

# Visitor satisfactions, impact perceptions, and attitudes toward management options on the Milford Track

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### **Great Walks visitor research programme**

This report is the eighth from the Great Walks visitor research programme. Reports from other track samples are published through the same series. While data were collected predominantly during January–February 1994, those visitor responses still provide valid indications of visit experiences and evaluations. Any significant management or use-pattern changes since then can be interpreted in light of these results. The main change that has occurred on the Milford Track has been the removal of the Clinton Forks Hut and a construction of a new hut on a site further down-river.

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# Abstract

Walkers on the Milford Track in Fiordland National Park were surveyed during January–February 1994, as part of a wider study of track users in New Zealand. On this track, which is managed with a set use-limit, the visit evaluations were highly positive, suggesting little dissatisfaction, or any need for urgent management action. Notable concerns are raised regarding impacts from aircraft noise, and from issues of social impacts related to hut and track congestion. Despite the limit to visitor numbers on this track, high perceptions of crowding and social impacts indicated that compromises to the quality of visit-experiences were still occurring, particularly due to hut congestion. Results suggest that further improvements to visit quality could be best achieved through improving the use of space in huts, minimising a track bottleneck, and improving the accuracy of visitor expectations, particularly among overseas visitors. For any additional management actions, visitors favoured information-based approaches rather than more regulatory controls.

# Executive summary

This report summarises key results from a survey of 384 walkers on the Milford Track. The survey was undertaken as part of a broader study of people doing overnight trips on the Great Walks. It provides information about visitor satisfactions with their visit experiences, about which aspects of visits may be detracting from the quality of these experiences, and about management options to address these issues.

## **Evaluation**

Evaluations of the visit were very positive. Overall satisfaction scores were very high, and few visitors considered the experience was in any way below their expectations. The overall satisfaction measure was not linked to any other variables in the survey, which limits its practical value as a possible tool for any monitoring of visit-experience quality. Despite this being a managed use-limit track, high crowding perceptions indicated visit experiences were being compromised in some way, and around a quarter of visitors also saw more people than they expected. While there were no relationships between these perceptions and how the trip was evaluated overall (e.g., overall satisfaction scores), the crowding perceptions were found to have some association with impact perceptions related to hut congestion and track congestion. In general, crowding scores appear to represent a more sensitive measure of compromises to visit-experiences. Three major concerns relate to the accuracy of pre-visit expectations of the visit experience (particularly among overseas visitors), the crowding conditions at huts and on Mackinnon Pass, and the higher crowding perceptions among overseas visitors.

## **Satisfaction with facilities and services**

Satisfaction with specific facilities and services was generally high, suggesting no immediate need for significant management interventions. Given managed use-limits, no new or substantially increased dissatisfaction sources can be expected, unless management conditions change or visitor expectations become less accurate. Small, but notable levels of dissatisfaction were expressed for current hut facilities and services, in particular with the limited space to relax in huts. Crowded visitors were more dissatisfied with these conditions. While the controlled use-levels for the track will not add additional pressure on huts, high crowding scores and notable dissatisfaction with huts are a signal that improvements in visit experience quality appear possible.

## **Impact perceptions**

Almost all visitors noticed impacts from aircraft noise, and a large majority were bothered by it. Despite no bunk capacity problem, impacts related to hut and track congestion were also noticed by a majority of visitors, and many were bothered by it. Although many indicated they were not bothered by these conditions (representing substantial impact tolerance), these results reflect high awareness of hut-based social impacts, and do indicate that compromises to the quality of visit-experiences were occurring. These hut-based impact perceptions were higher among crowded visitors, as were most other types of impacts.

Apart from the highly negative perceptions of aircraft noise, these results indicate that detrimental effects on visit experiences occur among the perceptions of social impacts associated with hut conditions. Track congestion, associated with encountering too many others on the track each day, is an important secondary issue. These results also emphasise that management actions to improve the quality of visit-experiences should focus first on hut conditions, as should any related monitoring. Management and monitoring of track congestion conditions represents an important secondary area. Addressing the problem of aircraft noise appears to be a priority for management.

### **Attitudes toward management options**

Visitor attitudes were varied toward the different options managers could apply to future use-level management. In general, visitors were most positive toward the use of information to encourage better visitor behaviour and visit expectations, and were most negative toward the more regulatory types of management approach. Results suggest current visitors disagree with any potential increase in use-levels.

### **Recommendations**

While not linked with overall satisfaction or crowding, the very high awareness and negative perception of aircraft noise among all types of visitors on the Milford Track indicates a specific management problem. Overall crowding perceptions appear to be excessive for a track with use-limits, and many visitors also saw more people than they expected. In both cases, responses were more negative among overseas visitors. Crowding bottlenecks appeared most often in the huts, and also to a lesser extent on the Mackinnon Pass section of the track. Lower dissatisfaction levels highlighted hut conditions, particularly related to space to relax in huts, and to dry wet gear, cook, and wash-up. Perceptions of impacts highlighted 'experiencing too many' in huts and on the track, and 'noise in huts'. Visitors who felt crowded evaluated all these more negatively. Overall, it appears that the way this managed-use track is operated may allow too many unexpected situations of perceived crowding. Congestion issues in huts appear the most prominent concern.

While there was no urgent need for immediate management action to address current problems, the most productive directions for actions to improve the quality of visit-experiences appear to be:

- Identifying options for reducing the perceived impacts from aircraft noise
- Optimising the use of space for comfort and access to facilities within huts
- Ensuring accurate pre-visit information about the Milford Track, to better match expectations with likely experiences (especially for overseas visitors)
- Promotion of more diverse departure times from huts to minimise the small, but notable visitor congestion bottleneck at Mackinnon Pass.

Most initial gains should be made by concentrating upon physical changes to hut facilities and their operation, complemented by long-term promotion of more accurate expectations through information use. Appropriate research and information back-up could include:

- Assessing hut use characteristics and options for optimising the use of space and facilities in huts.
- Assessing the effectiveness of information-based techniques in influencing visitor expectations and use, including exploration of reasons for inaccurate expectations of visitor numbers.
- Investigating the facility and service expectations of different visitor groups.
- Investigating the greater perception of most impact types by crowded visitors, and the greater perception of crowding by the overseas visitors.
- Investigating the distinction between noticing and tolerating impacts, and being bothered by them.
- Comparing evaluations and perceptions of independent and guided walkers
- Investigating the general resistance by visitors toward the more direct management approaches, and particularly among the New Zealand visitors.
- Assessing the degree to which the level of aircraft noise is expected, and how it is evaluated by visitors, particularly in post-visit reports to others.

Any monitoring of visit-experience quality should concentrate first on hut congestion conditions. This could be based at Dumpling Hut where the last trip-night is spent, or rotated through each of the three trip huts. Some of this monitoring could also include assessment of track congestion issues at Mackinnon Pass, and monitoring of aircraft noise impacts. More emphasis should be on crowding scores and selected impact perceptions, as measures of overall satisfaction appear less likely to provide a sensitive measure. Given that use-conditions should not deteriorate, unless management controls change, and if baseline conditions are then established by initial monitoring processes, ongoing monitoring applications will only be necessary for evaluating the effectiveness of any management actions taken.

## Acknowledgements

The Great Walks study covered a wide variety of different track and recreation situations, and raised a number of large operational and analytical challenges. Help and advice on statistical approaches to these analyses was provided at various times by Margaret O'Brien and Ian West of Science and Research Division, and Roger Wilkinson of Landcare Research. Data entry for the project was carried out very effectively by the Tourism Green project team of Michael Chan, Victor Keo, and Sulia Aumua. Ian Mackenzie of Science and Research Unit provided the editorial assistance for final production of these reports. Thanks are also due to other Departmental staff who viewed the draft reports and made useful suggestions on their overall approach and contents.

For this specific report, overall co-ordination was managed by Paul Wilson of Southland Conservancy Office, and Ross Kerr and Ken Bradley of Te Anau Field Centre. The actual application of the survey in the field was carried out by hut wardens on the Milford Track

# 1. Introduction

The Milford Track is a 3 day walk through forested glacial valleys and over an alpine pass in Fiordland National park. This survey was undertaken as part of a broader study of people doing overnight trips on the Great Walks. Tracks classified and managed as Great Walks are the primary locations for multi-day walking trips in the New Zealand backcountry. They are of high scenic and recreational value, and are usually characterised by high and increasing use-levels. The Milford Track represents an exception as it has a use-limit of only 40 independent walkers starting the track each day, and each group follows a constant trip pattern of one night in each of the three huts provided. This constant use pressure to the limit of hut capacities, and the need to provide for quality outdoor recreation experiences, requires that like the other Great Walks, this track must be specifically managed to provide high levels of facility and service provision without compromising the quality of the visit experience. To achieve this outcome, managers require information about visitor satisfactions with their visit experiences, and what aspects of visits may be detracting from these experiences. On this basis, the objectives of the Great Walks study were to:

- Provide brief description of overnight visitors to the Great Walks
- Identify visitor satisfactions with the facilities and services provided
- Identify visitor perceptions of crowding and use-impacts
- Identify visitor attitudes towards management options

Departmental staff at key huts administered standardised questionnaires to visitors on each track<sup>1</sup> on their last trip night. Overall, 384 Milford Track visitors completed the survey questionnaire during the 1993/94 summer season. After data coding and entry, preliminary results were initially presented to managers as percentage tables. These descriptive results are summarised here in the questionnaire format (refer Appendix 1).

Other analyses were carried out on the database, and this report summarises the main findings derived from these descriptive and analytical results. The report presents overall evaluations by visitors of their visit experiences, and then investigates the specific aspects of facility and services satisfactions, social and physical impact perceptions, and attitudes toward different management options. Analyses are undertaken which assess how these specific responses vary between different groups of visitors, and how they relate to the overall evaluations. This approach enables any significant current or potential compromises to the quality of visit experiences to be clearly identified.

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<sup>1</sup> A standardised questionnaire (Appendix 1) was developed for overnight walkers on the Great Walks system, which comprises the Abel Tasman, Heaphy, Kepler, Milford, Rakiura, Routeburn, Tongariro, and Waikaremoana tracks, and the Wanganui River journey. Surveys of the Travers-Sabine and Dart-Rees track circuits were also included, although flooding prevented any work being possible on the latter. A sample of sea-kayakers was also collected in Abel Tasman National Park. Some site-specific questions were used where required, particularly for questions related to boat use on the Wanganui River and the Waikaremoana and Abel Tasman Tracks; some non-applicable questions were omitted on the Milford Track; and it was possible to survey at Easter on the Tongariro, Kepler, and Heaphy Tracks. German and Japanese translations were provided.



## 2. Visitor information

In summary, visitor characteristics were representative of a young and international group of people, largely unfamiliar with the Milford Track and generally inexperienced in backcountry walking. Short hut-based trips predominated. Party sizes could not be presented as many visitors confused their personal party size with the number of people following on the same trip cycle (e.g., 40 persons starting per day). Some summary findings included: (refer Appendix 1 for details)

- An equal proportion of males (51%) and females (49%).
- 40% were from New Zealand, compared with 14% German, 15% British, 8% USA, 7% Australia.
- Most (70%) were aged between 20 and 40 years, only 11% were aged 50 or more.
- Most (95%) were on a first visit to the track, 25% were on their first overnight walking trip, 51% had done up to 10 similar walks, and 14% had done more than 20 such trips.
- All visitors stayed for 3 nights in huts.

When comparing the features of New Zealand and overseas visitors, the only distinctions were the greater age-range of New Zealand visitors, and their slightly greater previous experience of the Milford Track. overseas visitors were more often in the 20–40 year age-range (79% *vs* 56% for New Zealand visitors), were more often on first-visits to the track (98% *vs* 90% for New Zealand visitors). In general, experience levels appeared to be low for almost all visitors.

Comparisons were also made between the of the characteristics of visitors who indicated they were either ‘crowded’ or ‘uncrowded’. (Refer to Section 3.2 and Appendix 3 for descriptive discussion of this crowding distinction.) While few differences were apparent, one of these few was that many more overseas visitors indicated they felt crowded (75%), compared with New Zealand visitors (42%). This crowding appeared particularly pronounced among the German (83%) and American (87%) visitors (refer Section 3.3). Crowded visitors also had slightly greater experience of doing similar types of walks (mean score 2.86 *vs* 2.17). While neither group had greater previous experience of the Milford Track, the difference in numbers of similar walks done suggests that the crowded visitors may be more experienced. However, this difference is slight and no conclusions can be drawn from these results.

# 3. Evaluation of the quality of visit experiences

Overall evaluation of the quality of visit experiences was assessed through four questions related to overall satisfaction and perceptions of use-levels (refer Appendix 1 for question details).

## 3.1 EVALUATION OF OVERALL SATISFACTION

Two questions allowed visitors to evaluate the quality of their overall visit experiences:

- An *overall satisfaction* score (how satisfied or dissatisfied with the trip — Question 5)
- An *expectation fulfilment* score (was the trip better or worse than expected — Question 4)

Positive responses from visitors to these questions represented their evaluation that they had achieved high quality recreation experiences on their visit. Figures 1 and 2 show that satisfaction on the Milford Track (and other tracks) was very high (94%), and most experiences were as good as had been expected, or better (92%)<sup>2</sup>. These responses were consistent with those from other tracks. Virtually nobody indicated they were dissatisfied with their trip. The main conclusion drawn from these evaluations is that visitors are achieving quality experiences on the Milford Track that are frequently better than they expected.

Figure 1. Overall satisfaction.

Figure 2. Fulfilment of trip experience expectations.

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<sup>2</sup> While these responses were similar in degree, they were only moderately correlated with each other ( $r = 0.41$ ).

### 3.2 EVALUATION OF USE-LEVELS

Two further questions allowed visitors to evaluate the quality of their visit experiences in relation to use-levels:

- A score for perception of *crowding* (overall, did they feel crowded on the trip — Question 2)
- An evaluation of *expected visitor numbers* (seeing more/same/less than expected — Question 3)

Positive responses from visitors indicating low levels of crowding would have reinforced overall evaluations of achieving high quality visit experiences. However, Figure 3 shows that crowding perceptions were substantial, and were higher (62%) than on other tracks (60%). As noted in Section 2, these crowding perceptions were much higher among overseas visitors than New Zealand visitors, particularly among the Germans and Americans.

Most visitors (67%) indicated they experienced the numbers of visitors they expected, which is a consequence of the daily limit of 40 starting each day. However, Figure 4 also highlights that 23% of visitors expected there would be fewer people on the track. This was also found to be higher for overseas visitors (28%) than for New Zealand visitors (17%). This is an unusual result on a track where it is usually assumed that the set use-level is widely known. It may reflect some differences in the information about doing the Milford Track that is available to visitors. This result may also account for the weak correlation between crowding and expected use-level evaluations ( $r = .28$ ), which may not have otherwise been expected on the Milford Track, given that most visitors expected the use-levels they experienced. Comparison of crowding scores between visitors with different evaluations of the use-levels they expected<sup>3</sup> suggested that those who experienced higher use-levels than they expected did tend to give higher crowding scores.

Figure 3. Crowding perception summary.

Figure 4. Fulfilment of visitor number expectations.

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<sup>3</sup> In addition, an ANOVA test ( $F(2,306) = 13.62$ , signif.  $F = .000$ ) showed mean crowding scores increased from those expecting more people (2.29), through those expecting the numbers seen (3.23), to those expecting fewer people (4.26). Similar analyses found no significant differences between use-level expectations and overall satisfaction mean scores.

Other questions were asked which aimed to identify any focal points for crowding perceptions on the Milford Track (Question 3). Overall, 56% of visitors (n = 195) indicated that some places were more crowded than others, and of these visitors, 67% included hut sites in their examples while 42% included track sections. Appendix 1 summarises other crowding information from Question 3, which indicates that visitors who indicated some focus for hut crowding (n = 130) specified Mintaro and Clinton Forks Huts (each 30%), and visitors who indicated some focus for track crowding (n = 82) specified Mackinnon Pass (68%). These results indicated issues related to track use were as important to crowding perceptions as were issues of hut use.

Although substantial crowding perceptions were reported, and these could be interpreted as representing use-levels which are approaching 'social capacity' (refer to Appendix 3), they were not significantly linked with overall satisfaction. In other words, higher crowding perceptions were not associated with higher dissatisfaction with the trip, or it being considered worse than expected. While some visitors indicated they did experience crowding (particularly overseas visitors), and some indicated they experienced higher use-levels than they expected (despite the use-limit), this did not appear to affect how they felt about their overall trip.

Despite this finding, the occurrence of high crowding levels on this managed capacity track suggests strongly that some degree of compromise to the quality of visit experiences was occurring (refer Appendix 3). There was some indication that this affects overseas visitors, in particular. Subsequent sections in this report present analyses which indicate where some of these compromises may occur in relation to satisfactions with particular facilities and services (refer Section 4.2), or with perceptions of particular social and physical impacts (refer Section 5.2).

FIGURE 5. SATISFACTIONS WITH THE FACILITIES AND SERVICES PROVIDED.

## 4. Satisfaction with facilities and services

Satisfaction with 23 specific facility and service items were surveyed, covering aspects of the tracks, huts, and information services provided (refer Appendix 1, Question 7). The complete list of responses, summarised in Figure 5, shows there were high satisfaction levels, and there were few expressions of dissatisfaction. Dissatisfaction only exceeded 10% for hut relaxation space (22%), hut drying facilities (17%), hut washing-up facilities (15%), hut lighting (14%), hut cooking facilities (14%) and signposts with distance/times (10%). Some responses were neutral, indicating the facility or service was not present, or was not considered important. Overall, these results indicate a high acceptance of the existing standards of services and facilities, and by inference, may be indicative of little demand for any additional provision. Where dissatisfaction occurs, those surveyed emphasised the conditions of space and facilities in the huts.

### 4.1 EFFECTS OF AGE, GENDER, NATIONALITY, AND CROWDING PERCEPTION

#### 4.1.1 Background to analyses

Additional analyses were required to assess whether satisfaction varied significantly according to age group, gender, nationality, and crowding perception. Because it was apparent that patterns of visitor responses were often similar across particular groups or ‘clumps’ of these satisfaction items, summary scales of these ‘clumps’ had to be constructed to allow valid statistical analyses. The resulting satisfaction scales, each containing items which had related response patterns, are listed in Table 1 and shown in Figure 6 (next page).

TABLE 1. SUMMARY SCALES FOR SATISFACTIONS WITH FACILITIES AND SERVICES (REFER APPENDIX 2).

SCALES	DESCRIPTIONS
Hut space	Bunk numbers, hut space, cooking/washing/drying facilities
Hut services/facilities	Water supply, toilets, heating, lighting, warden advice
Track standards	Smooth/easy/gentle track surfaces, drainage, steps, boardwalks, track marking, distance/time signs, bridges
Information services	Map/brochure quality, visitor centre information/advice

FIGURE 6. SATISFACTION RESPONSES ORDERED IN SUMMARY SCALE STRUCTURE.  
(THIS IS SIMPLY A REORGANISATION OF MATERIAL PRESENTED IN FIGURE 5.)

### 4.1.2 Significant findings

Using the SPSS MANOVA routine, a series of multivariate analyses of variance were carried out on these satisfaction scales (e.g., the dependent variables). Differences in satisfaction scales according to age-group (under and over 40 years), gender (male/female), nationality (New Zealand/overseas), and crowding perception (uncrowded/crowded) were analysed. The same approach was subsequently used for impact perception (Section 5.1) and management attitude (Section 6.1) scales. The significant effects and interactions associated with the analysis of satisfaction scales using these independent variables are summarised in Table 2. These results indicate that satisfaction with hut conditions, track protection structures, track signs and extra facilities/services are particularly important for management attention.

TABLE 2. SIGNIFICANT EFFECTS ON SATISFACTION SCALES.

SOURCE OF SIGNIFICANT EFFECT*	SIGNIFICANT SATISFACTION SCALES†	MEAN VALUES (ADJUSTED)‡	
		Uncrowded	Crowded
Crowded effect <i>F(4,301) = 3.71, p = .006</i>	Hut space/facilities <i>F(1,304) = 14.04, p = .000</i>	1.95	2.48
	Hut services/facilities <i>F(1,304) = 6.83, p = .009</i>	1.64	1.87
Age-group effect <i>F(4,301) = 3.47, p = .009</i>	Track standards <i>F(1,304) = 9.54, p = .002</i>	Under 40 1.88	Over 40 1.65
	Information services <i>F(1,304) = 6.40, p = .012</i>	1.99	1.76

\* The significance of overall satisfaction effects was tested using the Wilks' criterion in the SPSS MANOVA.

† A series of univariate ANOVAs in the MANOVA identified the contribution of each satisfaction scale to the overall significant effect, and identified these listed scales as being significant.

‡ Mean values for the summary scales are divided by the number of constituent items to give an interpretation using the original question categories (e.g., 1 = Very satisfied; 3 = Neutral; 5 = Very dissatisfied).

#### ***Crowded effect***

Crowded visitors were significantly less satisfied with facilities and services. This difference was based most upon their lower satisfactions with hut conditions, as represented most by the hut space/facilities impact scale, and to a lesser extent by the hut service/facilities impact scale (refer Table 1 and Figures 6). Additional exploration<sup>4</sup> of the hut space/facilities scale indicated that the crowded visitors were relatively less satisfied with all the constituent impacts items. Among these items, lower satisfaction was most pronounced for space to relax in huts. Lower satisfaction for crowded visitors was also apparent

<sup>4</sup> Comparison of response to the dependent variable, for each item comprising the significant scales, was carried out mainly using the Mann-Whitney test. This provided a conservative test to identify the items which appeared to contribute most to the overall effect. Multiple ANOVA tests were also run which supported Mann-Whitney test findings. This complementary approach was applied to the constituents of all significant scales identified in this report.



(at decreasing levels) with washing facilities/space, cooking facilities/space, numbers of bunks, and drying facilities/space. Additional exploration of the hut services/facilities scale indicated that to a lesser extent, crowded visitors were distinctly less satisfied with all constituent impact items, apart from advice from wardens. Overall, these results indicate that crowded visitors were particularly less satisfied with what they experienced in huts. However, this finding must be seen in context of the generally high levels of trip satisfaction, where their mean scores remain within the 'satisfied' category, although the mean satisfaction for hut space/facilities among crowded visitors was almost at the 'Neutral' level (score = 3). This means that crowded visitors were really only less strongly satisfied, rather than being more dissatisfied.

### ***Age-group effect***

Satisfaction also varied significantly according to age-group. This difference was based most on younger visitors being relatively less satisfied with track standards and information services (conversely, older visitors were more satisfied). Additional exploration of the track standards scale indicated younger visitors were relatively less satisfied with most constituent impact items. While distinctions among these items were not large, crowded visitors did appear to have lower satisfaction with bridges and track marking in particular, and track drainage and steps to a lesser extent. In a less prominent effect, the lower satisfaction of younger visitors with information services also contributed to the overall difference. Additional exploration of the information services scale indicated younger visitors were particularly less satisfied with the advice and information received from visitor centres. However, this finding must be seen in the context of generally high levels of satisfaction, where the mean scores remain within the 'satisfied' category. This means that younger visitors were really only less strongly satisfied, rather than being more dissatisfied. (Conversely, the older visitors were more strongly satisfied.)

#### 4.2 RELATING SATISFACTION SCALES TO OVERALL TRIP EVALUATIONS

None of the satisfaction scales were significantly associated with the overall satisfaction or use-level evaluations (e.g., crowding). No notable correlations or significant relationships (using SPSS Multiple Regressions) were found. The state of facilities and services experienced on the Milford Track did not appear to contribute at all to how the overall trip was evaluated. In particular, the lack of any notable relationships between overall satisfaction and any of the facility and service satisfaction scales indicates these questions represent distinctly different visitor perspectives on visit satisfaction. This is an important distinction to acknowledge. Simply applying a single overall evaluation of satisfaction appears unlikely to highlight any specific-issue satisfaction problems until they are of an order where visit quality may be already highly compromised, and the problems more difficult to manage.

FIGURE 7. IMPACT PERCEPTION RESPONSES.

## 5. Visitor perceptions of impacts

Perceptions of 19 specific impact items were surveyed, covering social impacts, physical impacts, and impacts associated with the facilities and services (refer Appendix 1, Question 5). Visitors were asked to respond to each item using the options of 'not experiencing the impact', 'experiencing it, but not being bothered', 'being bothered a little', and 'being bothered a lot'. The complete list of responses, as summarised in Figure 7 (and Figure 8, next page), shows that many visitors did experience many of these impacts, although many were not bothered by them.

The most prominent impact effects experienced here are indicated through combining the responses of those who were 'bothered' by impacts, and those who simply 'noticed' them. These 'impact aware' responses often represented a majority of the visitors. The main examples of these more prominent impacts, which were experienced by over half the visitors, included noise from aircraft (91%), seeing too many in huts (85%), noise in huts (81%), seeing too many on the track (71%), seeing guided groups (67%), seeing too many big groups of people (60%), over-development of tracks (53%) and track damage from trampling/widening (53%). These were the most prominent impacts noticed on the Milford, although it should be remembered that there is a clear distinction between the impacts being 'noticed' and tolerated, and being seen as 'negative'. What contributes to the progression from noticing and tolerating an impact, to becoming bothered by it (e.g., it becomes negative) represents an important question for future research.

The most negative impact, representing that which most 'bothered' the visitors was noise from aircraft (69%). Other more negative impacts which bothered over 20% of visitors related mostly to social impacts, and included seeing too many in huts (34%), noise in huts (33%), seeing too many on the track (30%), uncertainty about the water being safe to drink (25%), seeing guided groups (23%) and seeing big groups (20%). Apart from the extreme dissatisfaction with noise from aircraft, these results emphasised notable dissatisfaction with social congestion effects in huts and on the track (also refer Figure 9). The notable proportion of visitors who were bothered by guided groups and big groups also suggests the possibility that 'perceived inter-group recreation conflict' is occurring. The response of uncertainty over water hygiene most often represents general caution about water quality, rather than being a direct reaction to hygiene problems experienced on the visit. It was not clear if this caution was related to all water sources on the trip, or just those in trackside streams.

When visitors did notice impacts, many were not bothered by them. This response could be considered 'tolerance' of the impacts. For example, of the 85% who experienced too many in huts, only 34% were bothered by it, compared with the remaining 51% who noticed the impact but were not bothered by it (e.g., indicating tolerance). It is clear from Figure 7 and Figure 8 that many other types of impacts were noticed, but were tolerated, including, for example, all impacts related to hut/track congestion and over-development.

FIGURE 8. IMPACT PERCEPTION RESPONSES ORDERED IN SUMMARY SCALE STRUCTURE.

However, when most of those noticing an impact were bothered by it, it could be considered to show high ‘intolerance’ and unacceptability of the impact source. Aircraft noise provides the strongest example of low tolerance. Physical impacts in general also appeared less acceptable to visitors (also see Figure 8). These included littering of huts, and tracks, seeing toilet paper and waste, and wood-cutting damage. Trampling impacts appeared more tolerable to most visitors noticing them. However, while these ‘inappropriate’ physical impacts appear to be those least acceptable to visitors, they were not highly experienced here.

## 5.1 EFFECTS OF AGE, GENDER, NATIONALITY, AND CROWDING PERCEPTION

### 5.1.1 Background to analyses

Additional analyses were required to assess whether these impact perceptions varied significantly according to age group, gender, nationality, and crowding perception. Table 3 and Figure 8 show the impact perception scales which were created for these analyses (refer Section 4.1.1).

TABLE 3. SUMMARY SCALES FOR SOCIAL AND PHYSICAL IMPACT PERCEPTIONS (REFER APPENDIX 2).

SCALES	DESCRIPTIONS
Physical impacts	Litter/waste, vegetation damage, track trampling/damage
Hut/track congestion	Too many on track/hut, noise, big groups, guided groups
Over-development	Excessive levels of huts, tracks, signs
Water/toilet/hygiene	Inadequate water supply/toilets, water hygiene uncertainty

(extra individual items — plane noise)

### 5.1.2 Significant findings

Differences in these impact scales according to age-group (over and under 40 years), gender (male/female), nationality (New Zealand/overseas), and crowding perception (uncrowded/crowded) were analysed (refer Section 4.1 for method). The significant effects associated with the analysis using these independent variables are summarised in Table 4, where the mean values show that while the perceptions of impact were not high (means <2), some differences were apparent between the different groups.

TABLE 4. SIGNIFICANT EFFECTS ON IMPACT SCALES.

SOURCE OF SIGNIFICANT EFFECT	SIGNIFICANT IMPACT SCALES	MEAN VALUES (ADJUSTED)*	
		Uncrowded	Crowded
Crowded effect <i>F(5,304) = 8.13, p = .000</i>	Hut/track congestion <i>F(1,308) = 39.97, p = .000</i>	1.76	2.21
	Physical damage <i>F(1,308) = 6.07, p = .014</i>	1.41	1.46
	Water/toilet/hygiene <i>F(1,308) = 4.80, p = .029</i>	1.50	1.58
	Over-development <i>F(1,308) = 4.31, p = .039</i>	1.44	1.67
Nationality effect <i>F(5,304) = 3.40, p = .005</i>	Physical impacts <i>F(1,308) = 8.41, p = .004</i>	New Zealand 1.55	Overseas 1.37

\* Mean values for the summary scales are divided by the number of constituent items to give an interpretation using the original question categories (e.g., 1 = Not noticed; 2 = Not bothered; 3 = Bothered a little; 4 = Bothered a lot).

#### ***Crowded effect***

Visitors who felt crowded had higher perceptions of most types of impacts, but were distinctly more bothered by impacts associated with hut/track congestion. Additional exploration of the hut congestion scale highlighted seeing too many others in the hut and on the track as the most prominent individual item contributing to the difference between crowded and uncrowded visitors. Seeing too many big groups and seeing guided groups were of secondary importance, while perceptions of hut noise also contributed to a lesser extent. These results suggest perceptions of appropriate visitor numbers in hut and track situations contributed more to crowding perceptions than did the more inter-group conflict issues of seeing too many big groups and guided groups.

To a lesser extent, crowded visitors were also more bothered by perceptions of physical impact, water/toilet/hygiene, and over-development issues. Exploration of the physical damage scale indicated all items made similar contributions to the overall difference. Exploration of the water/toilet/hygiene scale indicated perceptions of inadequate toilets made a particular contribution, and exploration of the over-development scale indicated perceptions of overdeveloped tracks and huts made the most contributions. However in all

three cases, these perceptions made much less contribution to the overall crowding effect than did hut/track congestion.

### *Nationality effect*

New Zealand visitors had more negative perceptions of impacts, based upon their more negative perceptions of physical damage. Exploration of the physical damage scale highlighted seeing litter along the track as the most prominent individual item, although all other physical damage items also had more negative perceptions among New Zealand visitors to a lesser extent.

## 5.2 RELATING IMPACT PERCEPTION SCALES TO OVERALL TRIP EVALUATIONS

None of these impact scales were statistically associated with overall satisfaction, indicating that no specific social or physical impact perceptions were related to how the trip was evaluated. However, significant associations were found between impact perceptions and the overall crowding evaluation. An SPSS multiple regression ( $F(3,343) = 34.37$ , signif.  $F = .0000$ ) identified an association (adjusted  $r^2 = .224$ ) between the impact scales (independent) and Crowding (dependent). The hut/track congestion scale ( $\beta = .457$ ,  $t = 8.92$ ,  $p = .0000$ ) was the most important predictor of crowding.<sup>5</sup> That is, being more bothered by the social impacts associated with hut/track congestion was weakly associated with feeling more crowded. This interpretation was supported by the moderate correlation between crowding and both hut/track congestion ( $r = .46$ ).

The most important individual items correlated with crowding from the hut/track congestion scale were 'seeing too many in the hut' ( $r = .49$ ) 'seeing too many on the track' ( $r = .42$ ). The prominence of these individual items emphasises the importance of social impacts to crowding perceptions. Correlations were relatively weak for the other impacts from hut/track congestion, including impacts from seeing too many big groups ( $r = .29$ ) and seeing guided groups ( $r = .21$ ). Impacts related to experiencing noisy groups in huts were not correlated ( $r = .09$ ), while impacts related to insufficient bunk numbers were excluded due to the controlled visitor numbers. Impacts associated with insufficient bunk numbers were not included for the Milford Track, as the controlled visitor numbers ensure sufficient bunks are always available.

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<sup>5</sup> In addition, a temporary variable composed of the extreme high and low crowding scores was used in a separate multiple regression analysis to test this association further, and demonstrated a stronger association with the same impact scales (e.g.,  $r^2 = .392$ ;  $\beta(\text{hut/track}) = .457$ ).



FIGURE 9. MANAGEMENT PREFERENCE RESPONSES.

## 6. Visitor attitudes towards management options

Attitudes toward 14 options for managing future increases in track use-levels were surveyed, with visitors indicating the degree to which they agreed or disagreed. These options included increasing the capacity of accommodation, dispersing use pressures, and providing pre-walk information (refer Appendix 1, Question 8). The complete list of responses, as summarised in Figure 9, indicates a variety of visitor attitudes. The only management approach attracting consistently high support was that associated with using pre-walk information to influence visitor choices about making track visits. Over 60% of visitors agreed with these approaches while less than 10% disagreed. Over 60% of visitors disagreed with a variety of other approaches, including providing more bunks in huts (83%), allowing more freedom to camp by the track (82%), allowing more guided trips and facilities (76%), providing more campsite facilities (76%), reduce facilities to discourage use (75%), building more huts (74%), and making peak times cost more (69%). Visitors were more evenly split both for and against approaches based on developing alternative tracks, making alternative areas cheaper, and promoting smaller group sizes.

Overall, these results indicate a pattern of preferences by visitors for different management options (see Table 5 and Figure 9). Indirect information-based approaches are clearly most favoured by almost all visitors. Providing alternative opportunities for undertaking the walking activity are options which tend to split visitors more evenly for or against. And the more direct actions to control and channel use, or to develop more accommodation options and facilities are clearly least favoured.

### 6.1 EFFECTS OF AGE, GENDER, NATIONALITY, AND CROWDING PERCEPTION

#### 6.1.1 Background to analyses

Additional analyses were required to assess whether these management items varied significantly among the visitor responses according to age group, gender, nationality, and crowding perception. Table 5 and Figures 10 show the attitudes to management scales created for these analyses (refer Section 4.1.1).

TABLE 5. ATTITUDES TO MANAGEMENT SUMMARY SCALES (REFER APPENDIX 2).

SCALE	DESCRIPTION
Information management	Encourage use elsewhere, promote low-impact behaviour
Increase accommodation	More huts, more bunks, more guided options/facilities
Manipulate use	Facility reduction, high peak costs, cheap alternatives, 1-way track
Camping options	More camping freedom, more campsites/facilities

(extra items — Provide more alternative tracks)

FIGURE 10. ATTITUDE TO MANAGEMENT RESPONSES IN SUMMARY SCALE  
STRUCTURE.

### 6.1.2 Significant findings

Differences in these management scales according to age-group (over and under 40 years), gender (male/female), nationality (New Zealand/overseas), and crowding perception (uncrowded/crowded) were analysed (refer Section 4.1 for method). The significant effects and interactions associated with the analysis using these independent variables are summarised in Table 6. These results indicate significant differences in attitudes towards management options do occur according to nationality.

TABLE 6. SIGNIFICANT EFFECTS ON ATTITUDE TO MANAGEMENT SCALES.

SOURCE OF SIGNIFICANT EFFECT	SIGNIFICANT ATTITUDE SCALES	MEAN VALUES (ADJUSTED)*	
		New Zealand	Overseas
Nationality effect $F(4,287) = 4.47, p = .002$	Information management $F(1,290) = 5.87, p = .016$	2.25	2.00
	Manipulate use $F(1,290) = 5.63, p = .018$	3.71	3.32
	Increase accommodation $F(1,290) = 4.07, p = .045$	3.91	4.24

\* Mean values for the summary scales are divided by the number of constituent items to allow interpretation using the original question categories (e.g., 1 = Strongly agree; 3 = Neutral; 5 = Strongly disagree).

#### *Nationality effect*

New Zealand and overseas visitors had significantly different attitudes towards management options to cope with increased use-levels. New Zealand visitors were more negative toward controlling use-levels by using information management and manipulating use conditions. Overseas visitors were more negative towards any developments to increase accommodation options. These results indicate New Zealand visitors are more opposed to management options that require visit controls, while overseas visitors are more opposed to options that require facility development.

Exploration of the 'information management' scale indicated New Zealand visitors disagreed more with using information on crowding to divert use elsewhere. To a lesser extent they also disagreed with using information on other tracks to provide alternatives, and with providing information on physical impacts to promote appropriate behaviours. Exploration of the 'manipulate use conditions' scale indicated that New Zealand visitors disagreed more with all options, but disagreed particularly more with encouraging smaller group sizes and making peak times more expensive. These results suggest a particular preference among New Zealand visitors to minimise any controls on visits, or any other compromises to visit freedom. Exploration of the 'increase accommodation' scale indicated that overseas visitors disagreed more with all of the facility development options. These results suggest a particular preference among overseas visitors for minimising physical developments.

### ***Extreme responses***

Because visitor attitudes were often substantially split both for and against the management options (refer Figure 10), additional exploration of these data were undertaken. The top and bottom 25% of scores for each of the management option scales were selected, representing the more 'extreme' attitudes of those who most strongly agreed or disagreed with the options. Differences were apparent according to nationality, age-group and crowding perceptions. New Zealand visitors with these extreme attitudes were disagreed more than overseas visitors towards manipulating use (67% *vs* 35%), information management (53% *vs* 38%) and camping options (76% *vs* 61%). By contrast, overseas visitors with these extreme attitudes disagreed more with options of increasing accommodation (59% *vs* 38%). These results suggest New Zealand visitors are more opposed to management controls while overseas visitors are more opposed to management developments. This reinforces the similar findings for nationality differences reported in Table 6.

In a result suggesting greater acceptance of visit controls among crowded visitors, those with extreme attitudes agreed more than uncrowded visitors with options of manipulating use conditions (65% *vs* 35%) and camping options (39% *vs* 24%). When crowded, visitors appear to be more tolerant of direct management controls.

## **6.2 RELATING MANAGEMENT PREFERENCE SCALES TO OVERALL TRIP EVALUATIONS**

There were no significant links between the overall visit evaluations (e.g., satisfaction and crowding), and any scales of the attitudes towards management options. These results suggest that preferences for different management options were unaffected by any experiences on the track visit.

# 7. Summary and discussion

## 7.1 OVERALL VISIT EVALUATIONS

Overall, levels of dissatisfaction were negligible, and very few visitors considered the experience was below their expectations. This suggests that visitors are highly satisfied with their visit experiences. However, some caution is required when interpreting the overall satisfaction findings, particularly as most visitors to the Milford Track were on a first visit. There is a tendency for such visitors to give approval to the status-quo of social and environmental conditions they experience on a visit. They usually lack previous experience of the site and any strong expectations as to what might constitute the appropriate and acceptable conditions which occur there. While use conditions are unlikely to change substantially on the Milford Track (unless driven by future management actions), most visitors will continue to experience similar conditions to those experienced by past visitors. In this situation, any visitor dissatisfactions are most likely to arise only as a consequence of inaccurate expectations of visit conditions.

Comparison of crowding perceptions and use-level expectations indicated that more overseas visitors had their use-level expectations exceeded, and were more often crowded than were the New Zealand visitors. This suggests that the information received about the Milford Track experience, by overseas visitors in particular, is not as accurate as may be appropriate. While, consideration of the overall satisfaction responses indicates that major dissatisfaction problems are not occurring, the crowding perceptions indicate strongly that there are some compromises to the quality of visit experiences. While visitors indicated they are having highly positive visit-experiences overall, issues of inaccurate visit expectations and uneven distributions of visitor numbers appear to arise. These findings focus attention on two major concerns: the pre-visit information visitors are receiving about conditions on the track (particularly overseas visitors); and the crowding conditions at huts (and to a lesser extent on the track at Mackinnon Pass). Both these concerns may require further investigation, if management action is considered necessary to address them.

## 7.2 SATISFACTION WITH FACILITIES AND SERVICES

No high levels of dissatisfaction were apparent for any of the facilities and services on the Milford Track. The high satisfaction responses across all the facility and service types indicated a lack of any substantial visitor problems with the track management infrastructure, and suggested there was no immediate need for management intervention beyond normal maintenance. However, those facility and service dissatisfactions which exceeded 10% almost all related to hut conditions. Many were dissatisfied with the space in huts for relaxing (22%), and around 15% were dissatisfied with the facilities and space in

huts for drying gear, washing-up, lighting, and cooking. While none of these represented a particularly prominent problem, together they suggest there are hut-use issues to investigate.

Hut conditions also featured in the differences in satisfaction between crowded and uncrowded visitors. Visitors who felt crowded had lower levels of satisfaction, most particularly with hut conditions related to the two similar, but statistically distinct satisfaction scales of 'hut facility space' (facilities and space in huts), and 'hut services' (e.g., water, toilet, lighting, heating, and warden advice). Most difference was apparent for satisfaction with hut facility space, featuring lower satisfaction with 'space to relax in huts' in particular. Lower satisfaction with facilities and space for cooking, washing-up, and drying gear were also important. Satisfaction with hut services was also distinctly lower, although to a lesser extent. This was consistent for all items of hut services, apart from advice from wardens, which did not notably differ between crowded and uncrowded visitors.

In a secondary effect, younger visitors (under 40 years) had lower levels of satisfaction, most particularly based on satisfaction with track standards and information services. Of the group expressing generally lower satisfaction with track standards, younger visitors particularly expressed lower satisfaction with bridges and track marking. Among these younger visitors, satisfaction with information services was also lower for the advice and information received from visitor centres. However, these were not strong effects and do not appear to represent a major concern at the time of the survey.

Overall, these findings suggest that while levels of satisfaction with facilities and services were high, in situations where use-levels are largely constant, a focus on hut conditions represents the area where most improvement in the quality of visit experiences can be made. This may be particularly important, given the high crowding scores on this controlled track. The suggestion is that the way the track is operating may be allowing too many situations to develop where visitors feel crowded. There appears a need for further investigation to address visitor expectations of the standard, extent, and use-characteristics of hut facilities and services. The lower track and information satisfactions of younger visitors also indicate where other investigations may be desirable, although these are of secondary importance. Overall, in both the crowded and age-based visitor distinctions, the relatively lower satisfaction scores occur in a context of high total satisfaction levels, suggesting that these are not priority issues of serious dissatisfaction. Given the relatively high crowding score on the Milford Track, some attention to hut conditions which are influencing satisfaction levels seems appropriate.

### 7.3 PERCEPTIONS OF IMPACTS

By far the most negative impact on the Milford Track was noise from aircraft. This impact was noticed by almost all visitors (91%), and a majority of visitors (69%) indicated they were bothered by it. Very few visitors who noticed aircraft noise were not bothered by it, suggesting very low visitor tolerance for this impact. It was not possible to distinguish the extent to which this major impact

could be attributed to Milford Sound scenic over-flights, or the morning and evening flights using the airstrip at Quintin Hut (Guided walk operation). While this impact is extreme, it was not linked to any overall evaluations of satisfaction, expectation or crowding.

Social, hut, and track conditions were the next most prominent sources of impacts which bothered visitors. Over 70% of visitors noticed seeing too many in huts, experiencing noise in huts, and seeing too many on the track, and over 30% of visitors were bothered by each of these impacts. However, while 67% of visitors noticed guided groups on the track, only 23% indicated they were bothered by this. And similarly, while 60% of visitors noticed seeing too many big groups of people, only 20% indicated they were bothered. These results suggest that simple perceptions of seeing too many people were as important components of experiencing social impacts as were any inter-group conflict issues.

Many visitors were also highly aware of other impacts, such as track damage from trampling/widening, inadequate toilets, and perceived over-development of huts, tracks, and signs. But these visitors were more often tolerant of these impacts rather than being bothered by them. Understanding the distinction between simply noticing these impacts and being specifically bothered by them appears an important research issue. Visitors also appeared to have very little tolerance of particular types of impacts which very visibly represent inappropriate behaviour (e.g., seeing litter, toilet paper/waste, and wood-cutting). While these were not prominent impacts overall, they do suggest particular visitor sensitivity to such 'inappropriate' behaviour in natural settings.

While overall impact perceptions highlighted aircraft noise, it was not perceived differently by different visitor groupings. This negative perception appeared consistent across different nationalities, age-groups, gender and crowding perceptions. However, for other impact types, the significant differences identified between the impact perceptions of different visitor groupings did highlight issues relating to crowding perceptions (uncrowded/crowded) and nationality (New Zealand/overseas). In summary, crowded visitors were more bothered by perceptions of hut/track congestion, physical impacts, water/toilet/hygiene impacts, and over-development. New Zealand visitors were more bothered by perceptions of physical impacts.

While most impacts were perceived more negatively among crowded visitors, those impacts related to hut/track congestion represented the most prominent differences. Given this track has controlled use-levels, perceptions of insufficient bunk numbers were not an issue. Among the visitors who felt crowded, the main differences for hut/track congestion featured seeing too many people in huts and on the track, and seeing guided groups and big groups to a lesser extent. This suggests that crowding perceptions on the Milford Track may reflect the attitudes of visitors toward the numbers of other people seen, rather than simply reflecting their direct congestion or recreation conflict effects. Higher crowding scores were associated with more negative perceptions of the hut and track congestion scale, which featured impacts from seeing too many people in huts and seeing too many on the track. Further investigation of social impact effects will be important, particularly related to



these most prominent hut and track congestion impacts. Other impacts more prominent among crowded visitors included perceptions of track and hut over-development, perceptions of inadequate toilets, and all perceptions of physical impacts. These results indicate that perceptions of crowding are related to a variety of impact perceptions which go beyond issues of simple hut capacity, but which remain based most strongly on perceptions related to hut/track congestion. It appears that most types of impacts will be perceived more negatively by visitors if they feel crowded.

The greater perception of physical impacts among New Zealand visitors suggested that they were making different interpretations of these impacts compared with overseas visitors. Seeing litter on the track was the single most prominent impact, but all other physical impacts were also more negatively perceived by New Zealand visitors. However, very few visitors overall were bothered by these physical impacts, suggesting that this nationality distinction is not of major importance at present. Investigations to better understand any differences between the perceptions of impacts by New Zealand and overseas visitors would be worthwhile in the long term.

#### 7.4 ATTITUDES TOWARD MANAGEMENT OPTIONS

When considering management options for addressing any increase in use-levels on the Milford track, most visitors were highly positive toward using information management. That is, the strategic use of information to better match visitor expectations with likely experiences, and to give prospective visitors a better basis to choose other visit options. The main question this poses for managers is whether such information management approaches represent an effective tool of practical value on the Milford Track, which already has a booking system. Certainly the use of information approaches to better match visitor expectations with actual track conditions may reduce the proportions of visitors experiencing higher use-levels than they expected. This may be particularly relevant among overseas visitors, who tended to feel more crowded overall. Information on the social impacts operating on the track may also reduce some of the crowding perceptions. These are areas where additional investigation should be encouraged, as they offer the possibility of reducing crowding perceptions without compromising existing use-levels.

Most visitors strongly disagreed (over 70%) with most other management options. On the Milford Track, these options relate to possible ways in which the use-limits could be raised to allow more visitors overall. Visitor responses indicated they opposed any such increase in use, especially if accompanied by development of additional facilities. The only options toward which visitors were more evenly split, both for and against, were options related to encouraging use of alternative areas, and encouraging smaller group sizes. The latter option may reflect a desire to have use-level limits reduced.

Compared with overseas visitors, New Zealanders had different attitudes toward options for how their recreation could be managed. New Zealand visitors were more negative toward having their activity managed, particularly by manipulation of use-conditions and information management. In both cases,

options reflecting more direct controls on recreation activity were viewed more negatively. Overseas visitors were more negative toward developing facilities, particularly related to any options involving increasing accommodation. In this case, options of physical development were viewed more negatively. Exploration of the extreme positive and negative responses here added support to these findings. While in a context of highly negative attitudes towards most of these management options, these results suggest some fundamental differences between the attitudes of New Zealand and overseas visitors. Where such options are being considered, and use by overseas visitors is prominent, further investigation of these apparent differences would be appropriate.

## 7.5 CONCLUSIONS AND RECOMMENDATIONS

Overall, the issue of aircraft noise emerged as the single most prominent issue for managers to address. At a secondary level, crowding issues related to hut congestion and associated hut conditions were also prominent, despite there being sufficient bunks for all visitors. Other impact issues appeared to be of much less importance to visitors. While conditions cannot be expected to change, given the controlled use-levels, any improvement to the quality of visit experiences will first require attention to the dynamics of hut use. Attention to the 'bottleneck' effect on the track at Mackinnon Pass would also seem appropriate. The crowding and impact issues raised in this research could be considered surprising for a managed track, suggesting that despite these issues not requiring urgent attention on the basis of use-levels, they warrant attention on the basis of visit quality.

A suggestion of high social impact pressures in the Milford track experience is reinforced by the highly negative attitude of visitors toward any management which might facilitate an increase in use-levels. New Zealand visitors were particularly negative toward any management actions which reduced perceived freedom in their recreation, while overseas visitors were more negative toward increased accommodation options which involved physical developments. If further management control is required, visitors indicated a preference for such actions to be based most upon information use to guide visitor choices, rather than any more direct regulation/manipulation approaches to limit or channel visit opportunities. Focus on information options is particularly important, as there appears to be some need to better match visitor expectations of the Milford Track with the actual conditions they will encounter. Some development of pre-visit information approaches appears worthwhile, and investigations and actions related to addressing hut congestion and space issues will also be important. In summary, the main management actions which could be undertaken include:

- Investigating options for reducing the perceived impacts from aircraft noise
- Investigating and optimising the use of hut space for relaxation and for access to facilities within and around the huts
- Provision and promotion of accurate pre-visit information about the features and use-conditions on the Milford Track to better match expectations with likely experiences (possibly more particularly targeted at overseas visitors)

- Promotion of more diverse departure times from Mintaro Hut and the Guided Walk huts to minimise the small but notable visitor 'bottleneck' at Mackinnon Pass.

Most initial gains should be made by concentrating upon making whatever simple improvements are possible in the use of space in and around huts. Investigations of the facility and service expectations of different visitor groups will be important, particularly emphasising hut conditions and hut use characteristics. The latter information options require generating expectation change among the visitors rather than the physical changes to hut facilities and their operation. Promoting beneficial changes in visitor expectations through information use represents a more long term approach, will be based largely on pre-visit information, and may require greater involvement with external agencies. Any consideration of these approaches will require additional investigations in a number of areas to assess the potential effectiveness of information use as a practical management tool. General investigation of visitor expectations of visit experiences, and the role played in these by current information services will also be important. Of particular importance will be investigations which address the question of why around a quarter of the visitors surveyed had expectations of seeing fewer people, despite the 'managed' status of the Milford Track.

Monitoring of the quality of visit experiences should not rely on overall visit satisfaction scores. Crowding scores offer a more sensitive overall measure. A good measure of success in reducing the compromises to the quality of visit experiences based on hut conditions will be reduced crowding scores. Any specific monitoring of visit-experience quality should concentrate first upon overall crowding perceptions, and the impacts perceptions from hut congestion. For the Milford Track, this may be best applied to the visitor experiences at the last hut stayed in on the walk, or cycled consistently through all huts to identify differences between them. If reducing the small but notable track congestion 'bottleneck' at Mackinnon Pass is considered necessary, monitoring of track congestion conditions could also be incorporated in some applications of any hut-conditions monitor. Further research and investigation will be required to identify what variables should be assessed in any monitoring methodology. Application of an aircraft noise impacts monitor should be undertaken, particularly to evaluate the success of any measures taken to reduce the perceived impact. Expanding the scope of some of this monitoring to include the guided walk clients will also be preferable. Since the Milford track has controlled use-levels, monitoring will not be addressing identification of deterioration in conditions. Once initial applications define the current states of the social conditions being measured, any further application of monitoring programmes will only be required if evaluation of new management actions is required.

# Appendix 1

## **Summary of Milford questionnaire responses (n=384)**

This presents the basic response percentages for the questions asked in the survey. These percentages are presented in the format of the original questionnaire, although some lists of responses are attached where their format is incompatible with this approach. Where appropriate, some distinction is also made between the responses of hut and campsite users (at least 1 night). Some questions from the standard overall survey are excluded for the Milford Track due to its controlled use-levels. These are indicated by 'N/A'.



# Appendix 2

## Details of Milford principal components analysis

Principal Component Analysis (PCA) was carried out upon selected subsets of response-list items from 384 respondents to the Heaphy Track sample from the Great Walks survey. These subsets related to response lists for visitor perceptions of impacts (Q. 5), visitor satisfactions (Q. 7), and visitor preferences for possible management responses (Q. 8) to increasing visitor numbers. The PCA defined a reduced number of summary scales which could then be used for more complex analytical procedures. The following material describes the summary scales, and demonstrates the degree to which they are representative of their component variables. Items were included in the scale if their removal reduced the value of the scale reliability co-efficient (Kronbachs alpha).

### SATISFACTION SCALES (from Question 7)

SCALE NAME	RELIABILITY (Kronbachs alpha)	COMPONENT LIST VARIABLES (from original questionnaire lists)	LOADINGS (from PCA)
Hut space/facilities	0.8136	Hut cooking space/facilities Hut washing up space/facilities Space to relax in huts Number of bunks in huts Hut drying space/facilities	0.772 0.755 0.743 0.602 0.501
Hut service/facilities	0.7840	Toilets at huts Water supply at huts Hut lighting facilities Hut heating facilities Advice from wardens	0.648 0.645 0.628 0.587 0.510
Track standards	0.8770	Gentle slopes/not steep Smooth/easy surfaces Track marking Steps Drainage of water Bridges over rivers Boardwalks over wet/fragile areas Distance/time signs Information signs by the track	0.749 0.748 0.732 0.711 0.700 0.646 0.611 0.606 0.458
Information/advice	0.8398	Material from visitor centres Advice from visitor centres Quality of maps/brochures Maps/brochures in the huts	0.862 0.830 0.802 0.607

**IMPACT PERCEPTION SCALES** (from Question 5)

SCALE NAME	RELIABILITY (Kronbachs alpha)	COMPONENT LIST VARIABLES (from original questionnaire lists)	LOADINGS (from PCA)
Physical damage	0.7531	Litter around hut Litter on track Seeing shortcuts off tracks Seeing human waste/toilet paper Seeing trampling around wet areas Seeing where wood cut for fires	0.732 0.729 0.714 0.649 0.593 0.514
Hut/track congestion	0.6670	Seeing too many big groups of people Seeing too many on the track each day Too many people in hut Seeing people on guided trips on track Noisy people in huts at night	0.780 0.746 0.680 0.616 0.323
Over-development	0.7981	Too much development of tracks Too much development of signs Too much development of huts	0.833 0.826 0.776
Water/toilet/hygiene	0.6348	Inadequate water supply Inadequate toilet facilities Uncertainty in water hygiene	0.794 0.761 0.542
Extra items		Plane noise	

**MANAGEMENT PREFERENCE SCALES (from Question 8)**

SCALE NAME	RELIABILITY (Kronbachs Alpha)	COMPONENT LIST VARIABLES (from original questionnaire lists)	LOADINGS (from PCA)
Information management	0.8141	Provide inf. on physical impacts Provide inf. on social impacts Provide inf. on crowding conditions Provide inf. on different track options	0.829 0.810 0.777 0.727
Increase accommodation	0.7324	Build more huts Provide more bunks in huts Allow more guided trips/facilities	0.865 0.742 0.726
Manipulate use conditions	0.6356	Make other track options cheaper Encourage small groups/discourage large Remove some facilities to discourage use Make peak use times more expensive	0.695 0.688 0.646 0.589
Camping options	0.8831	Allow more camping freedom Provide more campsite/camping facilities	0.901 0.866
Extra Items		Provide more alternative tracks	



# Appendix 3

## Details of crowding scores

Crowding was assessed using a widely used nine-point crowding scale (Question 2), and Table A3.1 presents the responses from Milford Track visitors.

TABLE A3.1 MILFORD TRACK CROWDING SCORES.

DEGREE OF CROWDING	(scores)	TOTAL % (n = 384)
NOT CROWDED	(1)	21
	(2)	17
CROWDED — slightly	(3)	27
	(4)	10
	(5)	7
CROWDED — moderately	(6)	8
	(7)	6
CROWDED — extremely	(8)	2
	(9)	1

Shelby *et al.* (1989)<sup>1</sup> summarised and evaluated the accumulated results from this method, and developed an interpretation method to highlight the management significance of these responses. These interpretations, which can be considered carrying capacity judgements related to the quality of visitor experiences, apply to the ‘crowded’ respondents (e.g., those scoring 3 or more). Table A3.1 shows that the proportion of ‘crowded’ visitors on the Milford Track was 62%.

Table A3.2 (next page) presents a range of results from other Great Walks and from studies summarised by Shelby *et al.* (1989). Accompanying these results are the interpretations applied to different crowding scores. Interpretation of 62% crowding on the Milford Track is that use is at ‘high normal conditions’, and that research and other investigations are needed to allow management actions to prevent future congestion problems. It is considered best to take such actions before conditions have developed into a more serious state, and at 62%, crowding scores are close to the 65% level above which they could be interpreted as being ‘more than capacity’. These interpretations represent informed, but subjective, guidelines based upon extensive accumulated knowledge.

Comparing the Great Walk crowding scores in Table A3.2 and Figure A3.1 indicates crowding is relatively high on the Milford Track, despite the controlled use-levels, and management to reduce the effects from current use will be required if the quality of visit experiences is to be enhanced. However, given the visit controls, use-levels are not likely to increase, so any management actions may not be urgent.

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<sup>1</sup> Shelby, B.; Vaske, J.J.; Heberlein, T.A. 1989. Comparative analysis of crowding in multiple locations: Results of 15 years of research. *Leisure Sciences* 11: 269-291.

TABLE A.3.2 DIFFERENT LEVELS OF 'CROWDED' RESPONSES. (AFTER SHELBY ET AL. 1989)

CROWD (%)	POPULATION	RESOURCE	STATE OR COUNTRY	RESOURCE CONDITIONS	CARRYING CAPACITY JUDGEMENT	
100	Boaters	Deschutes River	Oregon	Weekends section 1	<b>Much more than capacity</b> (80 - 100%) Manage for high density recreation experiences, or treat as a 'sacrifice area', allowing quantity of activity to compromise quality of experiences. Could be a localised compromise to reduce pressure on other areas.	
94	Anglers	Colorado River	Arizona	Thanksgiving weekend		
91	Boaters	Raystown Lake	Pennsylvania	On the lake		
89	Pheasant hunters	Bong Hunting Area	Wisconsin	Opening day		
88	Boaters	Deschutes River	Oregon	Weekdays section 1		
87	Riparian landowners	Lake Delavan	Wisconsin	Overall rating		
86	Goose hunters	Grand River Marsh	Wisconsin	Firing line		
85	Pheasant hunters	Public Hunting Area	Wisconsin	Opening day		
* 76 *	<b>Walkers (GW)</b>	<b>Routeburn Track</b>	<b>New Zealand</b>	<b>Summer</b>		<b>More than capacity</b> (65 - 80%) Studies and management are necessary to preserve recreation experiences, especially if low visitor impacts (social/physical) are important components. Immediate management to control use-levels at around 65% level of crowding conditions may be considered as an option. Research may be needed to establish more long-term solutions.
76	Trout anglers	Gun Powder River	Maryland	Opening day		
75	Salmon anglers	Waimakariri River	New Zealand	At river mouth		
75	Boaters	Raystown Lake	Pennsylvania	At attraction sites		
74	Salmon anglers	Rakaia River	New Zealand	At river mouth		
73	Canoers and boaters	Boundary Waters C.A.	Minnesota	Moose Lake		
72	Rafters	Grand Canyon	Arizona	1985 Summer		
70	Anglers	Klamath River	California			
70	Climbers	Mt. McKinley	Alaska			
* 69 *	<b>Walkers (GW)</b>	<b>Abel Tasman Track</b>	<b>New Zealand</b>	<b>Summer</b>		
69	Boaters	Door Country	Wisconsin			
* 68 *	<b>Walkers (GW)</b>	<b>Tongariro Crossing</b>	<b>New Zealand</b>	<b>Summer (Easter 86%)</b>		
68	Rafters	Rogue River	Oregon			
68	Rock climbers	Seneca Rocks	West Virginia			
66	Boaters	Raystown Lake	Pennsylvania	At put-in location		
* 63 *	<b>Walkers (GW)</b>	<b>Kepler Track</b>	<b>New Zealand</b>	<b>Summer (Easter 86%)</b>	<b>High normal conditions</b> (50 - 65%) Should be studied if increased use is expected, allowing management to anticipate problems. Represents the best time to establish more long-term management, as once higher crowding perceptions exist, there is difficulty in managing use 'down' to levels more	
63	Boaters	Raystown Lake	Pennsylvania	At take-out location		
* 62 *	<b>Walkers (GW)</b>	<b>Millford Track</b>	<b>New Zealand</b>	<b>Summer</b>		
62	Deer hunters	Sandhill	Wisconsin	1988 High-density hunt		
61	Goose hunters	Fishing Bay	Maryland	Firing line		
61	Floaters	Wolf River	Wisconsin			
59	Salmon anglers	Rakaia River	New Zealand	All anglers		
* 58 *	<b>Sea Kayakers (GW)</b>	<b>Abel Tasman Coast</b>	<b>New Zealand</b>	<b>Summer</b>		

	<b>Walkers (GW)</b>	<b>Heaphy Track</b>	<b>New Zealand</b>	<b>Summer (Easter 71%)</b>	appropriate for the main recreation experiences desired.
* 55 *	<b>Walkers (GW)</b>	<b>Heaphy Track</b>	<b>New Zealand</b>	<b>Summer (Easter 71%)</b>	appropriate for the main recreation experiences desired.
55	Wildlife photographers	Sandhill	Wisconsin	One-day visit	
54	Recreationists	Lake Delavan	Wisconsin	1975	
53	Anglers	Brule River	Wisconsin	1985 Winter	
53	Rafters	Grand Canyon	Arizona	In Hell's Canyon	
53	Rafters	Snake River	Oregon		
53	Backpackers	Mt. Jefferson	Oregon		
52	Canoers	Brule River	Wisconsin	High-use period	
50	Deer hunters	Sandhill	Wisconsin	1982 High-density hunt	<b>Low Normal Conditions</b> (35 - 50%) A problem situation does not exist at this time.
49	Backpackers	Eagle Cap Wilderness	Oregon	Late season	As with the above category, these may offer
48	Pheasant hunters	Bong Hunting Area	Wisconsin	No specific resource	unique low-density recreation experiences.
46	Deer hunters	State-wide	Wisconsin	Upstream	These are likely to change with any increase
45	Salmon anglers	Rakaia River	New Zealand	No specific resource	in social or physical impacts resulting from
44	Turkey hunters	State-wide	Maryland		increasing numbers of users, or from changes
43	Tubers	Brule River	Wisconsin	Summer	in activity types.
* 43 *	<b>Walkers (GW)</b>	<b>Travers-Sabine Track</b>	<b>New Zealand</b>	Summer	
* 42 *	<b>Canoeists (GW)</b>	<b>Wanganui River</b>	<b>New Zealand</b>	Summer	
* 42 *	<b>Walkers (GW)</b>	<b>Waikaremoana Track</b>	<b>New Zealand</b>	Summer	
42	Sail-boaters	Apostle Islands	Wisconsin	Summer 1985	
41	Tourists and drivers	Stockings Park	Michigan	Presidential Range	
39	Backpackers	White Mt. Nat. Forest	New Hampshire		
38	Floaters	Klamath River	California	1985 Low-use period	
37	Canoers	Brule River	Wisconsin		
* 35 *	<b>Walkers (GW)</b>	<b>Rakiura Track</b>	<b>New Zealand</b>	<b>Summer</b>	<b>Suppressed Crowding</b> (0 - 35%) Crowding here is limited by certain
32	Anglers	Colorado River	Arizona	Midweek	management or situational factors, which
31	Hikers	Dolly Sods Wilderness	West Virginia	Low-use period	allow particular low-density recreational
27	Goose hunters	Tuckahoe State Park	Maryland	Low-density hunt	experiences. These are likely to be unique,
26	Rafters	Illinois River	Oregon	Low use period	and managers should be concerned with
25	Trout anglers	Savage River	Maryland	Low use period	maintaining them. Changes likely to increase
24	Backpackers	Great Gulf Wilderness	New Hampshire	1982 Low-density hunt	visitor numbers/impacts should be considered
24	Deer hunters	Sandhill	Wisconsin	Late season	carefully.
23	Trout anglers	Gunpowder River	Maryland	Summer (Easter 68%)	
20	Canoeists	Wanganui River	New Zealand	Managed hunt	
17	Goose hunters	Grand River	Wisconsin	1988 Low-density hunt	
12	Deer hunters	Sandhill	Wisconsin		

\*\* and bold type identify the crowding responses for the tracks included in New Zealand's Great Walks.

FIGURE A3.1. DIFFERENT LEVELS OF 'CROWDED' RESPONSES ON GREAT WALKS.