minister of Conservation

For many New Zealanders our national parks and public conservation lands are part of our Kiwi identity. Up until now, we've reserved and protected unique landscapes, special places and habitats for native species because we've recognised we have a responsibility to future generations to ensure the experience of New Zealand's natural environment remains a part of the Kiwi way of life.

But this is now changing. Increasingly, people are becoming aware that in addition to the social and environmental reasons for conservation, there is a hitherto under-recognised economic rationale.

This publication explores that economic rationale more fully, and seeks to answer some of the questions the public have been asking. It draws on the findings of studies commissioned by the Department of Conservation to assess the economic impact of Fiordland National Park, conservation lands on the West Coast, Te Papanui Conservation Park in Otago, Abel Tasman National Park, the Queen Charlotte Track in Marlborough and Tongariro National Park. Independent economic impact reports on the Mt Ruapehu skifields (in Tongariro National Park), and on the five Southern Lakes ski areas (three of which are on public conservation land) and the Cape Rodney – Okaraki Pt marine reserve are also included.

The most obvious and immediate economic impact readers will discover is the enormous contribution conservation makes to regional wealth and employment, largely through tourism. International tourism is now our single largest foreign exchange earner. Tourism, generally, is a key driver of many regional economies, and the appeal of natural attractions in New Zealand is a key driver of the industry, particularly in areas like the West Coast, Nelson-Tasman/Marlborough, and in Queenstown and Te Anau.

But this publication also outlines many of the subtler and more complex economic contributions natural environments supply, such as "ecosystem services".

Ecosystem services are the natural processes nature provides for free, and from which we benefit. They include services like fresh water filtration and allocation, soil maintenance, erosion and flood control, and the role the environment has to play in the maintenance of food stocks, such as whitebait.

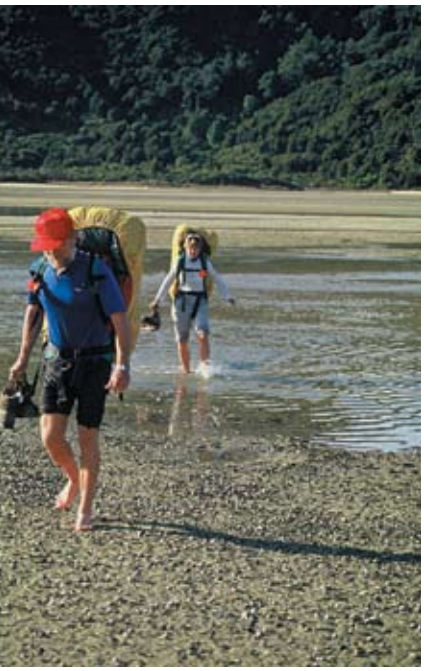
Around the world there is a growing realisation that these kinds of services actually underpin sustainable development and economic growth, and thus have a significant economic value, even though technically we don't have to pay for them.

Many of these services are extraordinarily difficult to provide artificially, if not impossible. If we destroy the ability of natural areas to provide them, we face considerable costs and consequences in trying to replace them. For this reason, it is crucial economic markets, government policies and legislation recognise ecosystem services and their importance. To achieve that recognition, they need to be understood by the public.

One of the best ways to preserve ecosystem services is to protect important landscapes and environments that provide those services. As this publication demonstrates, public conservation lands, which span some 8 million ha, do just that. They safeguard the "natural capital" of New Zealand.

Chris Carter
MINISTER OF CONSERVATION

Introduction



Crossing Awaroa Inlet, Abel Tasman National Park coastal walk
Photo: DOC

Sea kayaking, Abel Tasman National Park
Photo: Andy Dennis

Conservation is big business in New Zealand – one-third of our country is set aside as national parks and other conservation areas – but do we really know just how big?

In the 2006/07 financial year, the budget of the Department of Conservation was $277.2 million. Some 47 per cent of this money was spent managing natural heritage, our landscapes and our species. Another 42 per cent was spent managing the enormous recreation opportunities provided on conservation land. DOC manages $400 million worth of backcountry huts, walking tracks, bridges and other visitor infrastructure.

It is well known that our natural environment and the recreation opportunities in it underpin tourism in New Zealand. Tourism contributes around $17.2 billion, or 9.5 per cent, to GDP. Overseas tourism accounted for $8.1 billion or 18.7 per cent of our exports in 2005, making the industry New Zealand's largest foreign exchange earner.

The tourism figures suggest that there is a significant economic benefit derived from the protection and management of public conservation lands. But tourism is just one small part of the picture. There is also additional economic value in mining and electricity generation, filming, the harvesting of fish and game, the pursuit of health and wellbeing, and ecosystem services, such as water/soil conservation and healthy habitats, all of which of are provided in public conservation areas.

To assess just how big a business conservation is in New Zealand, the Department of Conservation has commissioned independent Christchurch economists Butcher Partners Ltd to measure the economic impacts of the direct use of public conservation land and DOC management at a regional level at three sites, using economic impact analysis.

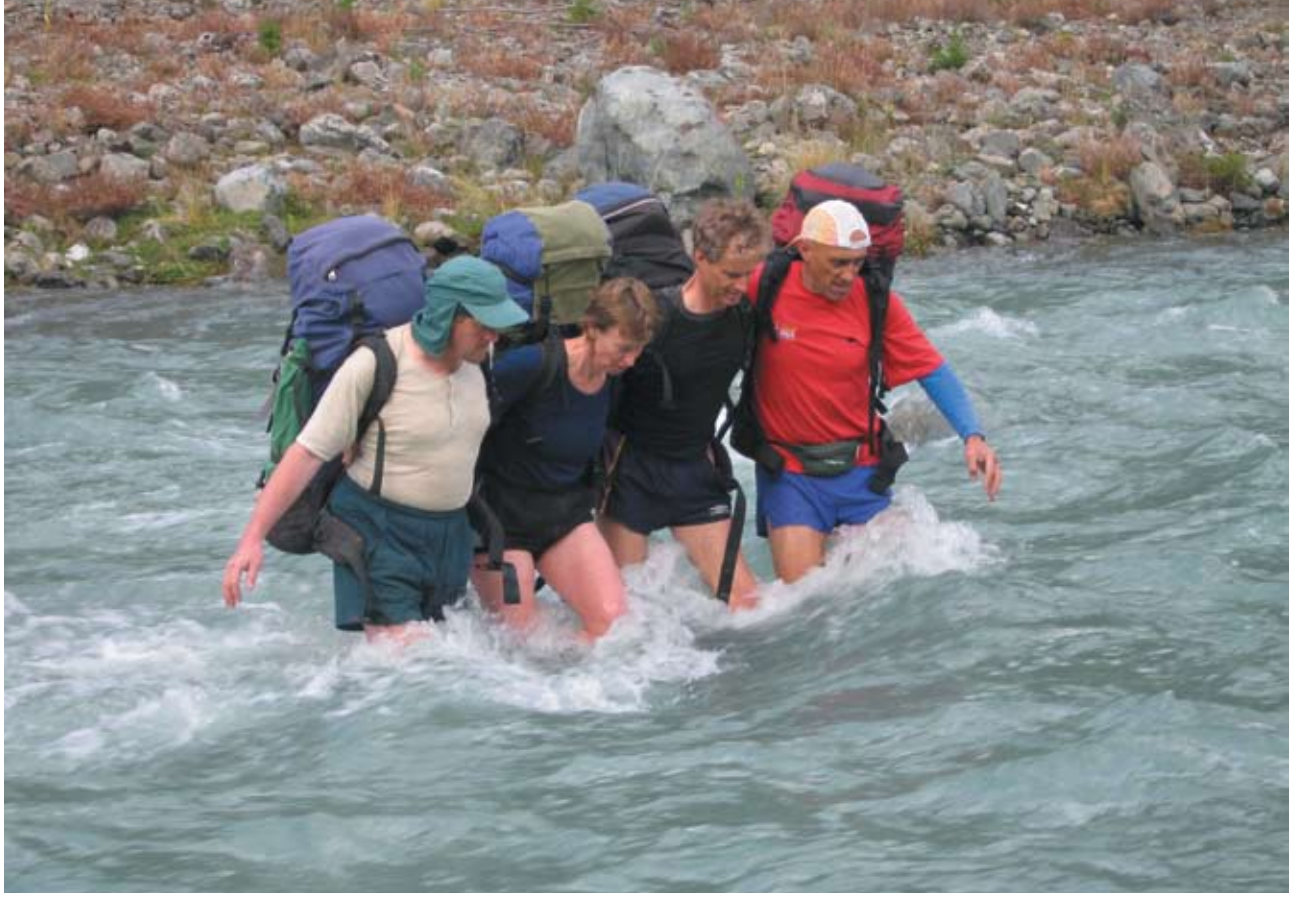
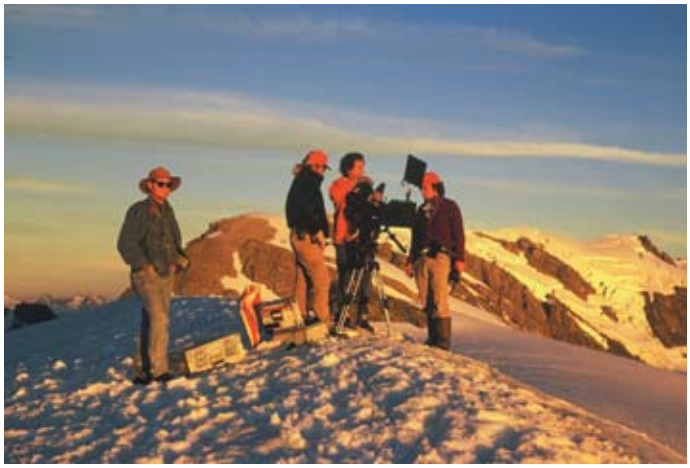


Photo: Ridgeway Lythgoe

The **West Coast** was chosen for the first study largely because public conservation land accounts for 84 per cent of the region's total area. It was expected that the economic impacts of tourism and mining, in particular, would be significant. The study was completed in July 2004.

Abel Tasman National Park and the **Queen Charlotte Track** were the subject of a second study, completed in May 2005. With 180,000 visitors to the national park, and 30,000 walking the busiest section of the QCT each year, the focus was on tourism impacts on Nelson-Tasman and Marlborough. A similar approach was taken in studying the economic impacts of **Fiordland National Park**, completed in August 2006, with the addition of impacts on New Zealand as a whole.



Filming above Franz Josef Glacier
Photo: Andy Dennis

In studying the water supply services provided by **Te Papanui Conservation Park** in Otago, Butcher Partners measured their value in terms of costs that would be incurred to Dunedin City Council, hydro-electricity generators and farmers needing water for irrigation if the water supply ceased to exist. This study was completed in late 2005.

DOC carried out its own study of DOC concessions in Tongariro, Abel Tasman and Fiordland National Parks in 2004/2005 to assess the economic and social impacts on local communities.

Two studies by the New Zealand Tourism Research Institute have been included, one on the impacts of the **Mt Ruapehu ski industry** on the economy of Ohakune and the surrounding region commissioned by the Ski Areas Association of New Zealand and published in March 2002, and a report completed in December 2005 for New Zealand Trade and Enterprise on the economic significance of the **Southern Lakes Ski Areas**. The case studies end with a summary of a report commissioned by the Rodney Economic Development Trust, completed in 2003, on the direct economic impact of the **Cape Rodney – Okaraki Pt marine reserve.**

ECONOMIC IMPACT ANALYSIS

The case studies for Fiordland National Park, the West Coast, Abel Tasman National Park, Queen Charlotte Track, DOC-concessioned activities in three national parks, the Mt Ruapehu skifields and the Southern Lakes Ski Areas were carried out using economic impact analysis, a standard tool that economists use. This method measures the total dollars spent in a region that would not have been spent if the national park/conservation area did not exist.

One advantage of measuring economic impacts is that the results can be expressed in ways that are familiar to non-economists:

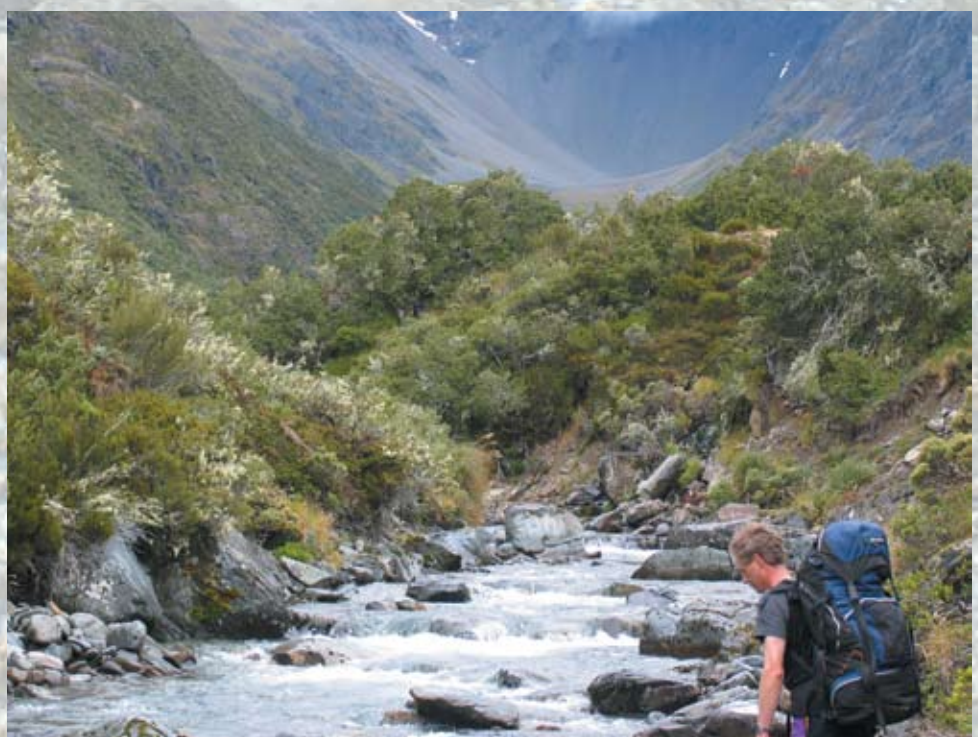
- **Jobs:** number of employees and self-employed persons expressed as full-time equivalents (FTEs).
- **Household income:** what households earn before tax.
- **Value added:** household income plus returns to business capital, i.e. wages, taxes, interest, depreciation, self-employed income and profits.
- **Output:** total turnover, that is, the sum of value added, and purchases from suppliers.

Calculating economic impacts entails chasing the money-go-round in a regional economy, that is, counting what tourists spend on tourism businesses, and what they buy from their suppliers, and so on. The flow-on effects are derived from the direct spending using formulas known as **multipliers**.

Multipliers are based on economic models of regional economies. For instance, on the West Coast, the average multiplier for all types of employment in respect of public conservation land is 1.26. That means that if there are 1442 jobs directly related to conservation, the total number of jobs generated in the region is 1814. The additional 372 jobs include the extra retail staff, hairdressers, bankers, builders, petrol station workers and so forth needed to service the 1442 workers.

Using economic impact analysis, it is possible to estimate how much extra money is pumped into a local economy, the number of new jobs created, and the contribution to a region's household income and to business profits as a result of a national park or conservation area.

The studies on following pages prove that public land is not a "lock up" of resources, rather, it provides a platform for businesses to operate sustainably.



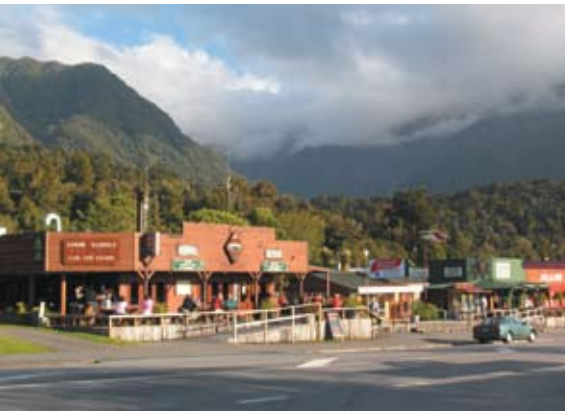
South Temple Stream, Lake Ohau catchment
Photo: Herb Christophers/DOC

Background image
Photo: Herb Christophers/DOC

Whitebaiting on the West Coast
Photo: Philippe Gerbeaux

WEST COAST PUBLIC CONSERVATION LAND

The West Coast covers 1.9 million ha of land managed by the DOC West Coast/Tai Poutini Conservancy, around 84 per cent of the region's total area. It incorporates parts or all of Kahurangi, Paparoa, Arthur's Pass, Westland and Mt Aspiring National Parks, as well as a number of forest parks.



Fox Glacier
Photo: Herb Christophers/DOC

The study found that economic activities arising in relation to public conservation land made a significant contribution to the West Coast economy – 15 per cent of the 12,341 full-time job equivalents in the region in 2003, 13 per cent of total household income, and more than 10 per cent of total gross output.

Today the figures would be significantly larger, with new developments occurring on public conservation land, and projected increases in tourism to the West Coast. Tourism to the West Coast grew by 31 per cent in volume and around 10 per cent in value between 2000 and 2003, and a Lincoln University survey has found that more than 65 per cent of visitors to the West Coast have public conservation land as their prime reason for visiting.

West Coast conservation land
impact on the West Coast in 2003

DOC spending	$13.0m
Jobs	1814
Output	$221.6m
Value added income	$117.7m
Household income	$62.1m

DOC employs 150 staff on the West Coast. As at 2003 there were 58 mining concessionaires, and 682 holders of non-mining concessions, mainly for tourism, farming, gathering sphagnum moss, electricity transmission lines and telecommunications.

Data for the study came from DOC expenditure figures, estimated value of DOC concession operations, and regional tourism figures. Butcher Partners also updated economic models for the region, and developed new economic multipliers for tourism, farming, the mining industry and DOC activity to calculate indirect and induced impacts on the regional economy.

Halls Arm, Doubtful Sound – a typical fiord landscape
Photo: Les Molloy

FIORDLAND NATIONAL PARK

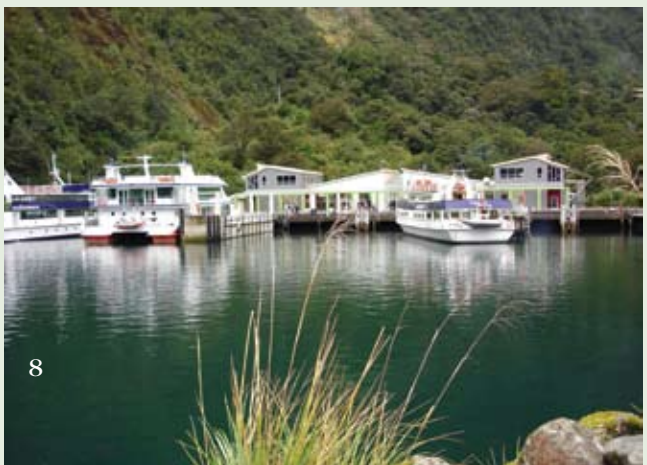
At 1.26 million ha, Fiordland National Park covers 15 per cent of public conservation land in New Zealand. Indented by fiords and splashed with lakes, this mountainous and forested region epitomises wild, untouched nature. It is also a treasure trove of economic value, not least in offering opportunities for private businesses in tourism and recreation.

Less easy to measure but important nonetheless are the value that Fiordland National Park has for its own sake – its intrinsic or existence value – and its value for present and future generations. These values are reflected in the history of the protection of Fiordland.

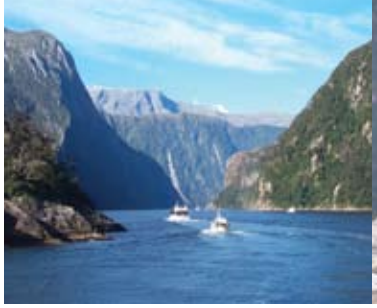
Fiordland National Park
impact on Southland and Queenstown Lakes Districts in 2005

DOC spending	$8.8m
Jobs	1600
Output	$196m
Value-added income	$78m
Household income	$55m

In 1905 the colonial government of New Zealand set aside 940,000 ha for a national park, formally constituted in 1952 with land added to it. Fiordland National Park has also grown in international importance as part of Southwest New Zealand (Te Wahi Pounamu), listed as World Heritage in 1986 and doubled in area in 1990.



World Heritage status recognises the region's outstanding glaciated landforms, and native flora and fauna. Around 700 species of plant are found only in Fiordland. It was the last refuge in New Zealand for the kakapo and the takahe, both species on the brink of extinction.



From left –Tour boats on Milford Sound
Kea at Crayfish Heights, Fiordland
Mitre Peak
Photos: DOC

Following the methods used in the Abel Tasman National Park/Queen Charlotte Track study, surveys of visitors and tourism concessionaires have formed the basis for a study of the economic impacts of Fiordland National Park on the Southland and Queenstown Lakes District economies.

The wider regional focus takes in the importance of Milford/Piopiotahi, with at least 450,000 visitors a year arriving by road or air from Queenstown and Te Anau to view Mitre Peak and, perhaps, take a boat trip on Milford Sound.

Attractions include the world-renowned Milford and Routeburn Tracks, and the Hollyford and Kepler Tracks, as well as the Dusky Sound and Hump Ridge walks, the crossing of Lake Manapouri to Doubtful Sound, scenic flights over the park, and hunting, fishing and rock climbing opportunities.

Fiordland National Park receives around 33,000 overnight visitors and 560,000 day visitors a year, 80 per cent of whom are from abroad.

To measure the impact of Fiordland National Park on the national economy, an additional set of survey questions were asked. The results were that the park is good for New Zealand as a whole, not just Southland and Queenstown Lakes. This is not a case of transferring economic impacts from one region to another.

Ten per cent of overseas visitors to the national park surveyed said that in the absence of the park they would have stayed a shorter time in New Zealand and a further 12 per cent said that they would not have come to New Zealand at all.

Specifically, foreign overnight visitors to Fiordland said that they would have stayed an average of 2.8 nights less in New Zealand, and foreign day-visitors said that they would have stayed an average of 1.6 nights less in New Zealand, if the park weren't there.

Beyond Southland and Queenstown Lakes Districts, Fiordland National Park generates an extra 155 jobs in New Zealand and extra spending of $32 million.

Another way of interpreting the results is to look at the direct spending in New Zealand as a whole by overseas visitors as a result of Fiordland National Park and this figure is $100 million of foreign exchange earnings.

In addition, Fiordland National Park contains the Manapouri hydroelectric power scheme which generates around 5,025 GWh/year (worth $300 million a year).

From left: Moturau hut on Kepler Track
Photo: DOC
Routeburn Track
Odette Singleton/DOC

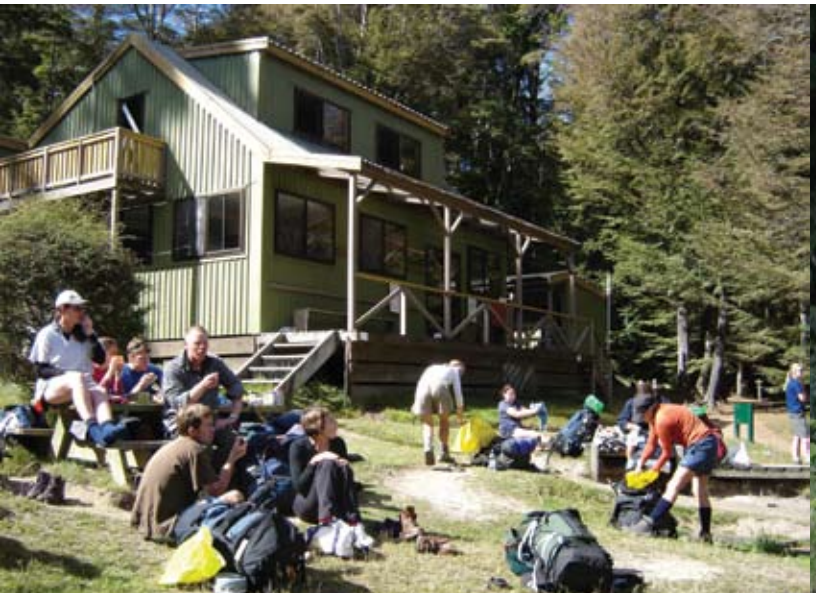
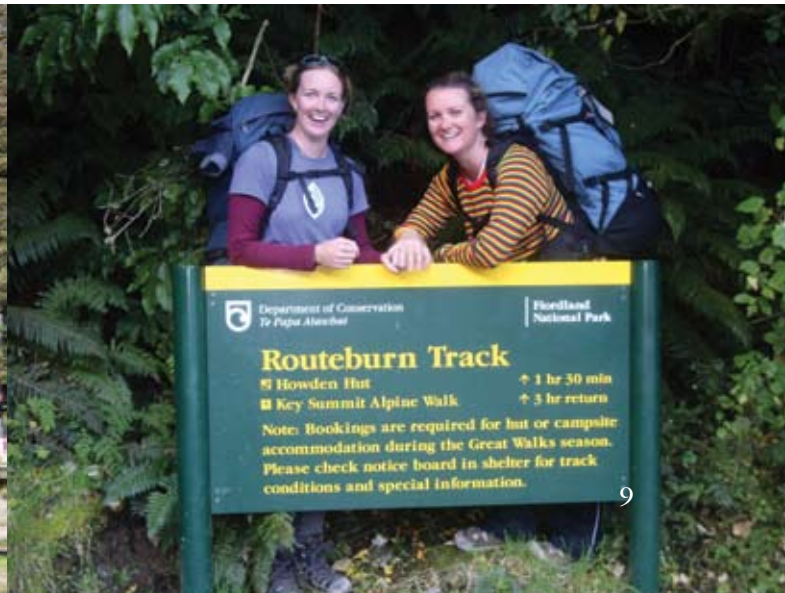



Photo: DOC

ABEL TASMAN NATIONAL PARK/QUEEN CHARLOTTE TRACK

The Nelson-Tasman and Marlborough regions were selected for further economic impact studies to add to the results for the West Coast. Two candidates presented themselves: Abel Tasman National Park and the Queen Charlotte Track. In both cases, tourism is the focus. Butcher Partners carried out visitor surveys to estimate visitor expenditure.

Abel Tasman National Park
impact on Nelson-Tasman

DOC spending	$1.2m/yr
Jobs	370
Output	$45m/yr
Value added income	$18m/yr
Household income	$11m/yr

Visitors were surveyed on what they spent during the 24 hours prior to getting to the site (to establish average expenditure in the region), expenditure at the site, expected duration of stay at the site and in the region, and how long visitors would have stayed in the region had they not been able to visit the site (to avoid counting tourism expenditure that would have occurred in any case).

Concessionaire activities (e.g. water taxis, kayak hire) and some DOC activities, which were estimated separately, are funded by visitor spending. Tourism spending on these activities was not counted to avoid double counting.

At Abel Tasman, visitors were divided into walkers, kayakers and Totaranui campers. Average daily spending figures were calculated for each group and then multiplied in each case by the numbers of visitors and the average time spent on each activity.

Abel Tasman National Park

At 22,530 ha, the headlands straddling Tasman and Golden Bays form the smallest of New Zealand's 14 national parks. Abel Tasman is best known for the 51km coastal Great Walk, taking in bush and forest-fringed golden sands and turquoise waters, granite headlands and islands, with ample camping and tramping facilities along the route.

The area attracted around 180,000 visitors in 2004, including 75,000 day walkers, 24,000 overnight trampers, 29,000 kayakers, 10,000 day boat users, and 10,000 staying at Totaranui, as well as 30,000 visits to the park by private boat, and 10,000 visitors using only the beaches and not the walking track.



Photos: DOC

Queen Charlotte Track

A water taxi ride away from Picton, the 71km track spans forested and farmed public conservation land and private land between Ship Cove and Anakiwa. Part of the attraction is the water taxi service, offering access to several landing points and a backpack-carrying service, allowing visitors to choose the number of days they wish to spend on the track. The private huts and lodges en route offer a wide range of accommodation standards.

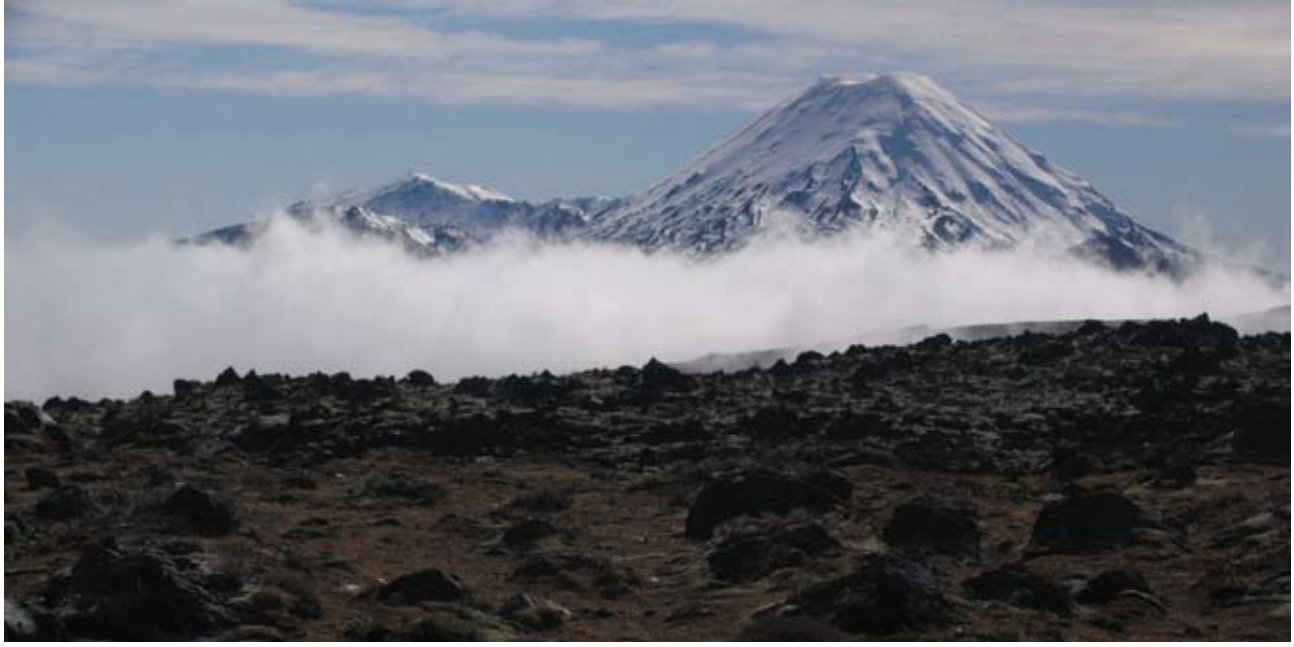
The track is open to mountain-bikers, except along the busy Ship Cove-Punga Cove leg between 1 December and 28 February, making the Queen Charlotte one of the few dual-use tracks in the public conservation estate. It is also one of the few tracks where people can walk comfortably side by side.

Queen Charlotte Track
impact on Marlborough

DOC spending	$0.2m/yr
Jobs	98
Output	$9.4 m/yr
Value added income	$4.3m/yr
Household income	$2.5 m/yr

Around 30,000 people walked or mountain-biked the busiest section in 2003–2004. There were 53,000 visitor-nights spent on the track in a year, and 12,000 visitor-days for people not staying overnight. The track directly supports more than 10 private accommodation businesses and three water taxi companies.

Queen Charlotte Track
Photo: DOC



Mt Ngauruhoe, Tongariro National Park
Photo: DOC

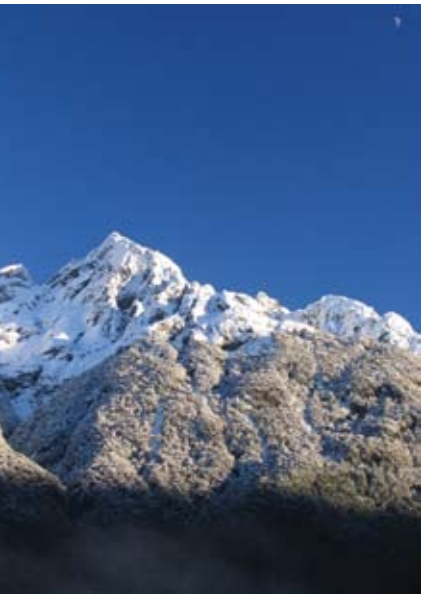
CONCESSION-BASED TOURISM IN THREE NATIONAL PARKS

Concessioned tourism activities (*) in Tongariro, Abel Tasman and Fiordland National Parks were studied in 2004/2005 to measure the socio-economic effects of DOC-managed activity on gateway communities and surrounding regions.

The results showed that the concessioned tourism activities examined are responsible for around 14 per cent of tourism jobs in the Taupo-Ruapehu region, 32 percent in Fiordland, and 1 per cent in Nelson-Tasman.

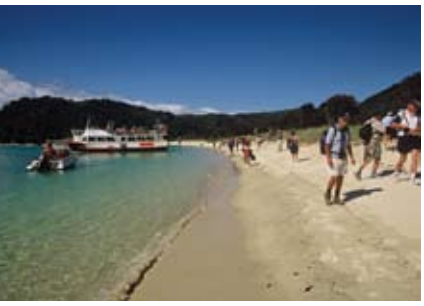
Concessioned activities in Tongariro National Park are dominated by the ski fields and accommodation in the gateway village of Whakakapa, and Abel Tasman by sea kayaking. In Fiordland, concessioned tourism includes a range of guided opportunities, transport activity and accommodation.

Operators in the three locations rely heavily on park resources for their business. Many rely entirely on concessioned tourism, while others also pursue non-concessioned tourism activities (such as boat cruises in Milford Sound).



Eglinton from Knobs Flat
Photo: Herb Christophers/DOC

National Park:	**Tongariro**	**Abel Tasman**	**Fiordland**
Impact on:	Taupo-Ruapehu	Nelson-Tasman	Queenstown Lakes
Jobs:	570	73	375
Output:	$43m/yr	$7.5m/yr	$64m/yr
Value-added income:	$20m/yr	$3.8m/yr	$29m/yr
Household income:	$14m/yr	$2.3m/yr	$14m/yr



The *Abel Tasman Explorer*", Torrent Bay, Abel Tasman National Park
Photo: Andy Dennis

A key part of the study was to determine the multiplier effects of DOC tourism concessions on regional economies. In Tongariro National Park, for every dollar generated by the concession, a further 40 cents of regional spending occurs, and every concessioned job generates an extra 0.3 jobs. For Abel Tasman, the figures are extra spending of 60 cents and 0.4 jobs, and Fiordland, 30 cents and 0.2 jobs.

Because of the multiplier effect, DOC concession holders help sustain other businesses and services in gateway communities. For instance, more than one-third of Fiordland National Park concession holders are located in Te Anau and Manapouri alone.

(*) The economic impacts are limited to those of concessionaires located in the study regions. Figures for Fiordland National Park are conservative as data was incomplete. The significant water taxi and cruise boat operations in Abel Tasman and Fiordland National Parks do not require a DOC concession, and the Milford aircraft industry did not require concessions during the period of study.

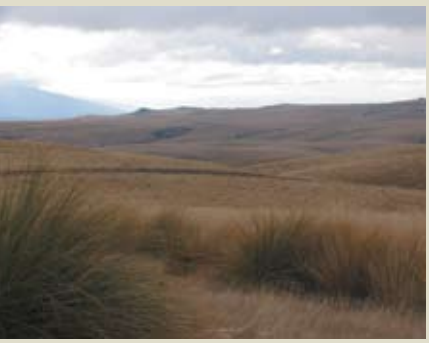


Photo: Herb Christophers/DOC

THE VALUE OF WATER IN TE PAPANUI CATCHMENT

The conservation values of the South Island high country were defined in the Crown Pastoral Lands Act 1998 as public access and recreation opportunities, native species, historic and cultural heritage, and landscapes. A significant omission from this list is ecosystem services. These can be of high economic value to regions, as a study of Te Papanui Conservation Park's water supply services has shown.

Te Papanui Conservation Park occupies 22,000 ha of tussocklands 60km northwest of Dunedin. Much of this land was on the former Rocklands Station, now transferred into DOC management via tenure review of the pastoral lease. What is special about the Central Otago tussocklands are the tightly-clustered blades of grass which trap condensation from the mists that frequently cloak the ranges and convey the water into the soil structure. Research has shown that snow tussocks are 31 per cent better at retaining water than exotic forest.

Te Papanui Conservation Park
net present value of water in 2005

Dunedin's drinking water	$93m
Hydro-electricity	$31m
Irrigation of Taieri farms	$12m
Total	**$136m**

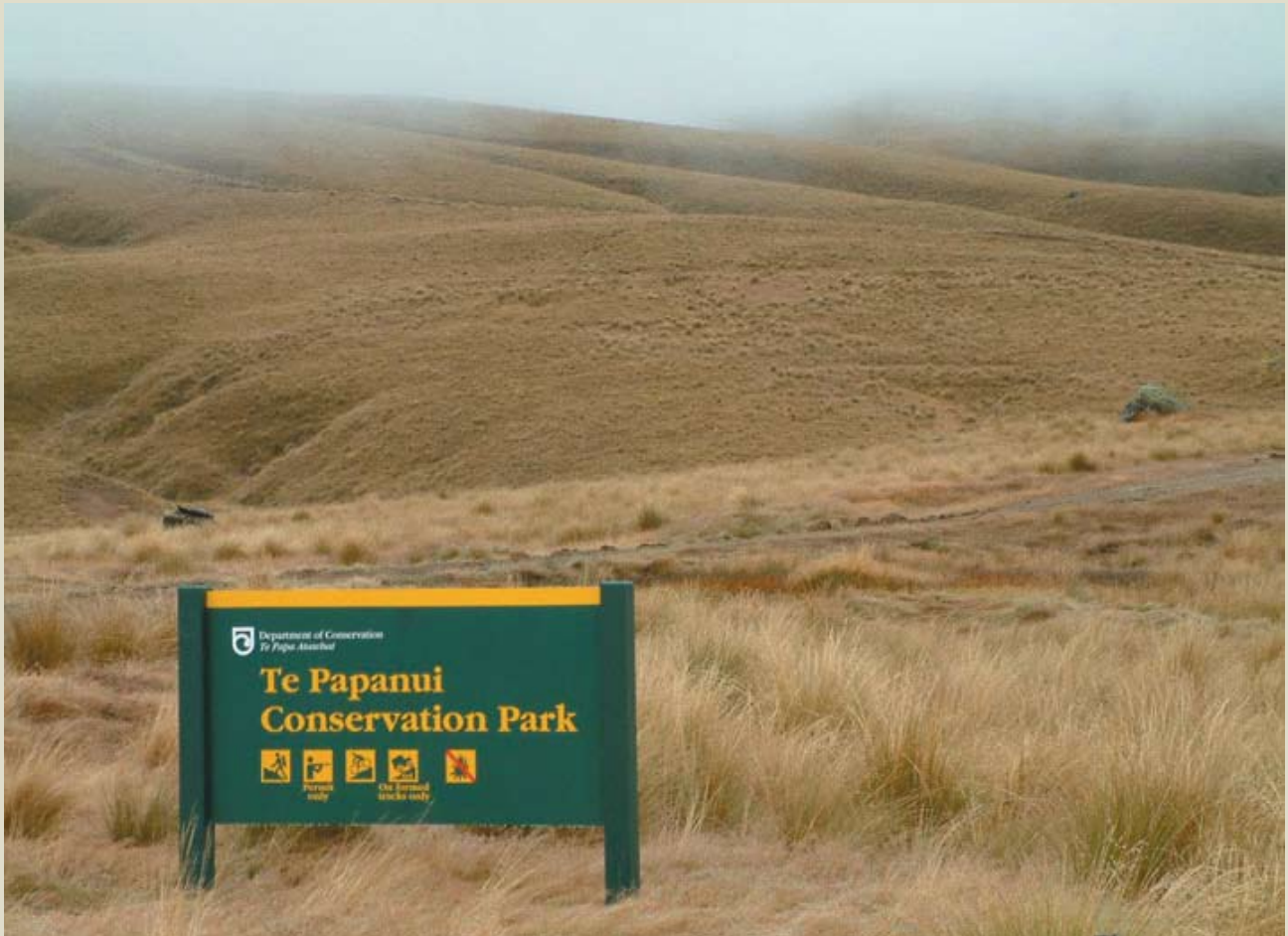
In approaching a valuation of Te Papanui's water supply, Butcher Partners Ltd asked this question: if the water supply were suddenly removed, how much would it cost the biggest users to get the water from somewhere else?

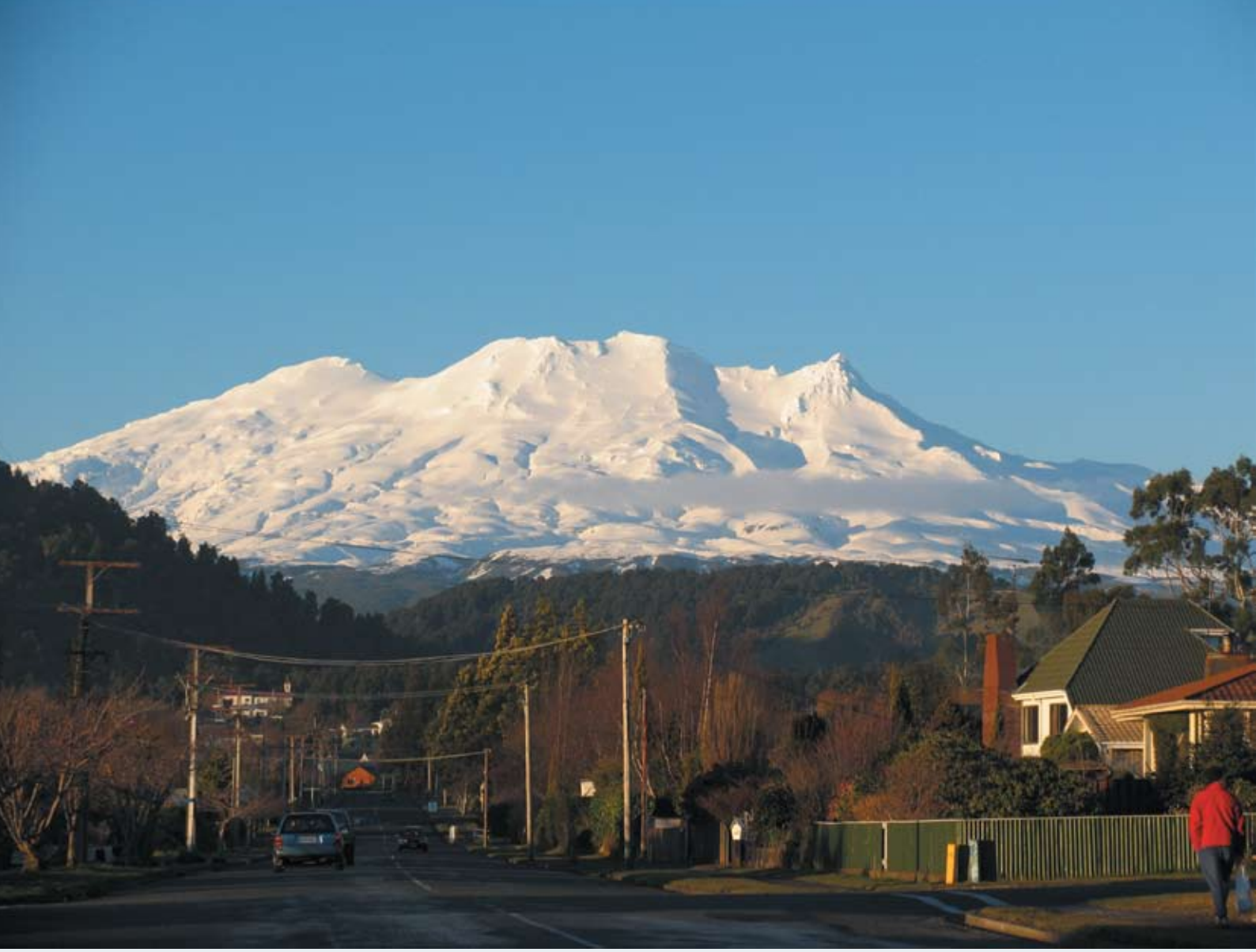
The resulting value of the water supply was $11 million a year (in 2005 dollars) to provide water for Dunedin residents, hydro-electricity generators in the region, and to irrigate the fields of Taieri farmers. This figure equates to a one-off payment in 2005 of $136 million.

A key point illustrated by the study is this: just because current users do not have to pay for Te Papanui water does not mean that it does not have value. Furthermore, the fact that this land is now protected has economic implications.

To determine how much better off people in the region are from Te Papanui water, a study would be needed to compare water levels and quality with continued farming at Te Papanui with a change of land-use.

Photo: Nicola Vallance/DOC



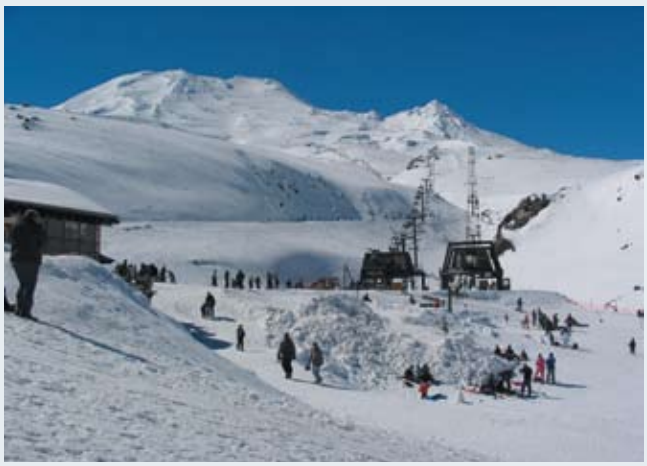


Mt Ruapehu from Ohakune
Photo: Herb Christophers/DOC

MT RUAPEHU SKIFIELDS

Mt Ruapehu skifields
impact on Ohakune and region

Jobs	2142
Regional output	$19.1m
Skiing output	$26.5m
Total output	**$45.6m**



Turoa skifield
Photo: Herb Christophers/DOC

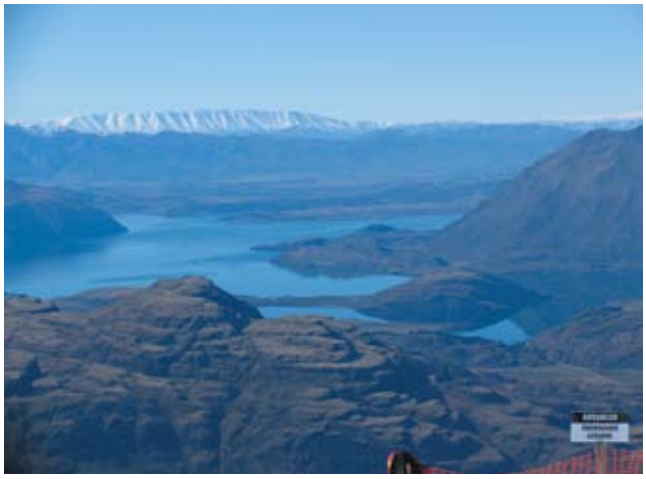
Research on the economic impacts on Ohakune and surrounding region of the Whakapapa and Turoa skifields, both in Tongariro National Park, was carried out by the New Zealand Tourism Industry Institute between June and September 2001.

In commissioning the research, the Ski Areas Association of New Zealand was keen to improve co-ordination between on-mountain and off-mountain businesses to get more out of tourism opportunities to the region, and specifically to Mt Ruapehu.

Surveys were carried out on (1) visitors to each skifield, (2) users of accommodation in Ohakune, (3) Ruapehu Alpine Lifts employees, and (4) businesses in the region. On these direct impacts, economic multipliers were applied to calculate the indirect and induced impacts.

The Mt Ruapehu skifields account for around 40 per cent of skifield business in New Zealand, and are two of 18 skifields on public conservation land nationwide.

SOUTHERN LAKES SKI AREAS



Lake Wanaka from Treble Cone
Photo: Herb Christophers/DOC

Southern Lakes Ski Areas
impact on the Southern Lakes region

Jobs	3300
Skiing direct output	$105m
Regional direct output	$48.3m
Total direct output	**$153.3m**

The five Southern Lakes Ski Areas are: The Remarkables, Coronet Peak, Treble Cone, Cardrona, and Waiorau Snowfarm. The first three are on public conservation land and the remainder are privately owned.

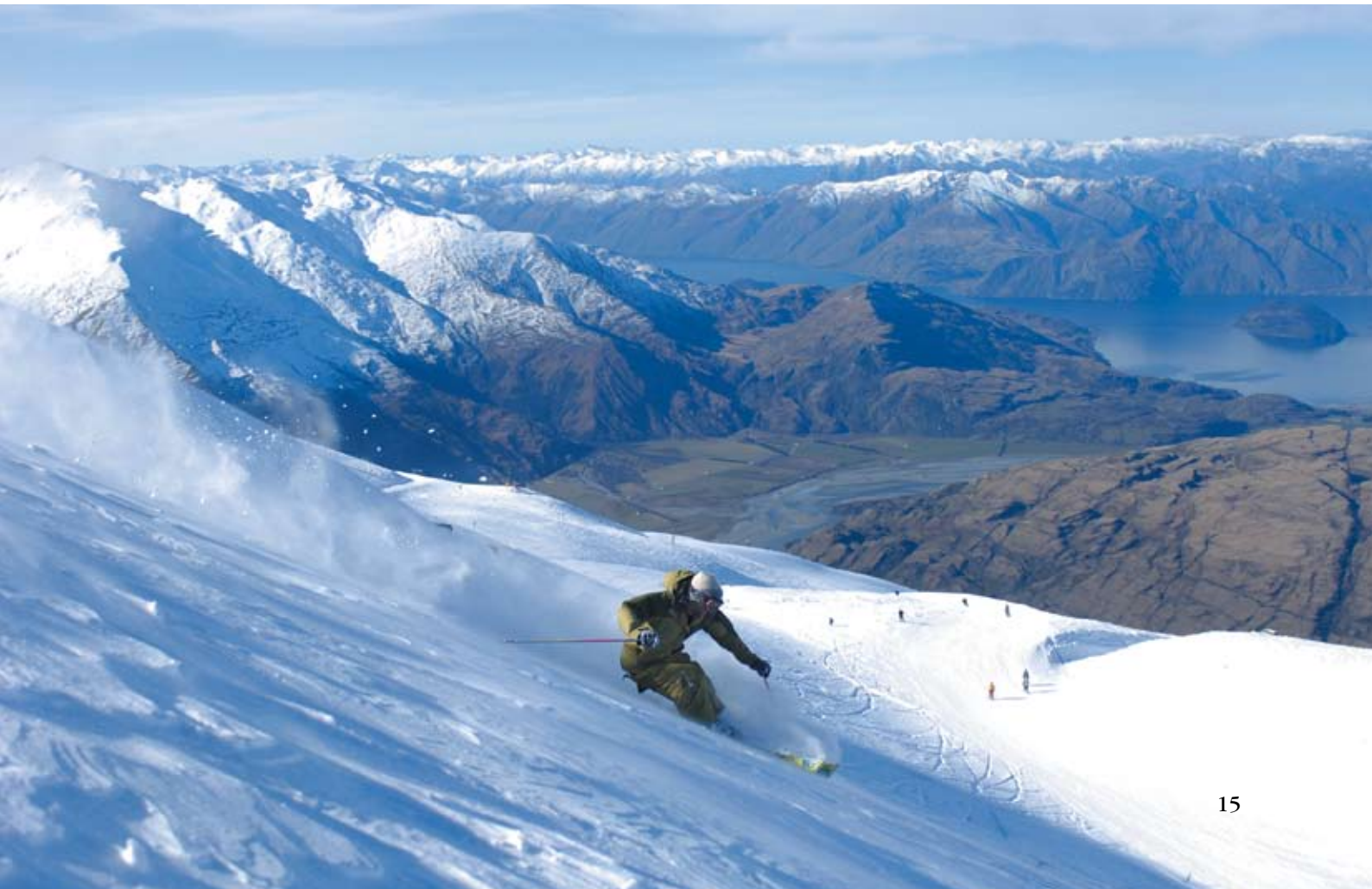
The report by the New Zealand Tourism Research Institute for New Zealand Trade and Enterprise carried out for the 2005 winter season covered visitor characteristics and spending, and the income and jobs generated by the skifields. The researchers surveyed visitors and local businesses, and interviewed ski area representatives.

The total output figure calculated did not include indirect and induced impacts, unlike the Butcher Partners and Ruapehu ski industry studies in which economic multipliers were used. For this reason, the gross output for the Southern Lakes Ski Areas would be higher than the figures tabled below.

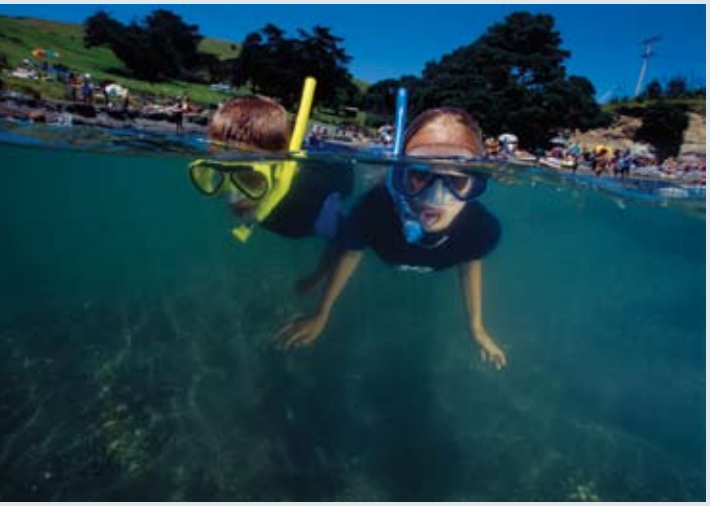
As well, the Tourism Research Institute estimated an additional direct spend elsewhere in New Zealand by visitors to the Southern Lakes Ski Areas at $68.1 million, to demonstrate the national significance of this industry.

Note: It is not possible to isolate the economic impacts of the ski areas on public conservation land from the privately-owned ski areas because some visitors used more than one skifield, and because all visitors use the same accommodation and other related facilities, centred in Queenstown and Wanaka.

Photo: Treble Cone Skifield



CAPE RODNEY – OKARAKI PT MARINE RESERVE



Children snorkelling,
Goat Island Bay
Photo: Daryl Torchler

New Zealand's first marine reserve occupies the coastal strip between Cape Rodney and Okaraki Pt, north and east of Auckland. At its gazettal in 1975 the area was effectively a marine desert from the effects of fishing. Now the area teems with snapper, moki, blue cod and other fish. The seaweed forests have returned, as have rock lobsters, shellfish and other sea floor species.

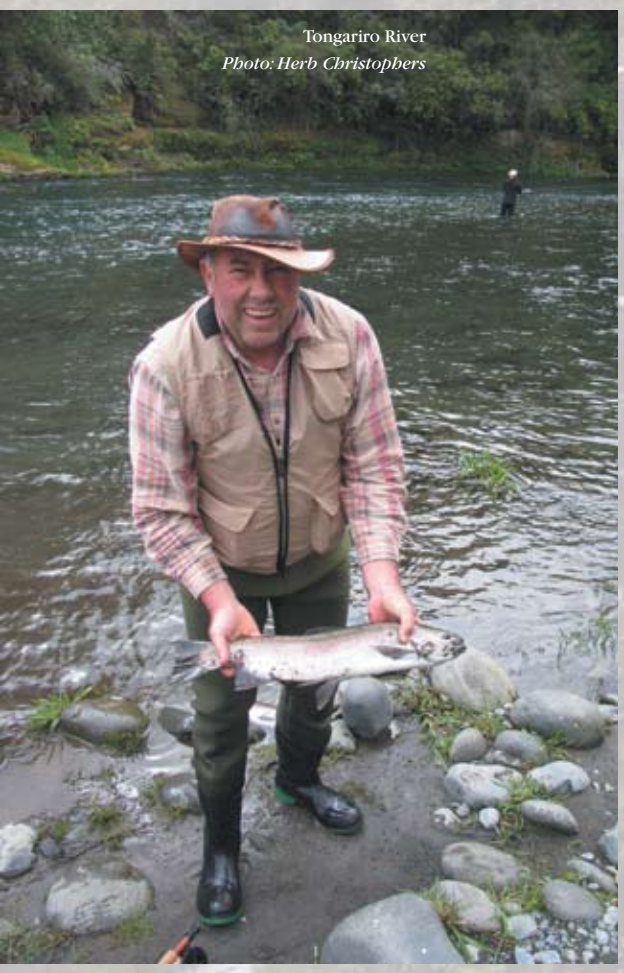
With the marine life has come tourism to the white sands and clear waters. Some 260,000 people visited the marine reserve – aka the Leigh or Goat Island marine reserve – in 2002.

Estimating that seven of every 10 visitors to the marine reserve are adults and three are children, and that each adult spends on average $60 per visit, and children, $20, the direct visitor spend in the marine reserve area was $12.5 million in 2002.

Of this figure, 51 per cent was spent on food, 16.5 per cent on retail, 16 per cent on wine, 5 per cent on accommodation, and 3 per cent on the hire of diving equipment. This activity has seen the opening of businesses such as glass bottomed boat cruising, cafes and restaurants, homestays and other accommodation, and a museum.

The flow-on effects of direct spending on the wider Rodney District economy were not measured. The study concluded that much of the development would not have occurred had it not been for the marine reserve.

Snapper and blue maomao.
Goat Island Bay
Photo: Daryl Torchler



Tongariro River
Photo: Herb Christophers

Moke Lake, Central Otago
Photo: Dave Mitchell

BACKGROUND ON "ECOSYSTEM SERVICES"

The air we breathe, the water we drink, the soils that sustain our pastures, forestry, orchards and crops are examples of environmental goods that benefit humans. Without them, life on Earth would be impossible.

These goods – air, water and soil – arise from interactions between living things, such as chemical reactions and mechanical processes. Ecosystem processes that benefit humans are called "ecosystem services".

When fungi, worms and bacteria convert sunlight, carbon and nitrogen, they provide an ecosystem service resulting in soil that farmers and gardeners use. When the marine environment allows tuna, snapper, hoki, squid and other commercial species to thrive, it is providing an ecosystem service to the fishing industry.

Ecosystem services deriving from public conservation lands appear in many forms:

Provisioning services

- Ecosystems and habitats that nurture fish and game, and other species that are harvested, either commercially, for customary or subsistence use, and/or for recreation.
- Ecosystems and habitats that provide opportunities for bioprospecting.
- Ecosystems and habitats that provide resources for scientific research.
- Ecosystems that provide fresh water for drinking, hydro and irrigation.

Regulating services

- Ecosystems and habitats that may capture carbon and regulate the effects of human-caused climate change.
- Vegetated catchments that regulate supply of water, mitigate flooding, reduce erosion, and reduce the rates of silting up of harbours and estuaries.

Supporting services

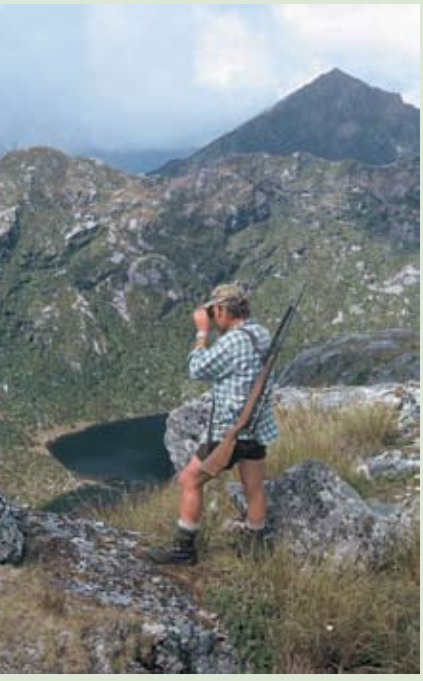
- Native bees, which are varroa bee-mite resistant, may provide important pollination services for horticulture and pastoral farming.
- High-biodiversity ecosystems and habitats, such as wetlands, that provide nutrient recycling and environmental detoxification services to improve aspects of the environment such as water quality.
- Ecosystems – e.g. bacteria, flies, worms, fungi – that decompose decaying organic matter into essential minerals and other resources such as soil and purified water.

Cultural services

- Ecosystems and habitats that provide attractive places to visit for recreation (e.g. tramping, mountain-biking, camping, sightseeing, photography, snorkelling and diving), and for conservationists.

Lake Te Anau
Photo: Amanda Christophers

Ruby Lake, West Coast
Photo: DOC



- Ecosystems and habitats in which people may pursue improved health and wellbeing, and/or for spiritual and/or cultural purposes.
- Ecosystems, habitats and scenery that provide the backdrop to New Zealand's clean, green image, and draw overseas tourists and film-makers to New Zealand.

Ecosystem services are often taken for granted, because they are "free", that is, not traded directly in markets – unlike fish, vegetables and timber. The value to society of ecosystem services becomes more apparent when:

- They are in decline – when air and water is polluted, when erosion and overgrazing degrades soils, when deforested catchments lead to flooding in heavy rain, when whitebait catches fall on the removal of wetlands and streams for farming.
- There are conflicting demands on use – between hydro companies, irrigators, kayakers, anglers and rafting companies for river flows; between diving tourism companies, recreational snorkelers and fishers for healthy marine environments.

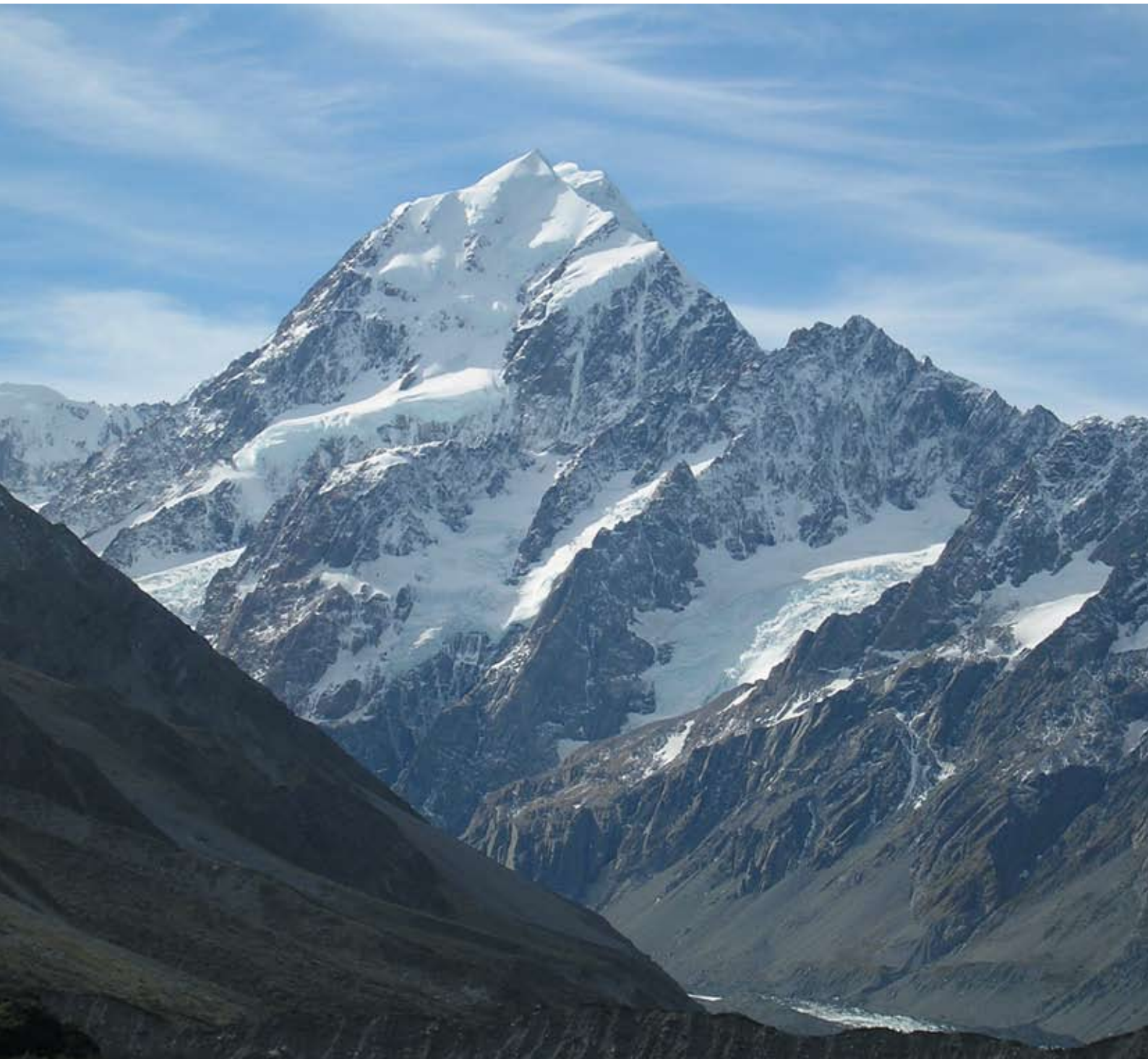
In these situations, the ecosystem services are no longer free, but, in the absence of markets and well-defined property rights it is unclear how they should best be managed. Also, ecosystems are so complicated that it is impossible to reproduce them artificially. Rather, humans impact on ecosystems, and in some cases the impacts are irreversible. The more the ecosystems are modified, the simpler they are likely to become and provide fewer services.

Conclusion

While the intrinsic values and recreation benefits of public conservation land are well known, the economic and health benefits are assuming increasing significance.

Failure to appreciate non-market values such as ecosystem services carries a risk of deterioration of natural capital in New Zealand, with consequences including increased flood risk, reduced whitebait catches, impoverished tourism experience, and damage to our clean, green image.

The first steps in preventing further decline in ecosystems (and the services they provide) are to recognise that they have economic values, and to attempt to measure at least some of them. Armed with this information, the Department hopes to make better-informed conservation decisions, and increase public awareness of what is at stake in our national parks and, generally, on public conservation land.



Aoraki/Mt Cook – supplying water to the Benmore Dam
Photo: DOC

Photo: Herb Christophers/DOC