

# The impact of climate variability on tourism businesses and tourism infrastructure providers in Glacier Country



Jude Wilson

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## Introduction

This report summarises the findings from 24 interviews with tourist operators and infrastructure providers in Glacier Country on the West Coast of New Zealand's South Island. The research was undertaken in September 2011. In line with the area represented by the Glacier Country Tourism Group (GCTG), Glacier Country stretches from Whataroa in the north, to Bruce Bay and Lake Paringa in the south: the majority of tourism activity occurs in and around the settlements of Franz Josef, Fox Glacier, Whataroa and Okarito.

Interviewees were selected to represent a variety of tourism activity types (e.g., air-, water- and land-based operators) and accommodation operators (holiday park, motel), tourist information services and infrastructure providers (the Department of Conservation (DOC), Regional and District Council representatives, road, communication and electricity services). Altogether, five of the tourism interviewees worked in Fox Glacier, ten in Franz Josef, two in Okarito and one in Whataroa; the infrastructure providers were based in Hokitika (the i-SITE and the Westland District Council (WDC)), Greymouth (Telecom, Electronet and the West Coast Regional Council (WCRC)) and Christchurch (New Zealand Transport Agency (NZTA)). In addition to the Franz Josef DOC Information Centre/i-SITE (which also operates as part of the national i-SITE network), interviews with DOC staff included: the Fox Glacier and Franz Josef Area Managers; the Asset Manager, Franz Josef; the Community Relations Manager, Franz Josef; and a Fox Glacier DOC staff member with experience in multiple roles in the region. The roles of these infrastructure providers are summarised in Table 1.

The interviews explored the ways in which tourism businesses and infrastructure providers in Glacier Country currently deal with, and/or plan for, climate variability (i.e., daily weather conditions), extreme weather events (such as severe storms or unusually heavy rainfall events) and predicted longer term climate changes (e.g., increased rainfall intensity, increased westerly wind, reduction in glaciation). This Glacier Country case study follows earlier research undertaken in the Southern Lakes Region and in Northland. A number of climate and weather related tourism issues identified in these earlier studies were also examined in respect of tourism in Glacier Country, including the use of weather information and emergency management. This case study also included an additional set of questions about other future concerns – particularly around the supply and cost of energy for tourism in the region – and challenges facing tourism in Glacier Country.

The report follows a similar structure as the other two case studies, beginning with an overview of the context in which Glacier Country tourism businesses operate (this includes a description of tourism in the area and the physical resources on which it is reliant, an introduction to West Coast weather and infrastructure challenges associated with these). This is followed by sections which address:

- The main climatic factors impacting on tourism businesses and infrastructure providers in Glacier Country;
- Changes already noted in the weather, attitudes towards climate change and adaptive measures adopted in response to these;
- The use of weather information and forecasting by tourism businesses, infrastructure providers and tourists;

- The impact of the weather on the visitor experience;
- Emergency management;
- Energy concerns (as an important risk factor and potential future challenge); and,
- Challenges to tourism in Glacier Country.

**Table 1 Roles of infrastructure interviewees**

New Zealand Transport Agency (NZTA)	The national roading agency responsible for SH6, which runs down the length of the West Coast. The settlements of Whataroa, Franz Josef and Fox Glacier all straddle this highway. NZTA also partially fund other roads in the region (e.g., the road to Okarito and the glacier access roads) in association with the Westland District Council and the Department of Conservation (DOC). While they have no remit to control rivers they do have to protect their own road assets. They work closely with the West Coast Regional Council and local rating districts with regard to management of the Waiho River.
Telecom	In charge of telecommunications from Karamea to Haast. They are based in Greymouth, but have staff in Westport, Hokitika and Whataroa.
Electronet	Role is to ensure there is capacity to meet electricity demand on the West Coast. Electronet does not have any formal relationship with the tourism industry, but are involved in instances of potential increased demand on the electricity network (e.g., from the ice wall attraction when it was installed at Franz Josef).
West Coast Regional Council (WCRC)	Role in Franz Josef is to provide river engineering advice, do flood warnings and manage the rating districts (set up to deal with flooding issues in the community). Work with DOC, NZTA and the Westland District Council (as they all have protection structures in the area).
Westland District Council (WDC)	The WDC area stretches from Kumara Junction to Haast (350kms). The district has a population base of 8,500 with Hokitika the biggest settlement. The WDC works with community development officers and local community groups in Franz Josef and Fox Glacier and has a close working relationship with DOC with regard to local roads (i.e., not SH6). They are closely involved in Civil Defence (CD); the Alpine Fault is a major concern.
Department of Conservation (DOC) <ul style="list-style-type: none"> <li>• Franz Josef Area Office</li> <li>• Fox Glacier Area Office</li> <li>• Franz Josef Asset Management</li> <li>• Franz Josef Community Relations</li> </ul>	<p><u>DOC Franz Josef</u> works closely with the local tourism community. They have direct involvement in tourism through concessions and provide access to the glacier. Maintaining visitor access (in respect of the SH and glacier valley) are major concerns. They also operate a significant kiwi biodiversity programme in the area.</p> <p><u>DOC Fox Glacier</u> looks after area from the top of the Fox Hills to the north end of Big Bay. Visitor assets and safety are their primarily concerns in Fox Glacier; they also have a large kiwi biodiversity programme in Haast.</p> <p><u>Franz Josef Asset Management</u> has responsibility for all visitor assets in the area, although the primary focus is on those associated with the glacier. The Franz Josef office also maintains an overview of the Fox Glacier asset management.</p> <p><u>Franz Josef Community Relations</u> is responsible for the issue and management of concessions and advocates conservation in the community. They communicate relevant DOC information to the community (e.g., on track closures) and offer a DOC 'point of contact' for community members.</p>

## Operating environment

### Tourism in Glacier Country

Glacier Country is one of the iconic tourism destinations in New Zealand and the glaciers are the main attraction of the area. As several respondents noted, *“That’s what people come for – it’s Glacier Country – that’s the only reason they come to South Westland”*; *“It is our name – Glacier Country”*. Overall, while they are both focused on their ‘glacier’ attractions, Fox Glacier and Franz Josef offer different types of experience to tourists: *“There is a little marketing thing we tend to use – if you want razzle-dazzle tourism – like a mini Queenstown – then you go to Franz Josef, but if you want the Wanaka instead of Queenstown – more rural and laid back then you come to Fox Glacier – so a lot of people are now choosing to stay in Fox Glacier and play in Franz Josef”* (Photo 1).

Franz Josef is the more commercial and developed of the two glacier settlements and a number of respondents used the analogy in the quotation above, describing Franz Josef as the ‘Queenstown’ of the region and Fox Glacier as the Wanaka. To some extent this was also a feature of the type of business operations prevalent in each location. Similar to the Southern Lakes, for example, the Franz Josef tourism operators were more corporate and business-like (i.e., more interested in developing product portfolios) whereas Fox Glacier had more ‘lifestyle’ operators (although this lifestyle effect was even more pronounced in respect of the Okarito tourism operators).



Photo 1 The ‘razzle-dazzle’ of Franz Josef

Tourism is seasonal with a pronounced peak in visitation over the summer months. There are some minor variations in the start (generally October through December) and end (usually March or April) months which bookend the peak season for each operator. Most Franz Josef and Fox Glacier businesses operate year round. One of the Okarito businesses interviewed only operates during the summer (i.e., over a *“three-month busy season with shoulders”*). The White Heron Sanctuary Tours operate around the heron breeding season which is usually from September until February, but in some years extends into March; the owners (who are based in Whataroa) also run an accommodation business which remains open over the winter months.



Franz Josef and Fox Glacier tourism operators cater predominantly to the international market, although there were some minor variations in the exact proportions of international/domestic tourists served by each business. There are considerable variations in the types of international tourists each company caters to, however, with some businesses relying heavily on the younger, independent tourists, travelling on the hop-on hop-off bus companies (e.g., Kiwi Experience and Magic Bus) while others cater to a broader and more mixed clientele. Domestic tourists are thought to be less dependent on the glaciers, i.e., they are more likely to do other things in the area, such as bush walks, tramps and *“exploring the little side roads of New Zealand”*. This preference is supported by much higher percentages of domestic tourists participating in the commercial tourism activities available in the smaller settlements of Okarito and Whataroa.

Some business also have dual operations (and multiple operating bases) which cater to both international and domestic tourists – e.g., Fox & Franz Heliservices offer hunting services out of Whataroa (which are 50/50 international/domestic) and tourist flights out of both Fox Glacier and Franz Josef (99% international). These services are also busy at different times of the year – hunting is busiest May-August, and tourist flights are busiest from early November until the beginning of April. The company also supply helicopters to DOC and the utility companies for repair and maintenance work, and operate an information and booking office in Franz Josef. Some tourism operators offer both activity and accommodation services which makes it *“easier for tourists”*.

Traffic flows are perceived to be close to equal in respect of travel direction with slightly more tourists travelling from north to south (e.g., around 60% of the people calling into the Hokitika i-SITE are travelling south). Fox Glacier accommodation providers often cater to tourists who arrive from the north, stay two nights at Fox Glacier, but drive back to Franz Josef for a day of that time. There is some perception that Glacier Country is not really a destination in itself, but rather is seen as transit place and some tourists – e.g., Asian tour groups – *“pass through and don’t even get up to the glaciers”*.

In the last few years tourist numbers have dropped considerably (DOC figures for July-September 2011 show a 20% drop from the same period the previous year). Overall, people seem to have a fatalistic attitude towards this: *“[We] just have to accept what happens”; “Everything in business changes – glacier, the valley, the clientele – [we] just have to move with it”*. Some business is perceived to have been lost as a result of the increase in direct international flights into Queenstown during the ski season (previously many Australians flew into Christchurch and drove down the West Coast en route to Queenstown). There has, however, been an increase in the number of West Coast residents visiting Glacier Country in the last year – pre-earthquake they tended to go to Christchurch for weekends.

The Glacier Country tourism operators work together to promote all the tourism attractions and businesses in the region – not just their own business – and the majority are represented and marketed collectively by the Glacier Country Tourism Group (GCTG). While GCTG represents the entire region, there is some criticism around the ways each place is marketed, particularly by Fox Glacier operators over the prominence given to Franz Josef as a result of its greater number of tourism businesses. There is also some perception by the Fox Glacier operators that, as a result, they ‘lose out’ to Franz Josef in respect of the number of tourists they receive (according to DOC figures Franz Josef receives around 200,000 visitors a year and Fox Glacier about half that number). The

relationship between Franz Josef and Fox Glacier was described by one respondent in terms of, *“Fox is smaller cousin to Franz Josef – some Fox Glacier people like being in their shadow”*. It was notable in the interviews that Fox Glacier respondents talked a lot about Franz Josef, whereas those from Franz Josef rarely mentioned Fox Glacier.

As a result of their level of tourism development, the nature of each tourism settlement varies and this impacts on their perceptions of where they ‘fit’ in the Glacier Country tourism picture, and in their attitudes towards tourism development. In Fox Glacier, for example, there is a perceived lack of entrepreneurship and willingness to promote tourism, although many respondents recognised that *“this is harder in Fox Glacier as it is more traditional farming community and the land is tied up in farming families”*. There is also perceived to be some hostility towards tourism development in Whataroa (also primarily a farming community). While Okarito offers a *“more peaceful place and a cheaper accommodation alternative to Franz Josef or Fox Glacier”* the tourism operators in Okarito are to a certain extent reliant on the infrastructure of Franz Josef for accommodation. White Heron Tours (a Whataroa business) advertises that they are *“off the busy circuit”* even though they are actually located on the main road. Both Franz Josef and Fox Glacier have issues with land availability for further expansion – in the case of Franz Josef, development is restricted by the terrain, in Fox Glacier by land ownership issues.

Accommodation shortages in both Franz Josef and Fox Glacier sometimes necessitate people living some distance from where they work (e.g., people working in Franz Josef may live in Harihari, Whataroa or Fox Glacier, Fox Glacier staff live in Okarito, and so on). Because of this, and the high price of fuel on the West Coast, some businesses offer mileage assistance to attract, or to keep, staff. Some tourism businesses have their own staff accommodation. Some people referred to live away from the tourist centres. As one respondent who worked in Franz Josef and lived in Whataroa – and who was re-considering their own living arrangements in light of rising fuel prices – noted, *“[Whataroa has] cheaper housing and it is a bit more open, and it feels a bit more like a town that is ‘just a town’ than a tourist centre”*. There is also some competition for jobs as a result of increasing dairy farming in the area (an industry which offers higher paying jobs than tourism).

While most tourism businesses employ staff on salary or wages (rather than contracts) work in Glacier Country is strongly seasonal. One of the flight operators interviewed, for example, offers primarily salaried positions with only a couple of people on contract and *“just find [them] other things that need to be done in wet weather – if it rains for a month it rains for a month”*. In the past they had more contract staff, but as this encouraged them to *“push the limits”* (e.g., by flying in marginal conditions) it was deemed better for safety reasons to have staff on salaries. Okarito operators tend to have staff employed full time over the busy summer months, and *“have people commit to us for the summer and, because we are at the end of the road, we commit to them as well”* and they note that *“the cost of having staff on stand-by is offset by the cost of not having them when the weather is good”*. Overall, although staff retention is an issue many respondents noted that they *“like living in Glacier Country because of the lifestyle”*; a number of respondents also noted that *“it is really good place to raise kids”*. Seasonality is an issue for the glacier guiding companies, as staff have to find something else to do in the off-season; the job itself is also *“very physical and most people would only do it for a couple of years”*.

## The importance of the glaciers

The majority of tourism activity is based around the glaciers: *“I want to see a glacier is on people’s bucket list”* and the *“other attractions are all add-ons to the glacier”*; the glacier is the *“core business”*. Approximately 60% of the Hokitika i-SITE sales are glacier products. Accommodation providers (who do not get direct financial benefits from the glacier) were of the opinion that a lot of the attraction for tourists is *“the ability to just walk up to glacier – and it not cost anything”* which presents potential challenges to those commercial operators selling ‘glacier’ products. There have been some attempts in recent years to increase the range of tourism products on offer in Glacier Country.

While the majority of respondents agreed that the glaciers were the main attraction they also often mentioned the Glacier Country’s landscapes and the pioneering history and noted that *“even without the glaciers there would still be things to do”*. DOC has put *“huge efforts into improving the bush walk experience here [in Glacier Country] and we’ve invested a lot into improving other tracks in the valley, and encouraged our staff to push those options too – if the glacier is closed, or if it’s just really wet, it’s important for the town to try and sell the positives of the water – and the weather they might experience – the bush and the waterfalls are often better experienced in the rain”*. Some of the product diversification has led to the development of facilities that also improve/enhance the lives of the local communities (e.g., cycle and walkways). This is particularly the case in Franz Josef (Photo 2).



Photo 2 Walking tracks around Franz Josef (note the Callery-Waiho track is closed due to flooding)

There is a close relationship between tourism operators, the wider community and DOC in Glacier Country. Franz Josef, for example, offers more wet weather activities and Fox Glacier accommodation operators do not hesitate to recommend these to their guests. While DOC facilitates the guiding companies’ access to the glaciers (e.g., they give them a key if the road barrier is down) there have been some community complaints about this favouritism (of guided over independent tourists). A glacier access group has been established in Fox Glacier in response to these issues. The creation of the DOC Community Relations position recognises the importance of keeping people informed in respect of changes in the glacier and what DOC has been doing, and plans to do, in respect of maintaining and managing access. On occasion, DOC has taken local motellers and other business people up to the glacier valley to show them what the problems with

access are: “While tourism operators who have been in the area a long time generally understand why DOC has restricted access to the glacier they [DOC] might have to educate any new operators that start up in the area”.

### Product diversification and ‘weather-proofing’

Despite widespread feeling that Glacier Country has a “*diversified product offering at destination level*”, much of the diversification that has occurred has remained strongly ‘glacier-focused’ with the introduction of complementary products (e.g., the ice-climbing wall which operated for a few years); it is only relatively recently that any new ‘non-glacier’ products have been introduced (e.g., the West Coast Wildlife Centre and the Hot Pools, Photos 3 & 4). There is some discussion, however, around what types of product ‘sit’ well with the glacier attraction – e.g., *Flowing West The Movie* – which shows an aerial view of the glaciers, and is very popular on wet days when helicopters cannot fly, has been very successful whereas the ice-climbing wall did not “*compete well with the ‘real’ glacier experience*”.



Photo 3 and Photo 4 Glacier alternatives: West Coast Wildlife Centre & Franz Josef Hot Pools

This push for diversification has been driven by a desire to offer attractions that will keep tourists in the area for longer, and by a perceived need to ‘weather-proof’ the attractions they already have. This includes extending the region’s appeal beyond the ‘glaciers’. There is, however, perceived to be a lack of awareness by tourists of what the other places (i.e., beyond the glacier towns) in the region offer. Some Okarito tourism operators, for example, feel that they simply get “*people who are staying in Franz Josef and who are just driving by and want something else – another activity – to tick off*”. They also report that “*Some people only come because they have been told it is a beautiful place and they actually have no idea what they can do here*”. Many respondents were of the opinion that tourists do stay longer than in the past because Franz Josef has more attractions.

The ‘weather-proofing’ of attractions, crucial in respect of enabling operating and guaranteeing business profitability, is approached in a variety of ways. While many Glacier Country tourism businesses offer a range of products based around the glaciers some have alternative landing/operation bases (e.g., scenic flight operators who might operate from Franz Josef, Fox

Glacier, Whataroa and Tekapo) and are able to relocate clients so as to take advantage of suitable weather conditions. The weather plays a *“huge role in what activities are operating”* and, while it is useful for businesses to have some *“non-weather dependent revenue streams”*, these are likely to be busy at the same time as the weather-dependent parts of an operation, which presents staffing challenges.

Generally, alternative activities are more attractive if they can provide some shelter from the weather. The West Coast Wildlife Centre, for example, market themselves as an *“all-weather indoor attraction”* and have a souvenir shop, a cafe and a live kiwi display (which fits well with the area as it is possible to see kiwi in the wild at Okarito, Photo 5) and *“I want to see a kiwi”* is also high on tourists’ want lists. The cafe also attracts the local population which means *“there is always someone around – even when tourists are thin on the ground”* and during the summer season the Wildlife Centre opens during the evening (one of relatively rare ‘evening’ tourist attractions on the West Coast of New Zealand).



Photo 5 Potential to see kiwis ‘in the wild’ around Okarito

## Challenging natural environment

### The weather – an overview

The majority of respondents commented that natural environment handles the high rainfall experienced in the glacier area well, and that it does not normally cause that many issues. The exceptions are at a few well-known trouble spots – the Waiho Bridge, the Fox Hills and, occasionally, the hills between Whataroa and Franz Josef. There are also sometimes issues with road access to the wider Glacier Country area, as snow can close both Arthur’s and Haast Passes. The road at the ‘Gates of Haast’ and the area around Bruce Bay are also known (and ongoing) trouble spots with regard to road and bridge flooding and coastal erosion. Extended periods of dry weather, followed by more normal rain, tends to create problems.

Roughly speaking, the best weather months coincide with the peak tourist months. The ‘best weather’, however, is assessed across a variety of factors with the summer season (i.e., warmer temperatures) having more influence than rainfall (it is actually wetter in summer than in winter). In the shoulder seasons, business can be sporadic even on ‘good’ weather days. Most of those interviewed reported increased weather issues in spring, with some reporting it to be the windiest time, and others that it was the wettest time. The equinox winds can also extend beyond spring

causing problems around Christmas when more tourists are in the area. The area sometimes gets long periods of beautiful weather and then they “*get slammed from left field – especially in April*”. Some of the newer tourism businesses have developed systems to “*make the most of the weather*”; the Franz Josef Hot Pools, for example, have been designed to “*embrace the rain*” rather than mitigating its impacts. They use rainwater for the pools (Photo 6).



Photo 6 Franz Josef Hot Pools – using the rainwater

Most people living in the area talk about micro climates, i.e., blocks or areas that, because of their terrain or location, have distinct weather conditions (e.g., it can be “*raining in one spot, dry in another*”). The weather in Okarito is often quite different to that in Franz Josef – they get twice the sunshine hours and half the rainfall of Franz Josef – and “*it can be hosing down in Franz Josef and stunning out here or, on occasion, the other way around*”. Because of their aspect, and the slope of the terrain, the weather can also vary on the two glaciers; this can affect their suitability for helicopter landings (e.g., while winds from the SW make landings difficult on Fox Glacier, Franz Josef is more sheltered – in a strong SE it is the other way round). Pilot experience also helps determine which glacier they will land on. For all tourism operators, experience of typical West Coast weather conditions is important. One of the glacier guiding respondents noted that the “*big weather events can be exciting to deal with*”.

There is a widely-held perception that people from outside the area do not understand the local weather conditions well; a particular bone of contention is the widely-held (and erroneous) belief that “*it rains everyday on the West Coast*”. Visitors to the area also do not understand the local weather patterns (i.e., “*we often get cloud cover sitting over Franz Josef which doesn’t extend up the valley or into the mountains, but have to explain that to people*”). A number of factors, including the weather conditions contribute to visitor safety. As might be expected, having people “*doing their own thing*” (e.g., Okarito kayaking which offers freedom rentals, or DOC who have responsibility of ensuring the safety of the tourists who make their own way to view the glaciers) increases safety concerns around weather conditions. Tourism experiences are more closely managed in the case of commercial activities and tourism operators might look at how many people they have out on water, or on the glacier, alongside the weather conditions (especially if the weather is deteriorating). Overall, the weather impacts more significantly on the natural resources used for tourism (e.g., the glaciers and the Okarito lagoon) than on the tourism experience per se.

## The glaciers and glacier valleys – weather impacts

The glaciers and glacier valleys are very dynamic and can be strongly affected by the weather – Fox Glacier is particularly “*volatile*”. There are significant weather impacts on: the ice itself; the amount of glacial debris generated; the rivers in the glacier valleys; and, the roads and walking tracks that provide access to the glacier valleys. Some of the weather impacts on the glacier ice are slow to materialise – e.g., it takes five years after a good snow dump (at the top) to see any effect on the glacier itself. The weather also mitigates many of the impacts of the two guiding companies on the glaciers – it only takes one rain event, for example, to remove any evidence of track cutting. The weather also impacts on these glacier tracks; the daily conditions (e.g., rain or sun) will determine what route the guiding companies can use. There is a widely held view that the glacier guiding companies are more aware of, and more familiar with, glacier risks than most other people (including other tourism operators and tourists). Fox Glacier Guiding are proactive with respect to checking weather and likely hazard conditions; they will sometimes charter a helicopter to check from the air what problems are. They are “*always either managing or avoiding issues*” and “*all that changes are the location of the issues*”.

In respect of accessing the glaciers, “*part of their ‘beauty’ is that they are so accessible to tourists*”. Because they are located within Westland National Park, DOC is responsible for maintaining and managing glacier access, a difficult task in the face of rapidly changing conditions (especially river levels). The weather presents DOC with the greatest safety risks in respect of glacier access.

Together, the terrain and the weather present significant challenges for DOC and they find that they affect the same repairs repeatedly, only to have tracks washed away in heavy rain. Repairs can take a long time as, because of the high volume of rainfall, they need to ensure good runoff and install a lot of culverts; any boggy ground has to be properly filled before work can progress. Over time, DOC at Fox Glacier have “*definitely had to increase the number of hours we put into the glacier valley as a result of the amount of natural activity, and we have had to invest in stop banks to keep the river away from the walking track, and we never used to do that – we now wouldn’t think twice about getting heavy machinery into the valley, whereas years ago you wouldn’t do that*”.

At Franz Josef, the valley below the glacier causes a number of problems, particularly with respect to the Waiho River Bridge on SH6 at the southern entrance to the Franz Josef township (Photo 7). As one respondent noted, “*the Waiho River has always been there [and has always been an issue]*”. The continuing aggradation of the Waiho River bed has necessitated the raising of the Waiho Bridge on a number of occasions (Photos 7, 8 & 9); a significant and costly operation for NZTA. There have also been recent issues associated with the aggradation of the Callery River (which feeds into the Waiho) and with the formation of a natural dam – a large rainfall event, for example, could burst this dam and take out the Waiho River Bridge (at Franz Josef). The Callery River bed has aggraded 6 metres in 3 months, with 1.8 million cubic metres of gravel.



Photo 7 and Photo 8 The Waiho River Bridge & Civil Defence warning sign



Photo 9 The Waiho River Bridge & aggrading river bed

## Infrastructure

SH6 runs the length of the West Coast and the townships of Whataroa, Franz Josef and Fox Glacier straddle it. SH6 is of a better road quality than would usually be put down – partly because of the weather and partly because of the importance for tourism (i.e., road quality is usually directly related to traffic volume) and the fact that there is no alternative route that can be used. High tourism use means the road surface is kept to a higher standard, the marker posts are kept cleaner and the cuttings better maintained than would otherwise be the case. SH6 also has a large number of rest areas. In recognition of the high volume of tourist traffic, NZTA are developing more passing opportunities (the amount of rain and spray thrown up require safer options for passing). There are numerous one-lane bridges which are vulnerable in flooding events; if these are closed for any reason it can isolate parts of – and sometimes the entire – region.

The area is also vulnerable in respect of electricity supply, as there is only a single line south from Hokitika to Fox Glacier. Operators deal with around 5-6 power cuts in the area each year. Electronet have a fault management base in Harihari and there is a 3MW hydro station at Whararoa (which can supply Franz Josef and Fox Glacier if there is a fault on the main line, but this would be difficult in the



peak tourist season). A 6MW hydro station being built at Wahapo will give more security (of supply), but these are all 'run of river' schemes (i.e., there are no water storage lakes). Electronet strongly recommends that tourism operators in the area have back-up generators available in case of power outages. Tourism creates a huge demand for electricity at the glaciers (daily usage in Franz Josef in summer is 1.7-2.0 MGW; off season 0.5-0.7) and there are *"high costs associated with keeping the power on at Franz Josef and Fox Glacier – they're at the end of a very long line, and it's only for a few months of the year that demand is required – so return on investment is slow"*. At the request of DOC (who were concerned about the vistas at one of the lakes in the region), Electronet installed an innovative fully-insulated cable (instead of the normal free hanging lines). Although this cable fails less often, when it does fail it is harder to fix.

The terrain in the region also presents challenges in respect of operating and maintaining the telecommunications network. While Telecom can get people back on the air very quickly in the event of problems, it can sometimes take months to make permanent repairs. On some occasions (e.g., events that affect the whole of the West Coast) they might have to get help from other parts of New Zealand. Telecommunications cabling is located both over- and under-ground.

## Relevant climatic factors

The following sections describe the climate factors and weather conditions which impact on tourism operations and operators in Glacier Country, including changes in the weather over time and changes in the glaciers.

### Cloud

Cloud affects all flight operators – including both glacier guiding companies who offer heli-hike options to tourists wishing to walk on the glaciers (heli-hike is traditionally a big revenue stream for these companies). For scenic fixed-wing flights, cloud (which restricts visibility) is of more concern than wind. One of the flight seeing operators reported that they are compromised by the weather 60% of the year. While they will only fly if passengers are able to see something, there is also a flying limit imposed by national park restrictions (i.e., they have to be above 3,000 metres in the valley and at the terminal face of glacier); cloud below that level restricts flights.

However, the timing (e.g., while mornings are often clear, cloud can build up during the afternoon) and location (e.g., it can be cloudy over the valley, but clear on top) of cloud also varies. In Okarito, the cloud rolling over mountains in the afternoon normally only reaches the edge of the village and so does not cause any problems. Misty days offer better conditions for bird watching at Okarito, although those tourists with only general interest in the boat trips are more interested in sunny conditions. Sandflies are worse on days that are cloudy, warm and humid.

### Rain

The majority of respondents expect, and routinely deal with, considerable amounts of rain. As one flight operator noted, *"We are already prepared for two months of rain (and not doing any business because of it)"*. Most respondents were of the opinion that rain itself was not an issue, as it is part of the natural environment of the West Coast: *"[The West Coast] can handle considerable amounts of rain"; "Can have 15 days of continuous rain and nothing happens"; "It is amazing how much water can come down here without causing any trouble"; "When the rain stops here you wouldn't even*

*know it had been raining*". Heavy rain is seen by many as *"part of the attraction"* of the area. While rain has the most impact on the tourism businesses which offer flight options, most of these companies also offer alternative products. Also, as one respondent noted *"When it's raining it is not cold – plus there are only a few activities that can't be done in the rain"*.

Heavy (and continuous rain), however, occasionally causes problems on the glaciers themselves, and can cause flooding, which restricts access to both the glaciers, and to Glacier Country more generally. The impacts of rain are often delayed, as in the case of glacial outbursts which occur when heavy rain forms small lakes up on the glacier, these lakes eventually break and the water flow is enough to flood creeks lower down, stopping operations. Heavy rain also causes creek flooding (i.e., of small side streams feeding into the glacier valley) which disrupts access to glacier itself and can make it difficult to access the glacier's terminal face. Several respondents noted that often Franz Josef and Fox Glacier 'trade' times, i.e., *"when one valley is OK in respect of access, the other is not"*.

While the guiding companies operate around higher water levels in the creeks that have to be crossed in the glacier valleys than DOC allows in respect of public access, they can still have access issues as a result of heavy rain. Fox Glacier Guiding, for example, 'manages' for wet weather and hazards – they send guides out early to cut steps and do an assessment of the valley conditions. Also, heavy rain in the Fox Glacier valley pushes walking trips back to the side of the valley, increasing risks from rock fall. The worst year at Fox Glacier (for the glacier guides) was 2009, when they had 30+ days with no access (as a result of rock fall, high river levels, and floods) (Photo 10).



**Photo 10 Restricted access to Fox Glacier viewing track due to rock fall and flooding**

The valley below Franz Josef Glacier is wider than at Fox Glacier (with fewer rock fall issues), although the Waiho River can flood the entire valley. This tends to happen more often in spring when the weather is getting warmer; the snow and glacier ice melting, in combination with warm rain, can dislodge large blocks of ice and cause flooding. Large flood events can deposit *"metres and metres"* of gravel on the river bed through which the river cuts new channels; the channel cut in an 'event' several years ago was, *"as far away from the access track as we could hope for"* although there is no expectation of that (fortuitous) situation lasting forever. At Franz Josef, flooding issues are more common in respect of walking tracks than with road access.

The rain also impacts on the glaciers themselves in a number of ways. Regular rain periods are better in terms of maintaining the system's equilibrium. Rain (particularly warmer summer rain) takes away the top crust on the ice (which the sun also melts) leaving really good hard ice. However, the resultant ice surface is very slick (i.e., slippery) and the guiding companies can lose steps they have previously cut. There is also a lot of glacier movement in heavy rain (basal sliding and lubrication of the base rock which opens up cracks (crevasses) in the ice when the water increases in velocity). Together, these changes in the glaciers create more work for glacier guiding companies.

In heavy rain, moraine walls wash out and the number of rock falls on, and around, the glaciers can increase, although there is some doubt as to whether this occurs as a direct result of rain. While it is sometimes quite difficult to see a clear correlation between rock fall and rain, there was some thought that it was related to the intensity of rain (rather than the amount). As noted above, rock falls are more of an issue in the Fox Glacier valley (than at Franz Josef) and DOC start to worry about rock fall when around 20mm of rain falls in one event.

Heavy rainfall events impact significantly on DOC assets; tracks and signage can be washed away at the glacier approaches and on other high use tracks in the area (e.g., the Lake Matheson track). Some walking tracks in the area also become slippery in heavy rain. Rainfall has more impact if it falls on already saturated ground. According to the West Coast Regional Council (WCRC) (who receive heavy rain alerts by phone from the MetService), for example, *"if we get a warning for 100mms of rain overnight that generally doesn't cause too many concerns, but it is when we get a warning for 300mms and we have already had rain then we will be really concerned"*. The DOC Asset Manager also noted that the *"first 100mm of rain doesn't matter to us too much, but if we've had 200mm [already], the next 100mm of rain over a 36-hour period is going to give us some grief"*.

For NZTA, rain also causes the most damage in terms of the expense of maintaining and repairing the road assets in the area: *"the levels of rainfall plus the concentration, and because of the [West] Coast's steep valleys, creates a lot of problems for us in terms of scouring – underneath the bridges – and then we get the rivers outflank it and just wash the road away"*. There are sometimes (heavy) rain-related rock falls on the Fox Hills, but these are normally fixed quickly as repair crews are based in the area. For the Westland District Council (WDC) who are responsible for local roads the increased runoff associated with severe flooding events can damage bridges and damage the seal on carriageways – their design standards only cover 1/20 year events (the Christmas 2010 flooding event was a 1/50 year event). It is sometimes necessary to shut down the turbines at hydro stations in heavy rain or flood events, and rain can sometimes wash out power poles and roads (restricting access to make repairs). In many locations, bridges carry the telecommunication cables and, in the event of floods (and slips), the cables can be ripped.

Operators of indoor attractions benefit from the cancellation of other activities in heavy rain. While flight cancellations have some impact, these are magnified when the guided glacier walks are also cancelled and, even more so, when public access is restricted to the glacier valleys. If tourists are unable to access the glaciers in heavy rain, for example, business at the Hot Pools and at the West Coast Wildlife Centre increases. The latter also reported an increase in sales of wet- and warm-weather clothing during rain. The West Coast Wildlife Centre building has a tin roof, and in heavy rain the noise can stress the kiwis (Photo 11).



Photo 11 The West Coast Wildlife Centre with its tin roof

A number of flooding issues also occur around the Okarito area. The access road to the heron viewing tours can be washed out or flooded by heavy rain (which happens 2-3 days each season) and (more rarely) river flooding affects the on-river operation of the tours. River flooding, for example, can impact on the loading and unloading of their boat, although it does not normally take very long to return to safe levels (e.g., “can look at it in an hour’s time”); the company always go and check the river level at the jetty after overnight rain. There are also flooding problems when the mouth of the Okarito lagoon becomes blocked (this occurs as a result of sediment build-up over time, but the process can be accelerated by both long dry periods and increases in the number of SW storms). The direction of the river mouth (which changes over time depending on the prevailing weather conditions) affects conditions on the lagoon and, in turn, impacts on boat launching, water currents and fuel use (and business costs). Flooding can also bring trees down in the Okarito River, silts and sediments build up around these and can restrict access to water channels. Rain, in combination with river and tidal flow, and the state of the lagoon mouth, also impacts on kayaking conditions. While severe flooding events can affect the water channels in the lagoon, this has minimal impact on kayaking company, as their clients can still generally go somewhere; the Okarito kayaking company, however, find that rain is their biggest weather issue in respect of “taking away people’s desire to paddle”.

### Dry spells

As noted above, lack of rainfall, which reduces the river flow and its ability to wash the mouth out, contributes to the Okarito lagoon mouth blocking. Also, reduced river flow in combination with low tides, can restrict the range of boat trips on the lagoon. In the wider region, sudden rain after a long dry spells leads to sodden land that cannot drain and brings trees down. Dust and pollen can also become issues during extended dry spells.

If there are extended dry periods the tubes and tunnels inside the glaciers that carry water away can shrink or block, and then when it does rain there is nowhere for the water to go. This is happening more often than it used to. Dry spells can also bring rock out onto glacier which has an aesthetic impact – i.e., the rock cover makes the glacier look dirty (Photo 12).



Photo 12 Exposed rock & gravel at Franz Josef Glacier face

## Wind

Wind can be an issue for air operators and at Okarito. For fixed-wing scenic flights, wind – especially easterlies – restricts their flight range (i.e., they have to stay west, rather than crossing the main divide). Wind can also restrict longer flights (e.g., around Mt Cook), but it is possible to adjust to other flight routes early in morning and look to see what conditions higher up are like. No exact wind speed stops operations – as one operator noted *“the weather is not an exact science”*. Often there is a build up of westerlies during the day, but they usually still have a window of opportunity (i.e., in the mornings) before the wind compromises flights. It can be difficult to explain to tourists that flights are not possible when there are clear skies, but too much wind. While the heli-hike options of the both glacier guiding companies are wind-affected, wind is less of an issue on the glaciers themselves. The Franz Josef Glacier Guides, for example, sometimes (i.e., perhaps half a dozen days a year) have to restrict glacier walks to half-day trips as it is too windy higher up on the glacier.

Wind is more of an issue at Okarito, especially around the equinox when SW winds are typical. These usually blow themselves out by November or December, but in 2010 they continued into early 2011. Wind in spring can impact on the heron nests (e.g., eggs can be lost), but the wind primarily affects boat operations. At its most extreme, maritime regulations restrict water activities to below a wind threshold of 20-25 knots. The outgoing tide and incoming wind can also cause problems for boat operators and wind gusts can be a problem. The boat tour companies can run boat trips early in the day, when the wind is lighter – while this coincides with the time the birds are most active, it is not necessarily when tourists are around. Although the boats used can *“handle the wind”*, it sometimes makes the experience unpleasant; wind can also compromise the tourist experience as strong winds can drive the birds away. Similarly, the SW can block the lagoon mouth off and the resultant rising water levels, in turn, reduce the expanse of lagoon flats available to wading birds.

Wind also impacts on the Okarito kayak company in the afternoons and is the biggest weather safety issue for the company. The SW wind on the lagoon makes the return paddle difficult for their clientele. When the company cancels trips it is sometimes purely for safety reasons and sometimes because the wind will compromise the tourist’s experience (e.g., *“if they are not going to go away raving about it – it is better that they don’t go out”*).

Wind, along with animals and car accidents, is the main cause of electrical faults.

## Snow and ice

Snow is not normally an issue in Glacier Country itself, but can close SH73 (Arthur's Pass) and SH6 (Haast Pass). There are issues with both snow and ice on these passes during winter. In the past, freezing overnight conditions caused some problems with respect to keeping the toilets open at the Franz Josef Glacier car park.

## Severe weather events

The Glacier Country area occasionally experiences severe weather events (usually heavy or prolonged rainstorms) which can affect the companies working on the glaciers, although there are some variations in how disruptive these events are. Depending on the severity of the event, for example, the glacier guiding companies may need a day to re-cut tracks, or they might be interrupted for a week while big slips are cleared. Losing the access road at the causeway into the car park has significant impacts on the operations of the glacier guiding companies, as well as for DOC, who are responsible for its reinstatement. Overall, the guiding companies' alertness to weather forecasts and their experience reduces their exposure to severe weather events, although they do still get caught out if the weather is worse than expected and they have groups up on glacier ("*[We] should never get in that position, but it happens*"). In these instances they might get a helicopter in to take clients off the ice, but "*it is better to do that than run the risk of making people wait for rivers to come down*". Severe weather events can flood the rivers below the glaciers with high water flow and increased rock and glacial debris. It is more difficult for DOC to manage independent visitors to the glacier in severe weather events.

Severe weather events can also cause access problems in the wider area. Road closures as a result of severe weather can turn Franz Josef into a ghost town (although it does depend to some extent on the location of the road closure). There is some perception that word gets around quickly that the road is closed and then it takes a lot longer (e.g., 3-4 days) for word to get out that it is open. In severe weather events, there is also potential for a significant number of people to be 'stuck' at Franz Josef or Fox Glacier, putting pressure on both food supplies and accommodation providers, particularly during the peak tourist season when the town is busy anyway. While extreme weather events might cut access on the State Highways (e.g., wash out bridges) these are usually repaired very quickly and the most (disruptive) severe events tend to happen further south (e.g., Makarora and Wanaka). As noted earlier, NZTA have to deal with significant landslides at the 'Gates of Haast' and coastal erosion at Bruce Bay.

In Glacier Country itself, the road over the Fox Hills (between Franz Josef and Fox Glacier) and the approaches to the Waiho Bridge are the most frequent trouble areas. In respect of the Waiho Bridge, a number of respondents were of the opinion that those responsible "*have to keep it open*". There is also some flood risk to Franz Josef township from the river bed on the south side of SH6 (where the helicopter landing pads are located). This area has flooded in the past. There was a widespread feeling that many of the places that regularly flood are gradually being fixed to more exacting standards, thus reducing the likelihood of further issues.

Severe weather events can cause power cuts (e.g., lines cut by either land slips or tree fall) and many Glacier Country tourism businesses have their own generators for emergency use (these are also important in respect of Civil Defence emergency responses in the region). The area gets a lot of power surges which can impact on the communication (radio) network. Loss of power affects all

types of tourism operations. Air operators, for example, need electricity to operate their fuel pumps although, as one respondent noted, if the power was out as a result of the weather they would probably not be able to fly anyway.

The biggest issue for Telecom are lightning strikes which can “*fry the cables*” (e.g., blow the end of the cable or break/burn the wires). The traditional copper cables are slowly being replaced with fibre optic which carries more services and is more robust (i.e., less susceptible to lightning). The lightning strikes that damage cables can also damage modems. There is more lightning in spring.

## Changes in the weather

It can be difficult to separate changes in the weather from other natural changes e.g., “*the locals in Okarito would say that river mouth blocking up is becoming more of an issue, but it is hard to tell because the river changes course anyway*”. There was a common feeling that, for local weather events to register as a signifier of climate change, they would have to be “*right in front of us*” (i.e., be very obvious), although perceptions of the weather are tempered by the fact that “*we live here – we chose it*” (i.e., they are used to, and familiar with, extreme weather events). Overall, the day-to-day ‘extremes’ of the ‘normal’ West Coast weather make it difficult to identify longer term changes in the weather:

- “*Not really aware of weather changes – we have always had wet periods then nice beautiful days*”
- “*Not really changing – have always had extremes – it is part of living here*”
- “*I think it is hard to draw a line about which it is – if it is long-term change or just a period we are going through*”
- “*Those flood events in the summer – they’re guaranteed, we’re going to get those – but the summers are getting scrappier*”

For some respondents, lack of experience with West Coast weather affected their perceptions:

- “*Not sure if climate change affects extreme events – you hear different things... watch the news... more erratic weather... snowfall at Christmas, really strange [events]... [I am] waiting for people to tell me – there is a lot to understand and see – plus I am quite new to this area*”

A number of respondents thought that the weather had become more erratic over time, however, and some respondents noted specific changes:

- “*Not so many rain events, but when they happen they are bigger*”
- “*Used to take a few days of heavy rain to cause flooding – now [that] happens much more quickly*”
- “*The rain events have got harder and longer and the seasons are less clearly defined*”
- “*Maybe a shorter summer*”
- “*The weather is not really changing – dry periods are usually balanced with wet ones, although maybe those balancing acts are becoming a little more extreme with both the wet [ones] and the dry [ones] being more dramatic*”
- “*Summers are coming later, but that is happening on a global scale*”
- “*Already having to deal with more concentrated events*”

- *“When I think about Okarito – the mouth is blocking more regularly than it used to – more southerly winds close the mouth off”*
- *“The flood events are definitely fairly frequent and more so than they used to be”*
- *“We used to have really good cold, clear winters, with lots of snow and ice, but now our winters are noticeably shorter and milder, and they just seem to have changed – when we [DOC] first built the toilets in the Franz Josef Glacier car park it was a huge drama trying to keep them open in the winter – through freezing – but now there is only the odd day when freezing is an issue”*

Some respondents were knowledgeable about the longer-term decadal weather cycles such as El Nino and La Nina and several respondents couched their discussion of changes in the weather in the context of these:

- *“Depends on what weather system is prevalent e.g., during El Nino [it is] wetter – but [my] gut feeling is that it is getting drier and warmer”*
- *“Weather comes in 10-year cycles – affects which area of the West Coast gets the heavy rain – Franz Josef [is] starting to get the heavy rains again now”*
- *“The weather in Glacier Country has always changed – it goes in 7-year cycles – but maybe the dry spells are getting longer”*

When asked specifically about climate change, many respondents talked about climate changes in respect of global, high-profile examples (e.g., floods in Bangladesh and the melting ice shelf) rather than as changes in the local weather patterns. As one respondent noted *“We have always had tornadoes, we have always had hurricanes and tsunamis<sup>1</sup> and there is not enough analysis to show the general public the frequency and severity of these events”*. Respondents also had mixed views on climate change with respect to the weather they routinely experienced:

- *“Personal interest dictates how much attention [you] pay to climate change”*
- *“I am not a climate change denier, but we live in an area with massive swings in the weather and one or two bad summers does not a long-term trend make”*
- *“Climate change still guesswork at this stage and the weather is so changeable in Glacier Country it is hard to attribute it to climate change”*
- *“[I] know as much as [I] want to know about climate change – you would look at it more if it was affecting you more”*
- *“Things like the prolonged El Nino of the late 1990s take a major chunk of time, and climate change is an even longer-term thing – but if severe weather events happen locally [they are] more likely to be remembered for a long time [than are overseas events]”*
- *“There is certainly plenty of information out there and it is whether you chose to read it or believe it”*
- *“As far as I am concerned the West Coast has always had major flooding events – throughout time”*
- *“I can be a little bit cynical on this – if I look even in the last 10 years I would say that the media is very active about this – we get to hear and see things happening all round the globe”*

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<sup>1</sup> A number of respondents discussed tsunami as a weather event



– you see it live – maybe those things were happening 15 years ago and we just didn’t know about it”

Predicted climate change-related weather changes were perceived to have both positive and negative impacts on tourism businesses in Glacier Country. Increasing westerlies, for example, might bring the West Coast more snow, but would be bad for a kayaking business, whose operations were vulnerable in respect of wind. One tourism operator noted that their business could be negatively affected by changes in the weather sequences. Also, climate change could potentially impact on migratory birds that visit New Zealand compromising many of the Okarito tourism businesses. Fewer available flying days over the glaciers could increase the number of tourists doing the guided walks.

## Shrinking glaciers

When asked specifically about the glaciers shrinking (and ultimately being lost as a tourism attraction) as a result of climate change, the general opinion seemed to be that there will always be some sort of tourism operation on the glaciers (albeit requiring some adaptation in the future) (e.g., “they have always been here and always will be”). The long history of glacier tourism reinforces the perception that tourism companies will be able to adapt to physical changes in the glaciers. Some of those involved in glacier tourism also expressed a sense of personal attachment to an industry with such a long history. While many respondents acknowledged that there might be challenges ahead with respect to glacier use by tourism operators, a number of respondents also noted that the glaciers are in better shape today, than they have been at many times in the past (Photo 13):

- “[We] have quite a long way to go to get to measures they had to use 100 years ago in order to access the glacier”
- “Have seen Franz Josef both growing and shrink – even though it is shrinking now it is still below where it was in 1984”
- “Have thought about absolute loss of glaciers, but [this] would not happen within 100 years”
- “They are the draw card – have not thought about them going – they have always advanced and retreated”

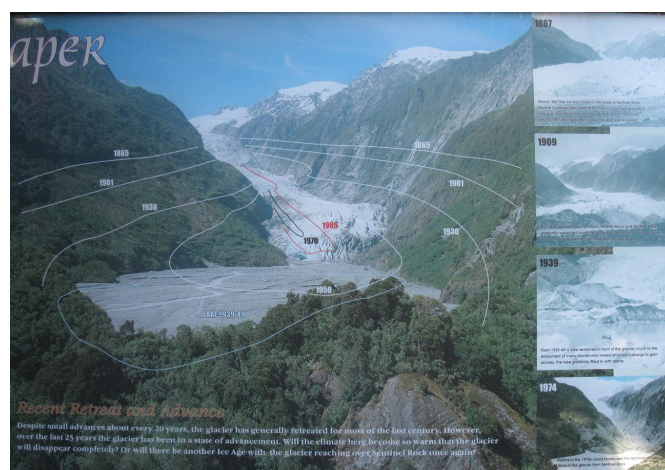


Photo 13 Interpretation panel at Franz Josef Glacier showing glacier advance & retreat over time

The focus for most tourism operators, however, was on the current state of the glaciers and the majority of respondents agreed that Franz Josef Glacier is currently in retreat (and Fox Glacier is advancing). This retreat is not solely in the length of the glacier (and, in fact, length-wise it might not

look all that different), but it is 'wasting down' (i.e., internally shrinking) and has probably lost between 1-200 metres in depth in some places, according to one informant. Shrinking glaciers have more bedrock under the ice (rather than moraine), and this makes it harder to put tracks in (i.e., the ice floats around a lot more). There is, however, an art to deciding where best to put tracks on the glacier, and it is easier when the glacier is retreating. In times of glacier retreat, the Waiho River is also more stable (i.e., does not change its path so often) and according to a DOC respondent, *"while the access path might get longer, I don't anticipate that it will be inundated by the Waiho River as much as it has been in the past"*. The speed of the glacier retreat is also increasing (i.e., *"Would not have worried a few years ago about climate change and the glacier, but in the last 18 months it has gone back a lot"*). The current retreat was attributed to increasing temperatures, although there was some debate as to whether this was a long-term continuing trend:

- *"Have seen it do both – not a global warming indicator – a naturally occurring thing (although the long-term trend might be for change)"*
- *"Just La Nina oscillations really"*

The impact of glacial retreat and glacier changes varied according to how one engaged with the glacier. The impact of changes to the glacier have to be considered in respect of: their effect on the view tourists get from the road; where the glacier face is located (i.e., how far away from car parks, access tracks and viewing points); and, what it looks like from the air (e.g., there are increasing numbers of cracks visible, along with clear signs of where the ice has receded down the valley walls). Access, however, is the biggest issue especially in regard to being able to get to the glaciers. There have already been some changes in how accessible the guided walks are, as commercial companies have tightened up their criteria of who they take.

Maintaining public access to the glacier is a major concern for DOC, and *"long-term that might force us to change the way we think about how people access the glaciers"*. At present access to Franz Josef Glacier is of the most concern for DOC, *"the retreating of the glacier, seen it massively, a little bit more and we are basically behind a rock wall. Could be quite soon! And how do you manage tourists then? There is a big hole already now that you can see. Access will be more and more difficult. [The] river coming out of this rock wall, not sure how we get tourists there [through a] gorge? Maybe some ladders on the side..."* There is already some thought being given to alternative ways to get to the glaciers – i.e., introducing new transportation options to cover the increasing distance required to access both viewing points and the glaciers themselves. There are some issues associated with limited space for access on the south side of Fox Glacier; while there has been some talk of a 'park and ride' scheme to overcome this, it is not a straightforward solution, because of limited parking space in the Fox Glacier township.

Even if the glaciers continue to retreat (restricting access) flying over *"should still be possible and it is pretty spectacular (although it may be compromised by rocks being more visible)"*. With less snow and more rocks visible, the glaciers look much dirtier from above and one flight seeing company has already *"lost a landing site and can see a huge hole that has opened up"*. Although further changes of this nature might curtail some of their flight seeing options, they could still fly over *"other mountain areas"*. The glacier experience for tourists walking on the glaciers is also compromised by increased rock fall and exposed areas of gravel, as often they *"do not realise they are even on the*

ice” (see Photo 12). The retreat of Fox Glacier would potentially increase rock fall issues as a very narrow gut must be traversed to access the glacier.

The medium term view of tourism operators in Franz Josef and Fox Glacier varied, with some noting that the entire region might drop down on tourists’ radar (e.g., *“like Waitomo has”*) if the glaciers significantly recede. Another commented that *“New Zealand being in the southern hemisphere offers a huge marketing advantage for [the] glaciers”*. According to one Franz Josef accommodation provider, however, *“maybe half the tourists would still travel the West Coast route without the glacier, but [we] might have to fight to get them to stay in Franz Josef or Fox Glacier (since the glacier is what’s pulling them in)”*. Another respondent suggested that they *“could still get people to the region without the glaciers, but the whole marketing approach would have to change”*. One respondent noted that, *“without the attraction of being able to stop overnight and access the glacier”* not only would his job not exist, but those of half his family would also disappear and *“there would be an awful lot of people [residents] who had no reason to be here”*.

Okarito tourism businesses are actively trying to shift their own focus away from the glaciers by selling *“birding and the natural habitats as the main reason to come to the West Coast”*. One Okarito tourism operator, however, noted that *“not everyone is a keen birder and we still use the backdrop of the mountains and the glaciers [in our marketing]”*. Another Okarito operator noted that *“we market ourselves as an alternative to the glaciers, but handily located close to them”*. Although the Okarito businesses do not offer glacier-based products (and would therefore still have a business without them) they recognise that they might need to change how *“we get people”*. There was also some sense, however, that the loss of the glaciers might not impact on Okarito operators, as they do not rely on the large volumes of tourists (who visit the glaciers) to maintain their own operations.

## **Adaptation to weather and climate change**

Glacier Country tourism businesses currently make a wide range of operational, logistic and product changes to deal with the weather conditions they experience on a daily basis. The glacier guiding companies, for example, *“Have to throw what you can at it to keep operating – otherwise significant financial loss is incurred”*. Their weather-adaptations, however, sometimes compromise the cost of operation and/or the quality of the experience they offer tourists. In some cases the degree of adaptation possible is limited by physical conditions:

- Might have to curtail some trips (especially heli-hike), but they usually get those people onto other trips
- Can avoid small streams that flood (restricting access to Franz Josef Glacier) but this involves taking higher access tracks and it takes longer to get to glacier itself – which limits trips
- Some of the higher tracks are more risky (i.e., they were built in a time when there was higher risk tolerance) and considerable investment would be required to bring them up to today’s standards
- Fox Glacier Guiding have, in the past, hired a Unimog to get past a blocked road
- If Franz Josef Glacier Guides know the weather is going to be bad they will use a transport shuttle system to get past possible slips
- Impact of shrinking glacier on clients is that they have to walk further – the half-day walks may eventually become full-day ones

- If Franz Josef Glacier goes back as far as it was in the 1970s and 1980s, they might only be able to do heli-hikes (which is what happened then), although in this scenario the weather then becomes more of an issue in respect of operations

The guiding companies also have strategies to deal with operating in a hazardous area. They might, for example, use a rock 'spotter' (a staff member stationed near danger points and issued with an air horn to warn of rocks coming down). They also have their guides wear hats, rather than hoods (which reduce hearing capacity, and particularly any directional sense of sound); on occasions they also ask clients to take their hoods off (especially in rain) to enable better communication. They also note the importance of having "*well-briefed clients*" (i.e., as to the dangers and appropriate responses to dangers).

DOC has a daily hazard glacier management procedure in place at both glaciers. This involves a manual check of conditions at various locations in the glacier valleys each day – at Fox Glacier, for example, DOC have "*indicators at particular locations – like if the water is over the magic rock then we start looking at other things in the valley*". By 9am each morning they know where the safe access point is for visitors; this information is relayed through to the DOC Visitor Centre at Franz Josef to tourism operators and others via a daily glacier update. The access track can be changed on a daily basis, depending on conditions. When there has been a significant amount of rain DOC increase their staff presence in the glacier valley – either in the number of hours they do, or in the number of staff they have working: "*sometimes, even in a rain event, we find that we can just hold things open, with a bit of additional work on site, rather than what might be seen as the easy option of closing it up. The reality is that it's hours of work for us to close it up, and hours of work for us to open it again, a lot of work for the office staff here, and work for the businesses that the information goes out to*".

Most tourism businesses are used to dealing with the weather and know what to expect after heavy rain; as noted earlier, when necessary, they will do a weather-impact check prior to starting operations. Few of the tourism operators interviewed reported planning around the weather – rather they "*just role with it*"; how busy they are more commonly depends on the number of tourists in the region. The changeable nature of the weather is also an issue and the locals' approach is that "*we just have to take it [the weather] day-by-day, because it can change so quickly*". The weather does, however, have some influence on the booking systems and booking conditions set by some tourism businesses. Also, as noted earlier, it is possible for the flight seeing operators to change their flight paths to suit the weather conditions; these companies also have "*pilots who are always ready to go*" when the weather is opportune. At the Hot Pools they 'gear up' to be busier if the glacier hikes are cancelled, although it is difficult to call in extra staff.

Most accommodation providers have information sheets with wet weather activity options – getting tourists out in wet weather is also to the accommodation providers' advantage, as it means tourists are more likely to be out of their rooms. In terms of their own protection from adverse weather impacts, one Franz Josef tourism operator noted that they "*have insurance against flood – so [it is] not a problem*". To some extent there is a fatalistic attitude to the impact of the weather and heavy rain, expressed by one accommodation business manager (whose property was regularly under threat from the Waiho River) as "*we just get on with life and not worry too much about what might happen*".

The Okarito tourism operators have a variety of weather-adaptation measures in place. The boat tour company, for example, has *“wet weather gear for people who need it”* and *“if the weather forecast is bad we might try and change trip times – especially for older people – but that can be hard to do if it is busy”*. The Okarito kayak company can run one-way trips, i.e., can go and pick tourists up (by motor boat) if the wind comes up. Their ability to do that, however, also depends on the tide and this service can substantially increase their operating costs. If the frequency of rain events increased, the Okarito boat tour company could cover their boat, but they feel this would compromise the experience they offer.

Many infrastructure providers try to build improvements into their repairs, although this is not always possible due to funding and logistical factors. NZTA are funded for *“a certain level of incident response – the day-to-day events we get funded for – like we put down CMA for the prevention of ice – but the questions becomes ‘what is sudden and unexpected?’”*. Most rivers have some protection in already, so in a severe weather event it is *“a matter of assessing what we had before and what has happened in the past”*. The WCRC follows government guidelines for climate change mitigation (e.g., they try to build stop banks higher to deal with the larger water flows expected in the future), but their ability to do this is restricted by what the local community can afford.

DOC also tries to improve their facilities with each repair iteration (e.g., the access road to Fox Glacier is now closed less often as a result of putting in a new ford bridge with a full culvert), although the car park area further up the valley is still vulnerable in severe flooding events. There is some scope to facilitate further changes: for example, the point at which going onto Franz Josef Glacier becomes unfeasible is far off – in the 1980s (when the glacier was further back), the car park was also further back, and DOC could consider that for future. The access road to the Franz Josef Glacier valley was in the process of being upgraded at the time of this research (Photos 14 & 15).



Photo 14 and Photo 15 Road works on Franz Josef Glacier access road

## Weather information and forecasting

Weather information is used to inform tourism businesses' own operations (and their staff) and customers. As might be expected, there is a much higher use and concern regarding weather forecasts by those offering either weather-dependent or weather-affected outdoor activities than by indoor attraction operations or accommodation providers. One respondent noted that generally *"people working outdoors have a lot more appreciation for the weather than people in the city"*. A number of respondents noted that a closer watch on the weather was necessary during spring, when more extreme weather conditions are often experienced. The internet has increased the accessibility of – and the amount of attention paid to – weather information.

## Weather information sources and their use by operators

A variety of weather information sources are used by tourism operators and infrastructure providers in Glacier Country. While DOC obtains weather data directly from the MetService some DOC staff also commission forecasting from other providers (e.g., Blue Skies) and use MetVUW for their own operations. Franz Josef Glacier Guides have their own weather stations up the glacier valley and look at MetService and MetVUW. They find MetVUW to be reasonably accurate for longer-term forecasts (whereas the *"local weather from the radio is useless"*), but recognise that some skill/experience is needed to do their own forecasting off the MetVUW weather charts and maps. MetVUW is often used in combination with other sources e.g., Fox Glacier Guiding uses MetVUW, Sunrockice<sup>2</sup> and Australian BoM – *"to see what is happening out in Tasman [the source of West Coast weather] and we juggle the three forecasts"*. They also note, however, that *"this requires some expertise as you need to be used to doing that, and know what it all means"*.

There are some issues associated with understanding the weather in the glacier valleys as a result of the micro climates – e.g., *"at the beach you can have 3 metres of rain, at Franz Josef have 5 metres and up the glacier valley have 10 metres"*. Franz Josef Glacier Guides have considered putting a weather station higher up the valley, but this is complicated by being in the national park (and therefore is a concessional issue). Franz Josef Glacier Guides also use data from their own weather stations to plot what happens before 'bad' glacier events – looking for better understanding of the weather-glacier system.

The glacier guiding companies keep a close watch on the weather conditions and review these throughout the day: they look at the forecast about half a day ahead and physically check conditions on the ground each morning. Fox Glacier Guiding has a communications board in their staff room on which they post heavy rain warnings and MetService emails. There was a perception that the number of severe weather event emails the MetService sends out has increased over time (although there was some thought that this was possibly as a result of the 2008 Mangatepopo Gorge tragedy, rather than an increase in severe weather events). They also have radio contact with staff in the valley to pass on any weather warnings. The glacier guiding companies will sometimes remove equipment from likely problem spots if bad weather is forecast.

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<sup>2</sup> Sunrockice Mountain & Ski Guides New Zealand (<http://www.sunrockice.com/index.htm>) has links to a variety of international weather data sources as well as to weather maps, data and text from New Zealand providers such as MetVUW and the MetService.

Other tourism companies reported not making any changes according to the weather, but just *“accept what it throws up”*. Also, while they might look at the weather forecast for a few days ahead (for planning purposes, e.g., organising rosters and pilot meetings) *“on the day we just look outside”*. Some operators reported looking at the forecast for up to four days – or even a week – ahead, but that they take this with a *“pinch of salt”*. Many of the tourism operators interviewed expressed a preference for MetVUW – although some noted that they were aware that the MetService has improved – based on the data or forecasting service provided and/or specific data requirements:

- *“Traditionally, it [MetVUW] has been consistently better for 12- or 24-hour forecasts”*
- *“MetVUW is better as it has wind data – but also because you are going back to the raw data, rather than some interpretation of it”*
- *“[I am] aware that they both use the same data – using MetVUW you do have to make some of your own predictions – but the wind direction tells us what weather will do”*

Overall, MetVUW is preferred for longer term forecasting. One of the flight companies interviewed, for example, uses MetService and MetVUW (the latter for longer-term information) – using their own experience to ‘read’ between the two. They also interpret the maps, rather than the forecast. One respondent thought that MetVUW has not been as reliable in the last year. There is a private weather station at Okarito from which temperature, dew point and precipitation data are reported to NIWA each day. None of the flight operators interviewed had their own weather stations, but they might sometimes have to do a flight to *“take a look”*.

Those operating businesses which are less weather-affected tend to rely on the weather forecast on the television news, although they are sometimes sent more detailed MetService forecasts by other tourism operators. While the weather is not as important for indoor attractions such as the Franz Josef Hot Pools (*“weather information is not crucial [for us], but we do watch the forecast – MetVUW for next 7 days”*) and the West Coast Wildlife centre (*“we always print off weather forecast and have it on the counter – MetService forecast via DOC”*) they do still look at some weather data and sometimes display it for their customers. For other operators, the importance of the weather forecast varies depending on what the actual weather conditions are: as one operator noted, for example, keeping an eye on the weather forecast is *“not so necessary if we are in a settled spell of weather”*. They might, however, look at weather information on the internet if it looks like it is *“going to really pack up and we have a lot of people booked”*; they also noted that they *“need to look at what is expected to happen and when”*.

The infrastructure providers also consult a variety of weather information sources. NZTA have developed a weather-model with the MetService for the national State Highway network, although this is primarily used in respect of winter conditions. NZTA have their own live weather stations at Hokitika and Springs Junction (which indicates to them when fronts are coming) and have thermally mapped the whole area (which they can correlate with the weather data collected at Hokitika). They use weather information to plan repair work and working shifts for contractors. Telecom staff look at the MetService website on a daily basis and get MetService weather alerts via email. They pass daily weather information onto their staff and contractors and plan their maintenance work in South Westland around long-term forecasts. If there is a big storm forecast they might look at staff volumes, at who is on leave and at who might be able to be deployed (often for a few days) to potential problem areas. As noted earlier, a number of DOC and tourism staff live some distance

from where they work and if severe weather is forecast they might leave work early in case of weather-related road issues in known problem spots (e.g., the Fox Hills).

### Sharing weather information

The Franz Josef DOC Information Centre/i-SITE emails a daily report on the weather and glacier access conditions to tourism operators and accommodation providers and they often contact the glacier guiding companies by telephone. They display the daily weather conditions in three places in the information centre and often change this display during the day. They can update their weather information up to six times in any given day. They also display the daily weather conditions at the glacier car park. DOC gets heavy rain warnings and alerts direct from the MetService. The Franz Josef DOC office radios the weather forecast every evening to four huts (3 DOC and 2 Alpine Club) in the area. The Fox Glacier DOC office also displays the daily weather outside their office in the township and on a whiteboard up the glacier valley (*“having that whiteboard shows people we have been up there that day”*) (Photo 16).

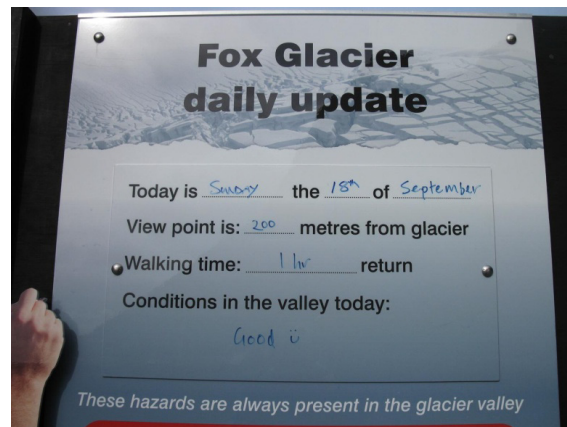


Photo 16 Daily update at Fox Glacier Valley car park

A number of tourism operators also post the daily weather and glacier conditions on display boards outside their offices. They primarily rely on the MetService forecast (which they get via DOC) for these data but, as noted earlier, they tend to use MetVUW data to inform their own operations (because they *“find it to be the most accurate”*). The Hokitika i-SITE staff print out, and display, a daily forecast, as do many tourism operators. Some accommodation providers also do this, but on the whole they rely on the TV news for their own weather information; if requested, they will look at more detailed information for their guests. One of the Fox Glacier accommodation providers reported spending *“a lot of time on MetVUW, itinerary planning for guests – giving them the best options – like do things this morning because it is going to rain”*. Other respondents noted that if tourists call in advance they might verbally tell them the forecast.

Weather information is often shared between tourism operators. Some flight companies, for example, also have an operating base on the other side of the main divide and check conditions over there. The West Coast Wildlife Centre is associated with Antarctic Centre in Christchurch and will sometimes contact them with regard to the current weather conditions. Often, Glacier Country tourism operators talk to other tourism businesses based further south on the West Coast and get an idea of what weather is on its way. However, many simply rely on their own personal experience: *“Have sort of sussed it really – know the day before what the weather is going to do”*.



In the event of emergencies, or road events, NZTA have a road information system within which consultants or contractors check incidents called in by the public, or the police, and then make decisions on what response is necessary. Details of this response (e.g., road restrictions or closures) are then posted on their own webpage, the Automobile Association (AA) website and other websites (such as councils etc). They also send email notifications, operate an automated phone number and are developing a system to text updates to people. Each area [of New Zealand], however, is slightly different *“so on the West Coast we fax people – the key suppliers – the cell cover is not too flash and over there a lot [of people] don’t really look at their computers all the time and they like to have a hard copy fax”*.

When there are potential flood events, the WCRC (who have an advisory role to the Westland District Council and other community groups) will pass heavy rain warnings on to DOC; DOC then use a call tree to alert people to the possible dangers – the river levels determine the level of alert that is issued. The Regional Council *“always say to the community and to everyone else that they should be proactive at looking at weather reports themselves – which they are – and also that there is no substitute for someone being on the ground looking at it, and knowing what is going on, and for them to keep an eye on it”*. The Regional Council have their own network of rainfall and water level gauges along the West Coast – information from these is put onto their website live and is one of the most used parts of their website. The WDC, who subscribe to regular emails from the MetService, also regularly consult the Regional Council’s river level data.

While many of the tourism companies reported passing some weather information onto tourists, it can be difficult to convey the exact conditions, or the implications of those conditions. It is difficult, for example, to convey weather information to people even when they are on-site, e.g., *“convincing them that if it is bucketing down in the evening that it could be fine the next morning”*. Tourists do ring and say that weather forecast looks bad (for the next day), and then ask to postpone; in these instances the tourism companies *“have to tell them to wait and see what it is like in the morning”*.

Some tourism operators find that they have to teach tourists about the weather (e.g., *“[we] have to educate foreign people about what the weather is going to do here”*). While often tourism companies simply tell tourists about the local weather patterns as a point of interest, passing on weather information can also be a safety issue (as in cases, for example, when tourists freedom camp near a river that could rise quickly). The Okarito kayaking company find that they need to get some idea of how much a tourist understands about the weather before explaining what the conditions are actually like (although tourists’ safety can be further compromised through lack of kayaking experience and proficiency). Some tourism operators reported that they try not to mention the weather unless the tourists do so; as one operator noted, *“tourists all ask ‘what if it rains?’ – we have got to the stage now that we say ‘you get wet’”*. In respect of passing on weather information, DOC has to find *“a balance between giving people information and scaring them”*. The DOC Franz Josef Information Centre/i-SITE has a list of wet weather activities which they display when it is raining (and conversely fine weather ones for sunny days); they also have some weather interpretation displays in the information centre (Photos 17 &18).

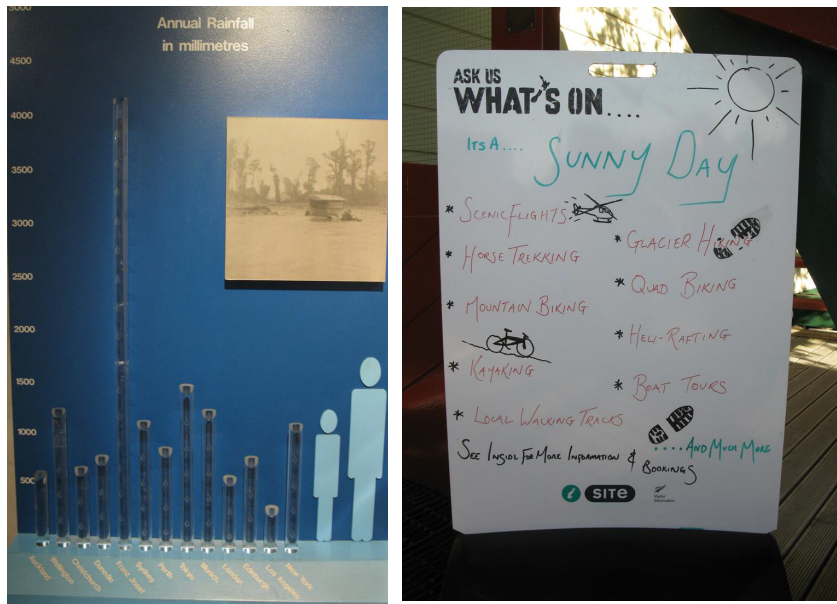


Photo 17 and Photo 18 Franz Josef DOC Information Centre/i-SITE: Graphic display of annual rainfall & whiteboard displaying sunny weather activities

Over time, the West Coast tourism industry has had a number of issues with regard to the scale of forecasting, e.g., the weather might be bad at Milford Sound and bad in Hokitika, but be fine at Franz Josef. There is a perception that tourists stay on the east coast when the forecast is for rain on the West Coast, and that bad weather forecasts also stop people coming to Franz Josef in particular. The length of the West Coast compromises forecasts and there was some suggestion that the TVNZ weather forecast should include the glaciers on their weather map, as both Hokitika and Milford Sound (which are the closest points currently on the map) are a long way apart. They recognise, however, that while the MetService have glacier weather data via automatic weather stations it needs a powerful lobby to get such a change. Some also noted, however, that “[it is] pointless telling people the forecast anyway, as it changes so quickly”. There were some complaints that the area can have fine weather for weeks and that this is never on the TV weather reports. There was a suggestion that it would be possible to counter this problem by tourism companies displaying weather information on their own websites. Also, although forecasting for the entire West Coast is an issue, even if Franz Josef was included it would not help Okarito businesses much as they don’t get the same amount of rain. As one Okarito respondent noted, there actually is the real “possibility that at some stage of everyday it will rain in Franz Josef”.

In severe weather events, or during periods of heavy rain, tourism operators might tell tourists who are moving on (i.e., away from Glacier Country) to watch out for surface flooding. The Hokitika i-SITE display road information from NZTA or Opus (one of the road contractors) and get information from the Franz Josef Information Centre/i-SITE about road conditions further south. If accommodation providers are in email contact with guests before they arrive they might “tell them it is going to be a great day in Haast so they should make the most of coming up here – or we might speed them up if the next day is not so great”.

Many operators take an interest in the weather and record daily data, often alongside visitor numbers, although this is often more for general interest than subject to formal analysis (e.g., “we

*jot down what weather was like on a particular day – can go back and see what it was like*). DOC records the daily weather conditions and data on visitor numbers at both glaciers, at Lake Matheson and at the Franz Josef Information Centre/i-SITE. The Hokitika i-SITE staff also record the daily weather conditions alongside their daily visitor door count and some flight operators record weather data alongside their operating days. The Okarito boat operators record the basic daily conditions – e.g., windy or wet – in their boat log book.

## Visitor experience and the weather

There was overwhelming agreement with respect to the significance and importance of the glaciers as an attraction in the region – as one Fox Glacier accommodation provider noted, *“we are lucky because we have two of the 100 (AA) must-do’s right on our doorstep”* (although these were identified for New Zealanders, not international tourists). However, seeing the glaciers is more important for some tourists (e.g., ones who don’t have glaciers in their own countries, such as Australia and Asians) than it is for others (e.g., Swiss tourists *“couldn’t care less about the glaciers”*). It also makes a difference how much time tourists have, and what they plan to do in Glacier Country. The flight seeing companies, for example, reported that while tourists take advantage of any windows of opportunities in the weather there is some variation in what they are able to do (i.e., if the weather is bad they find some people wait and others keep going, depending on their planning and on how much time they have). Sometimes, if tourists are *“heading south and know it is sunny in Wanaka they are more likely to move on”* (rather than wait around for the weather to improve).

## Glacier expectations and experiences

While most people want to ‘see’ the glaciers there are considerable variations in respect of what activities tourists are interested in. The Hokitika i-SITE find that international tourists are more likely than New Zealanders to do the commercially guided glacier walks, although New Zealanders are more likely to do a glacier flight than a walk. One of the accommodation providers in Franz Josef noted that the independent Asian tourists they host are more interested in glacier flights, and are not as interested (as other tourists) in walking up to the glaciers. The glacier guiding companies also reported that the two glaciers attract a different demographic – Fox Glacier attracts older people, more families and more Asians, whereas Franz Josef attracts the younger backpacker market. This differentiation may however be unintentionally reinforced by the fact that the Franz Josef Glacier Guides have a strong partnership with the Kiwi Experience company (which, on the one hand, attracts more backpackers and, on the other, might put other tourists off). Respondents also reported variations in how much interest tourists going on the glacier had in the glaciers themselves, with FIT tourists often taking *“more time to research their options and then picking the best glacier [for them]”* whereas *“a lot of the backpackers on the backpacker buses aren’t really aware of where they are anyway – they are doing it because they want good photos on their Facebook sites”*.

Tourists’ travel plans often incorporate high expectations and when tourism companies can’t meet those expectations it can be disappointing. For some people *“getting to the glacier is very important – they may be disappointed if that becomes impossible to do [in the future]”*. Few tourists appear to have any prior expectations of what the glaciers will look like, however as one of the guiding companies noted, *“some FITs expect it to be cleaner (although that is only at front – once on the ice it is better), and I don’t think they have any size expectations”*. Some tourists expect the glacier to be

an all-weather experience and, in poor weather (i.e., bad enough to cancel glacier trips), dealing with tourists' expectations can present challenges for the guiding companies.

The majority of tourists, however, visit the glacier/s independently and will usually go to both glaciers because they are so accessible: *"They can just drive in, and from the car parks people of all levels of ability and fitness can walk up and look"*; *"Everyone you talk to says it is the whole thing of touching it [the glacier] and getting close"* (Photos 19 & 20). Some tourists think they can walk right up onto the glacier and need to be told they can't. Commonly, tourists might go on one glacier (with one of the guiding companies) and visit the other (independently); which option they take at which glacier depends on their travel direction, although Franz Josef is more popular as the township has more accommodation options. As noted earlier, tourists will sometimes 'stay' at Fox Glacier and 'visit' Franz Josef. The visitor numbers are significant with around 500,000 tourists visiting the glacier valleys each year.



Photo 19 The 'accessible' Franz Josef Glacier

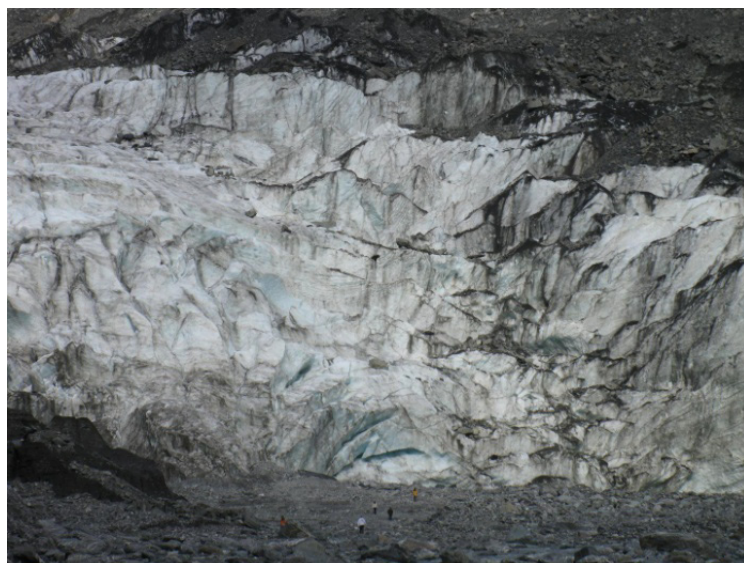


Photo 20 Getting close enough to touch the glacier

The heli-hike options offered by the two glacier guiding companies are particularly popular and also very weather-affected; tourists might wait the weather out, go away and return, or hop between Franz Josef and Fox Glacier in order to maximise their chances (Photo 21). If tourists do not have time to wait around for the heli-hike, however, they might just do half day walk instead. Those who do *“wait it [the weather] out do so because the flight is their core reason for coming to glaciers”*, although they are still constrained by time (e.g., *“a lot of people only here for one night and it depends where they are heading for next how long they can ‘afford’ to wait around”*). The majority of respondents reported that tourists’ *“tight schedules”* precluded waiting around for the weather to improve. Often, the weather is not bad enough to cancel activities, but rather the weather conditions might put tourists off wanting to participate. Generally, however, because *“most tourists are only there once”* they will still go on their preferred activity regardless of the weather.



Photo 21 Helicopter landing on Fox Glacier

## Glacier safety

In terms of managing public access, DOC have some issues with tourists not understanding the conditions properly – e.g., *“they understand full-on floods where they can see the full power of the river and can understand that that’s not a good place to be, but we’ve all seen people pushing icebergs aside while walking up flood channels – so the concept of how big the risk is, is foreign to them”*. At both glaciers, managing visitor safety is a key concern for DOC and they have some issues with tourists crossing the barrier ropes to get closer to the glaciers – at Fox Glacier this can depend on *“where the barrier rope is, where the ice is and if there is a guided group visible beyond that”* (Photo 22).



Photo 22 Warning sign at Fox Glacier viewing point (with tourist visible beyond barrier)

The Glacier Gateway Motel (which is located on the banks of the Waiho River) reported that they “often see chunks of glacier ice coming down the river and, as a safety precaution keep an eye on colour changes in the water, and on the amount of ice coming out”. They also commented, however, that “seeing the ice floating down the river is a real novelty for our guests, who rush out and pick up the ice and put it in front of their units. It is the extremes and the fact that there is a glacier river right next door that appeals to them”.

There is some community concern that DOC ‘favours’ the guiding companies in allowing access to the glacier. In terms of managing hazards in the glacier valleys (and in response to the deaths of two tourists at Fox Glacier in 2009), DOC has changed the colour of some of their signage and is using stronger wording on signs (Photos 23 & 24). Also, in respect of safety in the glacier valleys, DOC staff are of the opinion that some New Zealanders have a better understanding [than international visitors] of what the [natural] environment can do, although their safety considerations can be compromised by their “desire and expectation to be able to get to ‘their’ glacier in ‘their’ national park”.

Overall, from a safety perspective, New Zealanders are perceived to be more knowledgeable than international tourists about the local weather conditions. Often tourists are more concerned about delays to their travel plans than about safety concerns. If the State Highway is closed for any reason the DOC Information Centre/i-SITE at Franz Josef have to deal with tourists who “are getting worried – they don’t want to be stuck in Haast, or they have booked accommodation and want to know [what is happening] or [want to] move on”. For safety reasons, the Hokitika i-SITE staff often advise international tourists to “take their time” driving in windy or heavy rain conditions.



Photo 23 and Photo 24 DOC safety warnings at Fox Glacier (left) & Franz Josef Glacier (right)

## Weather impact on the tourist experience

In addition to the weather impact on glacier activities, the weather also affects tourists' planning and behaviour in a number of other ways. For tourist operators in Glacier Country it can be a challenge knowing how busy it will be, especially when the weather plays such a big role in their daily operations, and in the number of tourists passing through or staying in the area. In this respect it is an advantage to deal with tour groups, so as to have some idea of the timing and number of visitors.

Some companies reported that they do not get many bookings ahead of time; even if tourists do book in advance, they do so on the understanding that they contact the operator closer to departure time to check conditions. The current weather has more impact in the case of businesses who attract more 'walk-ups' than those who take advance bookings. The Hokitika i-SITE is busier in fine weather; in rain it is harder to get tourists to commit to booking activities (at the glaciers) although they have a system of referral bookings, whereby the tourists can book in advance, but do not have to actually pay until they get to the glaciers. For flight-seeing operators, the weather also makes pre-booking (i.e., the day before) difficult and they might book tourists in, but not discuss the finer details of flights until immediately prior to flight time. If the weather is bad this gives them the option to either offer an alternative flight, or the opportunity to wait (if weather looks like it might improve); it is up to the tourists to decide which option to take.

Because of the tendency for weather conditions to deteriorate as the day goes on, operators try to encourage tourists to make early contact (rather than, for example, *"turning up 2pm when conditions are less suitable when they could have come earlier"*). If contact is made with tourists before they get to Glacier Country, operators might tell people to *"get there in time to go out that day, because the forecast for following day is not so good"*. The weather can also impact on tourists' travel timing, e.g., if it is raining they don't arrive at the glaciers until late in the day, whereas they might get there earlier if it is sunny. Sometimes tourists might be booked in for a few days, but will want to leave when it is raining on their first day – the accommodation provider might then have to *"convince them to stay"*. Most accommodation providers have strict cancellation policies in place to deal with the number of tourists who try and cancel their bookings when they see that the weather forecast is bad.

The amount of rain the West Coast receives *“does not really enter into tourists’ consciousness”* (as one accommodation provider noted, *“some of our guests don’t know how much rain we get each year”*). This is potentially not helped by the fact that the GCTG *“website includes primarily sunny photographs”* although the *“What to do on a rainy day?”* is one of the most visited pages on their website. Rainy weather that stops tourists getting to the glaciers also shuts out a lot of other activity options which tourists do not always appreciate:

- *“People are a bit cranky because they have come to New Zealand and it is raining”*
- *“Tourists don’t realise what impact the wind will have – they think ‘I am here and want to do something – kayaking or the boat’ and it surprises people that they can’t”*
- *“At the end of the day you just have to tell people (and remind yourself as well) that if we didn’t have the rainfall we wouldn’t have the attraction in the first place”*

There is some discussion in interviews of the possibility to *“make the weather part of the attraction”*, although this was usually suggested by tourism operators who were not directly impacted by heavy rain. The Hot Pools respondent, for example, talked about providing more weather interpretation by telling tourists about the volume of rain, and by showing the conditions via the installation of a webcam up on the glacier. One of the accommodation providers also noted the value of a glacier webcam which would show *“that we are good once they are above the low cloud”*.

Tourism operators also have to deal with tourists’ varying perceptions regarding the suitability of the weather for activity participation, e.g., *“it could be cloudy and pouring with rain and tourists expect to fly, other days there might be a little puff of cloud and they will think it is not so good”*. One of the accommodation providers reported that some tourists will *“only fly if the sky is totally cloudless”*. The weather also impacts on tourists’ moods. The Okarito kayaking company reported a variety of weather-related tourist behaviours:

- *“It can be difficult to convince people that weather is not suitable for kayaking – a particular problem is squally weather – calm with small fronts coming through”*
- *“Even if there are wonderful kayaking conditions a bit of drizzle makes it hard to get people out of their cars”*

There are also variations, according to nationality, in how much tourists are prepared to do in wet weather. Tourists from the UK or Europe, for example, will go out in all weather whereas tourists from the new tourist markets (e.g., Asians) will not do so (e.g., *“many Asian tourists will come through here and it is spitting lightly and they will say ‘oh, it’s raining, we can’t go outside”*). Accommodation providers have found that those tourists that do get out when it is wet are encouraged by the provision of drying facilities for their clothing and footwear, although tourists from Asia tend not *“to have the right clothing or shoes”* for the conditions.

The weather sequences the area experiences also have an impact (especially in the summer) on visitor travel behaviour, e.g., *“we get 3-4 days good weather then 1-2 days bad weather – people around in those bad days pass on negative word-of-mouth and on the good days those people have already gone from the region”*. Whataroa-based White Heron Tours find that *“more people stop when they see our signs on the way past on a nice day, whereas if it was raining they would go straight to their hotel – but then they might not be able to do anything else [at the glaciers] so they will ring up to see if our tour is going”*. Some tourist operators noted that they often have to *“stick to*



*their guns*” with regard to the weather conditions as they “*know from our own experience that the weather conditions will not last, but you have to convince tourists [who do not see it]*”. There is also some perception that tourists do not understand the impact of the weather on many activities; according to the operators of the White Heron Tours, for example, “*tourists might look at the weather map, see that rain was forecast, and decide not to go to the West Coast – if only they knew it doesn’t affect the [heron] viewing*”.

Domestic tourists are perceived to be more likely to cancel a trip to the West Coast if the weather forecast is bad. There are also issues with domestic tourists for whom “*the word ‘glacier’ is related to snow – they don’t understand that it is not all that cold and they don’t realise there is a lot more out there – the bush walks and the coastline*”. New Zealanders ‘expect’ rain on the West Coast and according to the Hokitika i-SITE staff are “*are more likely [than international tourists] to comment if it is a nice day*”. The Okarito kayak company (who also cater to a high percentage of domestic tourists) also reported that “*on sunny days we have tourists saying ‘you can’t get many days like this’*”.

## **Disaster management**

Disaster management in Glacier Country is well-coordinated, with considerable involvement by tourism personnel, a situation attributed to small town circumstances (e.g., “*as a company, we see that as part of corporate and civic duty in a way – to help people in a small town*”). There is active community involvement in emergency services and the area is well-equipped for emergencies. Many tourism activity companies have a lot of useful equipment such as, for example, stretchers and ropes. Bigger organisations have generators and LPG, the community is well set up with barbeques (and always make sure their gas bottles are full), LED torches, and so on. Some companies have no formal involvement in Civil Defence, but contribute financially to the provision of emergency equipment. Both DOC and the Fire Service operate radio networks.

This attention to emergency management in Franz Josef is triggered in part by experiences of dealing with the recurring flood events on the Waiho River. The possibility of experiencing a large magnitude earthquake on the Alpine Fault (which runs through the Franz Josef township) generates the most concern however. While the Christchurch earthquake has to some extent raised the profile of earthquake risk, it has always been a concern. Involvement in Civil Defence requires ongoing commitment and engagement and relies heavily on volunteers. Local emergency service volunteers have numerous practice drills and the regional Civil Defence organisation sometimes runs West Coast-wide emergency practices.

There are Emergency Plans for the Franz Josef and Fox Glacier townships and at a business level many tourism operators have plans for earthquake and floods (which includes taking responsibility for guests in the initial stages of an emergency). In the event of a severe emergency, there is some expectation that the local population might be isolated for a period of time, while tourists would be airlifted out and dealt with as a priority. If tourists are not evacuated, however, the area does have a lot of accommodation available. The Civil Defence plan – and emergency planning more generally – includes the use of generators to keep freezers operating in order to manage food sources. One respondent, however, noted that they also “*need a bulk food source (like rice) and then [we] have meat in paddocks and deer in the bush*”. Others noted that “*living in an isolated town you learn to*

*adapt – when you buy groceries you buy more than you would otherwise, and [you] always have things like spare blankets available”.*

In Okarito *“everyone just helps each other out”*. In the event of an emergency they do not expect outside help, and have no expectation that Civil Defence would even be able to get to such an outlying community. In an emergency, Okarito residents expect that they could get a fuel drop via helicopter from Franz Josef or Fox Glacier to keep their generators going. Whataroa has always been proactive with regard to Civil Defence planning because the Whataroa River is prone to flooding, but in recent years that risk has been mitigated to some extent. The Christchurch earthquakes, however, have raised the importance of Civil Defence planning across the entire West Coast region. Okarito have had several tsunami warnings over the last few years.

A number of infrastructure providers (e.g., NZTA, Electronet) are responsible for ‘lifeline utilities’, the continuing operation of these are given priority in emergency situations. There are sometimes energy supply problems (e.g., the 2011 earthquakes and snowfalls in Canterbury affected the fuel supply lines to the West Coast) which can cause issues in emergency situations. As one respondent noted, an interrupted diesel supply might also compromise their ability to run generators in emergency situations.

The impact of an emergency event could be vastly different depending on when it occurs – e.g., in the busy tourist season, compared to the winter months. Emergency services are also slightly limited by the fact that the people involved are all volunteers and might not even be in the area/townships when an emergency occurs. While accommodation providers can take care of their guests, the amount of campervan traffic and freedom campers in the area presents challenges with respect to knowing where tourists are. Franz Josef is *“tied between two rivers and so could become a bit of an island”* in an emergency situation and in the summer there would potentially be a lot of people that needed looking after. There is a perception that tourists are unprepared for the normal West Coast conditions, let alone for emergency situations e.g., *“they don’t even have insect repellent or raincoats”*.

## Energy

Most of the comments made about energy concerns focused on the high costs of operating at the local or business level. The isolated location of Glacier Country, and the small population base, makes it an expensive area in which to both live and to operate a business of any sort. The cost of energy impacts significantly on operating costs, e.g., the *“revenue from heli-hike operations has slowed considerably as fuel prices have risen”*. While price rises can be mitigated in part by putting the ticket prices up the companies have to absorb some of the increased cost – *“we can’t keep putting prices up”* – so have reduced margins. Although most respondents were of the opinion that they cannot do anything about the cost of energy – *“[we] just have to pass those costs on”* some noted that *“it comes a point where that becomes unaffordable for tourists”*. Those that do pass the (rising) costs on *“try to do so infrequently, but then [it] is usually a significant rise”*.

Some companies have been proactive in reducing their own energy costs. Fox Glacier Guiding, for example, have upgraded their vehicles (which they use to transport walkers to the glacier), a consequence of which is that it is now easier to get Certificates of Fitness, their preventative

maintenance costs are lower and they are more efficient to run; they are also cleaner and easier to drive. While using less fuel was part of reason for upgrade, it has been positive for the business on multiple levels. Franz Josef Glacier Guides also see energy costs as a business concern – using newer vehicles, using bio-oils or diesel – and the company is considering a new operations building that collects rain. The Franz Josef Hot Pools complex uses a computerised pool management and building maintenance system which is energy efficient. The Hokitika i-SITE switches off their TV screens and radio equipment overnight and switches off their computers when they are not needed – again, more for the environmental cost, than as a money-saving measure.

In respect of energy costs, one DOC respondent noted that *“sustainability is on our agenda, e.g., [our] footprint, but [it is] also a cost factor”*. With respect to their own operations, they have spent *“quite a lot of money on insulating our staff houses in Fox Glacier – the same in Franz Josef – in fact DOC has been doing it nationwide and we have been trying to think of ways to improve heating and lighting and having more people in vehicles that are going to Haast”*. The tourism components of DOC operations are more energy intensive than their conservation activities. For DOC, balancing operational budgets and expenses is common and they may install fewer signs and put less gravel on the tracks in response to rises in fuel prices.

When the owners of Okarito Nature Tours bought their business they replaced the boat motors with cleaner, quieter ones although this was done primarily because of the importance of ‘quiet’ in respect of the product they offer. They have now *“started to look at an electric motor for the boat – in response to the cost of fuel and cost to the environment”*. For some of the bigger tourism operators, having several operating bases (and being a bigger company) reduces their own fuel costs (e.g., economies of scale); these companies were less likely to report having thought much about energy issues. They did note, however, that they could potentially use more energy running generators (i.e., diesel) in response to power cuts caused by severe weather events. Other respondents noted that they have already *“fine-tuned tours as much as possible in respect of fuel use”*. The West Coast Wildlife Centre, which has high costs because of running lights in their nocturnal house, is also a new business and *“so is not in position to make energy adjustments until we see what situation/costs are – we need at least one season”*.

A number of respondents noted that energy savings are *“not something they have thought about much yet”*; the use of the word ‘yet’ suggests, however, that they know they will have to at some stage. Another respondent noted that there is *“talk in the aviation industry about different fuels – e.g., bio fuels”* although this was discussed somewhat remotely (i.e., as if it had nothing to do with the speaker) and while they might be able to change their fuel mixture to make some efficiency savings they were *“not overly worried about cost of fuel”*. One respondent reported that they were not personally affected by external fuel price rises (i.e., the fuel costs associated with tourists either getting to New Zealand or to Glacier Country), but that internally they have taken account of energy costs – (e.g., *“we use LPG for heating, but have mitigated risk of increasing prices by way of a good contract with provider”*).

As noted earlier, the high cost of fuel also impacts on the cost of living for many of tourism and DOC staff who, because of accommodation shortages, are forced to live away from the area (e.g., some Franz Josef/Fox Glacier staff live in Whataroa or Okarito). Glacier Country is an expensive place to live, even if people travel to Hokitika for cheaper supplies it costs them more in fuel. Almost all

respondents reported that because of high fuel costs they try to make trips 'out' as worthwhile as possible (e.g., they get many things, things for others, car pool). Some DOC staff internet shop using Christchurch suppliers. In the case of the lifestyle operators, for whom home and work costs were quite blurred, other energy savings were made in the home (e.g., double glazing). High electricity charges are also a concern and there was a suggestion that climate change might present opportunities for wind generation, although this advantage might be cancelled out by the reduction in hydro generation if the east coast gets drier. A number of respondents noted that energy cost is something they need to "keep a handle on" and suggested a variety of alternative energy options that could be considered:

- *"[There is the] option of using thermal energy or [we] could use methane gas from a covered refuse place"*
- *"Should look for alternative electricity generation and [I] can't understand why the West Coast doesn't have its own hydro dam supplying electricity"*
- *"Would like to see more localised small power generation (e.g., could use lagoon surge)"*
- *"Could have solar, wind or wave energy – technology is almost there [for it to happen]"*

Others couched these alternative energy options in terms of opportunities for New Zealand tourism:

- *"[We] could be proactive on the West Coast in terms of showcasing 'green initiatives' – it goes well with current New Zealand (marketing) image"*
- *"Accept that burning fuel on boat tours [is not good], but counteract the environmental damage of that by educating people into the importance of protecting natural areas"*

While most respondents had a fatalistic attitude to power prices (*"what can you do – the power companies are god"*), many have made some effort to accommodate these in their business costs. Some accommodation providers, for example, have put in gas heating (for both water and more general heating) in accommodation units. They also do not offer winter accommodation rates (i.e., it is not cheaper in winter so they can make up their extra running costs). One reported that *"we are aware of energy cost and always looking at ways to reduce these – shower restrictors, energy light bulbs, but have to be careful to still provide good facilities to guests – energy bulbs are not always the best"*. Another noted that *"while can be energy aware and switch off unnecessary lights etc, you still have to look as though you are open and trading"*. It is also possible to *"shop around for suppliers and freight costs and [we] have energy bulbs – but we go through a lot because of power surges – and timers on the heaters"*. There are also limits to how much power use can be reduced, as one respondent noted *"using other heating sources, such as coal, is also unsustainable"*.

The size of the area they are responsible for impacts significantly on the fuel costs for infrastructure providers such as Telecom and DOC. Telecom (whose area stretches from Karamea to Haast) have fitted all their vehicles with GPS to enable them to actively monitor driving speeds, and have made quite a few fuel savings as a result of this. The WCRC also have high petrol costs associated with managing such a large area of land. While the WDC has some concerns around the cost of energy they try to budget to allow for rising prices of energy. They also appreciate the impact of rising fuel prices on visitor spending and numbers: *"it [fuel costs] plays a major role because the global recession has definitely affected people's spending habits – the tourist numbers as well – who knows"*

*in 10 years time we [could] have an alternative fuel – it’s an ever-changing world – the technology is changing faster than it was even last year”.*

While higher fuel costs could ultimately lead to less traffic and less wear and tear on the roads, it could also increase the costs of repairs (e.g., bitumen costs would also increase) for NZTA. The travel component of their own operations would also become a more significant cost to their business and they might need to look at how to improve that. NZTA are constantly looking at how to improve their efficiencies to make the most of their restricted budgets – there is potential to reduce surveillance, change contracting arrangements, and the probability of increasing technologies that replace having to physically go out and look at the network (e.g., videos of the network, road markers with cameras, and so on).

Overall, relatively few respondents took a wider perspective on energy concerns (in respect of financial or environmental costs) and tourism in Glacier Country, although there were a variety of comments made about the energy cost to tourists in respect of getting to New Zealand, and then travelling within the country:

- *“The biggest issue is getting people to Fox Glacier in the first place”*
- *“It [the price of petrol on the West Coast] does not affect tourists much as for many (e.g., from UK and Europe) fuel in New Zealand is cheap anyway”*
- *“Rising fuel prices would affect arrivals – especially domestic [tourists]. International is different”*
- *“Danger that New Zealand is increasingly under a green spotlight – especially from tourists from countries that are really ‘up on it”*
- *“[I] am a low energy user, but for tourists to get here involves high energy costs for both flying and driving – New Zealand being a long-haul destination is an issue”*
- *“Trying to run an eco-business when people are coming from the UK or USA is ‘almost pulling the wool over your own eyes”*

## **Future challenges**

When asked about challenges to tourism in Glacier Country over the next 20-30 years issues ranging from concerns at a destination level, to broader, New Zealand-wide tourism concerns were noted.

A number of respondents expressed concern over the long-term sustainability of the two glacier settlements, although the issues challenging each differed. The land access issues which restrict new settlement in Fox Glacier, for example, make it hard for people to settle there. This presents some significant community challenges in respect of maintaining a viable community (e.g., keeping the local school open). In Franz Josef *“none of the real locals are involved in tourism anymore and there is increased hostility towards tourism as locals feel they are missing out”*. In both communities there are infrastructure issues and a perceived need for better community services (e.g., water and sewage systems, footpaths, toilets, rubbish collection). Most however recognised that this was difficult for a community with a population of only 300, but which hosts hundreds of thousands of visitors each year (Photo 25). The growth in tourism over the last 10 years is straining many utilities and in Franz Josef this has the potential to become worse with the development of more subdivisions and further expansion.



Photo 25 Campervans at Franz Josef Holiday Park in the quiet shoulder season

While the cost of living in Glacier Country presents challenges for residents and for tourism operators, the cost of tourism in Glacier Country is also challenged by other competition from other tourist centres. Queenstown, for example, offers tourists much cheaper accommodation and Glacier Country operators often struggle to explain to tourists that theirs is a seasonal destination, and, as a result, tourism operators bear higher costs for providing services.

There was also considerable concern surrounding the impact of external events on tourism in Glacier Country (and on New Zealand tourism more generally): *“business is not as strong as in the past due to external conditions”* and *“continuous downturn over last few years – caused by mostly external factors”* were typical comments. These external factors included: SARS, swine flu, recession, earthquakes, ash cloud, exchange rates, the US\$, financial crisis, fuel prices, and the 2011 earthquake and tsunami disaster in Japan. One respondent noted that that the *“big thing is to still have tourists coming (to New Zealand) and issues around what obstacles – like wars, volcanic ash, earthquakes, recession, and so on – there might be to that”*. Others differentiated between factors that prevented people coming to New Zealand and those that might impact on them once in New Zealand.

Exchange rates were mentioned by a number of respondents and a range of exchange rate impacts were identified. One respondent, for example, pointed out that *“exchange rates – cost people more to get here and then reduces [their] spending once here – [tourists] might get better value in other countries”*. According to the Hokitika i-SITE respondent, once in New Zealand tourists are *“quite careful of the exchange rate”*. The cost of the New Zealand dollar also affected the affordability of travel in New Zealand in respect of fuel, accommodation and food prices. Another respondent also commented that attracting tourists to New Zealand depended on long-haul travel affordability and quality of service in tourism, and that New Zealand needs to *“work on becoming/being a good quality value-for-money destination”* providing a *“good quality of service”*.

There were also some concerns around the impacts of falling visitor numbers on tourism development in Glacier Country as *“in order to diversify our product offering we need a volume of people (which is not happening because of the recession and earthquakes)”*. A drop in tourist numbers coming to New Zealand could ultimately affect DOC revenue (e.g., reduced concession

revenue) and have implications for conservation. Also, the 'type of tourists' visiting makes a difference; as one respondent pointed out *"the cheap flights might bring more people to New Zealand but they are Mum, Dad and the three kids who don't want to spend money here"*. One accommodation provider expressed concern about the increasing pollution from freedom campers.

Several respondents commented about challenges associated with changes in the New Zealand tourist markets (e.g., more Chinese, Indian and other Asian tourists, rather than the traditional UK and European ones). There was some suggestion that *"[we] might need a change in marketing to attract these tourists – get smarter about destination marketing – market to people who have not already decided to come to New Zealand, not the ones already here"*. Another respondent noted that *"we also need to refine the product offering – new tourists might not accept current product standards"*. One respondent noted that some parts of the tourism sector (e.g., holiday parks) are very adaptable, and are already able to cater to many different types of tourists. Another noted the potential to change dynamics of tourism in Glacier Country through other developments, such as, for example, Hokitika Airport servicing international flights.

Most of the concern and focus was on the impacts of external factors on international tourists; few respondents expressed any interest in, or expectation of, attracting many domestic tourists to the region. As one respondent noted *"Kiwis just have this mental block about the West Coast and most of that comes from the weather"*. Another suggested that it was a challenge *"convincing local New Zealanders and people in Canterbury to come to the glaciers because of the weather forecast and unawareness that it is only 4.5 hours drive away"*.

The potential loss of the glaciers did not feature as a challenge and most respondents were of the opinion that they will remain a tourist attraction for a long time. As long as the glaciers are *"accessible and people can still climb on them there will still be tourism in the area"*. While one respondent commented that *"the glaciers are as big as you make them and they are not for everyone"*, most of those interviewed acknowledged the importance of the glaciers in respect of Franz Josef and Fox Glacier townships (Photo 26). As one respondent noted, *"with no visitors we would have no towns – [we] might not even have a National Park"*. While it may be possible to pre-empt the impact of having no glaciers (and many fewer people) by diversifying the tourism product offering (such as is happening in Okarito) the reality is that these alternative products do not have the mass appeal of the glaciers.



Photo 26 Strong focus on the glaciers