

Lake Management under Conditions of Heavy Tourist Pressure: The Case of Fraser Island

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Summary

Fraser Island is the largest sand island in the world and a World Heritage listed area. It is remarkable for its 90 kilometres long surf beach, its chain of unique dune lakes, its vast sand-blows and its unique vegetation. There is prolific wildlife, mostly nocturnal, with the local wild dog (dingo) considered to be the most pure strain in Australia. Access to the Island is via vehicular barges, aircraft, cruise vessels, private boats or on commercial tours. Roads on the island are mainly sandy tracks, which may only be negotiated by 4WD vehicles. More than 40 dune lakes occur – over half the world's known total. Perched lakes are the most common type of lake, which develop when a saucer-shaped “hard pan” of organic debris, sand and peat forms in a depression between dunes. Water collects, slowly filtering to the watertable below. These lakes are popular for recreation, but are vulnerable to damage. Most of the lakes do not have streams flowing to or from them, so foreign materials are trapped for a long time and may alter the lake's ecological balance. Visitors are asked not to use soap, toothpaste or detergent, or camp and deposit waste products in or near lakes and streams.

Despite these restrictions the ecological health of the lakes on Fraser Island is threatened by nutrient additions from tourists. The crowding effect of a large number of visitors and their impact on the natural environment – through significant degradation, site hardening or lack of proper on-site management – has been identified as a particular concern. For the Queensland Department of Environment and Heritage (National Parks and Wildlife Service) the evidence led to the following question: how to find ways of meeting visitor expectations while allowing as many people as possible to experience Fraser Island? The present paper suggests that part of the solution is to provide adequate information along with *enforceable* standards relating to the ecotourism experience at the Fraser Island lakes.

Introduction

Over 120 kilometres long and an average of 15 kilometres wide, Fraser Island is the largest sand island in the world (Figure 1). It is remarkable for its 90 kilometres long surf beach, its chain of unique perched lakes, its vast sand-blows and unique vegetation. There is prolific wildlife, mostly nocturnal, with the local wild dog (dingo) considered to be the most pure strain in Australia. A unique species of tortoise can be found in many of the freshwater lakes.

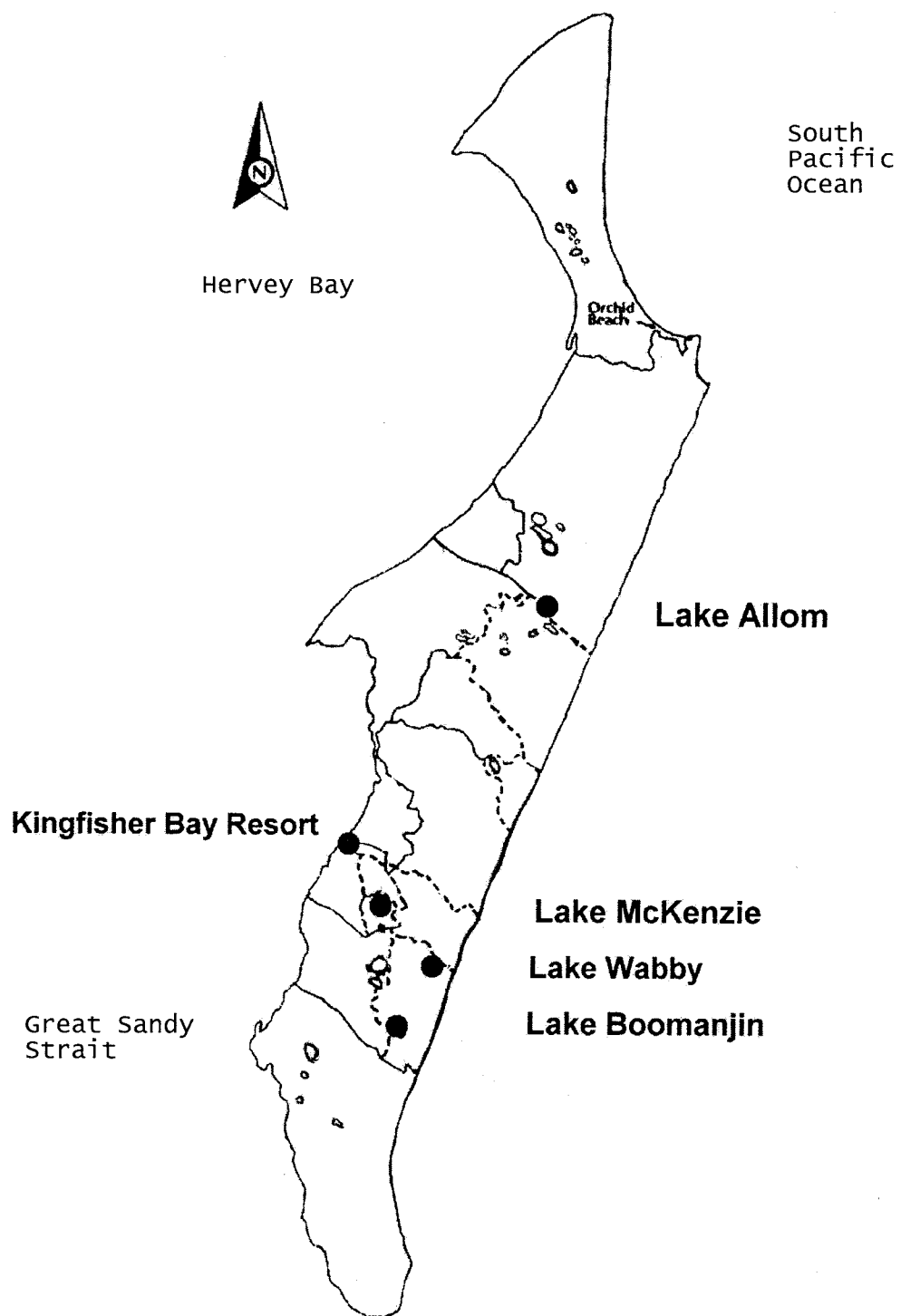


Figure 1: Fraser Island

Access to Fraser Island is via vehicular barges, aircraft, cruise vessels, private boats or on commercial tours. Roads on the island are mainly sandy tracks, which may only be negotiated by 4WD vehicles.

More than 40 dune lakes occur here – over half the world’s known total. Lake Boomanjin, the world’s largest perched lake (200ha) and Boomerang Lake, one of the world’s highest (120m above sea level), are found on Fraser Island. Perched lakes are the most common type of lake, which develop when a saucer-shaped “hard pan” of organic debris, sand and peat forms in a depression between dunes. Water collects, slowly filtering to the watertable below. These lakes are popular for recreation, but are vulnerable to damage. Most of the lakes do not have streams flowing to or from them, so foreign materials are trapped for a long time and may alter the lake’s ecological balance. As a result, visitors are asked not to use soap, toothpaste or detergent, or camp and deposit waste products in or near lakes and streams.

Despite these restrictions the ecological health of the oligotrophic-perched dune lakes on Fraser Island is threatened by nutrient additions from tourists (Hadwen et al. 2002). Indeed, the whole Great Sandy Region of Queensland, of which Fraser Island is a major part, has important problems in this respect. The *Final Report of the Review of Tourism Activities in the Great Sandy Region* (Department of Environment and Heritage, 1998) clearly identified the value of nature-based ecotourism activities to the region, but it also flagged potential problems – both for the environment and visitors – of uncontrolled access to Fraser Island. The crowding effect of a large number of visitors and their impact on the natural environment – through significant degradation, site hardening or lack of proper on-site management – was identified as a particular concern.

This Report supported the view held amongst many visitors and locals that Fraser Island is already “over used.” For the Queensland Department of Environment and Heritage (National Parks and Wildlife Service) the evidence led to the following question: how to find ways of meeting visitor expectations while allowing as many people as possible to experience Fraser Island? The present paper suggests that part of the solution is to provide adequate information along with *enforceable* standards relating to the ecotourism experience at the Fraser Island lakes (Hockings and Twyford 1997).

World Heritage Listing

Fraser Island was listed under two World Heritage criteria in 1991 by the Australian Federal Government, and inscribed on the list in 1992. These criteria are important for the present study in that they ascribe particular ecological values and require particular management practices for the environment that tourists to the Island come to experience.

Criterion N (ii): Ongoing ecological and biological processes

The infertile sandy soils of Fraser Island support a diversity of plant communities ranging from colonising plants and open woodlands to very tall eucalypt forests and rainforests to low, shrubby heath. The distribution of these communities across the island is intimately related to the distribution of the soils that have developed on the various dune systems. The Fraser Island dunes provide a series of windows in time that show progressive stages in plant succession, including changes in floristics and structure and increasing biomass, followed by stages of decline as access to nutrients decreases

(retrogressive succession).

It is this diversity of dune systems and the chronosequences showing both progressive and retrogressive plant succession that gives Fraser Island its World Heritage recognition. The incongruity of seemingly sterile sand supporting forests and lakes, as well as many forms of specialised fauna adds to the values of the Island (Australian Conservation Foundation 2001).

Criterion N (iii): Natural phenomena and areas of exceptional natural beauty

The large scale of Fraser Island and its diversity of landscape elements with vistas and sites of exceptional beauty are of world quality. The outstanding beauty of the extensive natural areas is found in an essentially wild state. From the exquisite beauty of the crystal clear perched lakes, to the massive sand dunes with their coloured sands, to the magnificent rainforest stands growing, as nowhere else, in pure sand. The marine and coastal area of the Island also contains many rare and endangered species of whales, dugongs, dolphins, turtles, and fish along with a spectacular variety of birds.

The Dune Lakes

The dune lakes are a quite unique aspect of the World Heritage listing. The Island, surrounded by salt water and formed entirely by sand, supports over 100 freshwater lakes and numerous streams. Much of the water from the annual average rainfall of 1600mm is absorbed into a large dome-shaped water table below the dunes. It has been estimated that between 10-20 million megalitres of freshwater may be held in natural storage systems on the Island.

Forty of Fraser Island's lakes are perched in the tops of sand dunes high above sea level, are up to 300,000 years old, and are not connected to the underlying water table or the creeks except by slow seepage. The Island supports the largest perched lake in the world (Lake Boomanjin at 200 hectares), and has half the world's perch lakes. Perched lakes sit upon a layer of humus impregnated sand or "coffee rock" formed from accumulating organic matter and sand cementing together into a largely impervious seal. Perched lakes are dependent on rainfall for the maintenance of their water level. There is a slow loss of water from perched lakes due to evaporation and seepage through the coffee rock.

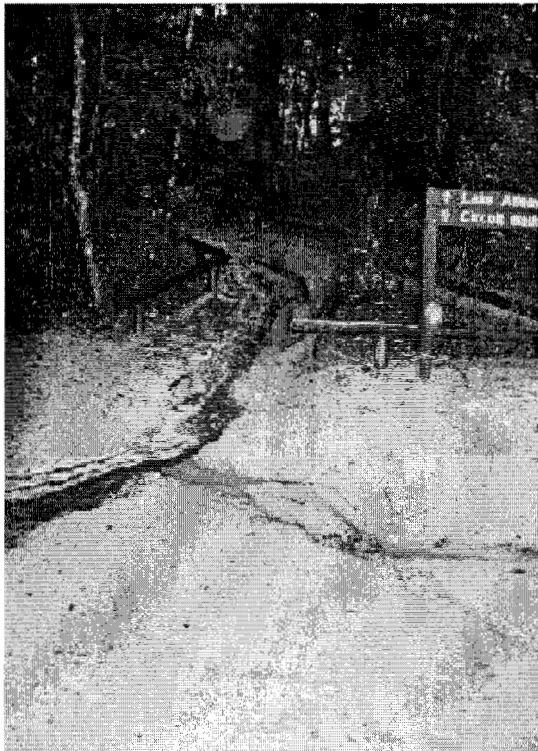
Perched lakes are oligotrophic, meaning they have a low nutrient status, so little aquatic flora and fauna is found in these lakes. Another factor contributing the low levels of organisms is the acidity (low pH) of the water caused by decaying organic matter. Most of the lakes contain only one species of zooplankton, *Calamoecia tasmanica*. These lakes, and the impact of tourism on them, are the subjects of this paper.

Because of the dynamic nature of many sand dunes, occasionally one will block the path of a flowing creek or stream to form a different type, the barrage lake. Lake Wabby, an excellent example of a barrage lake, actually comprises two emerald-green lakes surrounded on one side by tall forest and on the other by the massive Hammerstone Sandblow. The lake is slowly being invaded by the sand dune and one day may be completely covered.

The lakes of Fraser Island can hold water for a number of years before they are flushed. It is important that visitors to these lakes do not use any soaps or detergents in

them as they may accumulate, change the chemistry of the water and harm the plant and animal life. Many soaps and detergents are biodegradable and so release additional nutrients, which may possibly affect the natural balance of the lakes. As the number of tourists visiting Fraser Island continues to grow, so too does concern over potential environmental impacts on the freshwater lakes where so many visitors like to swim. In addition to physical disturbances (e.g. trampling reeds along the shoreline), tourists can adversely affect water quality – particularly through the addition of nutrients, like phosphorus and nitrogen. Small, perched dune lakes on the island (i.e. those that sit perched above the regional water table) are especially vulnerable to enrichment because nutrients will accumulate in their sediments over time. In a worst case scenario, prolonged and unregulated nutrient additions in these nutrient-poor lakes may lead to water quality problems, unsightly blooms of algae along shorelines and impacts on some of the island’s unique and unusual lake biota. If this occurs, visitors may have to be excluded from some of the worst affected lakes (Hadwen 2002)

This ...



leads to this ...



Figure 2: Silting of Lake Allom

In April 2002 the Fraser Island Defender’s Organisation drew to the attention of the QPWS to the rapid silting of Lake Allom. Run-off from the adjacent roads, camping ground and car parking area are causing two major alluvial plumes, which at the current rate of silting, threaten to fill Lake Allom within 100 years (see Figure 2). On 24th August, FIDO noted that, four months later, not only had absolutely nothing been done to address this urgent issue, which is destroying one of the World Heritage values of

Fraser Island, but also the alluvial plume seems to have grown since first reported. In October it was noted that still nothing had been done not even the most rudimentary silt trap but work had begun on the construction of a viewing platform for the Lake. It would appear that the QPWS has priorities for recreation management, which seem to outweigh any obligations it should have to the protection of World Heritage values. This is further evidenced by the amount of roadwork carried out during the same four months that it neglected doing any work to protect the lakes.

Management

Management is a problem facing all World Heritage areas and Fraser Island is no exception. The number of tourists travelling to the island and the fact they are allowed to camp on the beachfront in unregulated camping areas are two major problems. Fraser Island is a poorly resourced World Heritage site considering the visitor pressure and its vulnerability. It has less than half the budget required to manage it in a sustainable manner for the present level of visitation. The devotion of most of the budget to *recreation* management has meant that cultural and natural resource management has been seriously neglected. The budget for managing both Fraser Island and the whole of the Great Sandy Straits Region needs to be doubled to bring them into line with the budget for other Australian World Heritage sites.

A Management Plan for the whole Great Sandy Region was developed and adopted in 1994. Unfortunately many actions required under the plan have not been carried out and some parts of the plan have been over-ruled by the Queensland Government, which has failed to provide adequate resources to properly manage the area, which has shown itself to be exceptionally vulnerable to any surface disturbance.

Review of management priorities

The priorities for managing the Island and its surrounds must be transferred from catering for recreation management and tourism to resource management, including implementing an appropriate Fire Management Plan. The wilderness qualities of the region are being compromised by the almost unrestricted vehicular access, particularly to the more remote northern end of the Island. None of the more than 200 km of surfing beach has been closed to motorised transport to date, although there has been some restriction on camping outside of designated areas.

There must be some control over the number of tourists travelling to Fraser Island. The major problems centre around the commercial development that has been allowed within the World Heritage Area and the mismanagement of backpackers. More regulated camping areas must be put in place, and more public toilet facilities provided. Fraser Island has become an international tourist icon and now attracts more than 350,000 tourists annually. Since disturbance of the ground surface increases the risk of water erosion, this is having a serious impact on the Island. Failure to acquire private holdings on the Island has already resulted in huge developments of settlements at Orchid Beach and North White Cliffs over the past decade. There has been no attempt to contain the scale of development at these or the other two settlements on the Island.

The development and implementation of several subsidiary plans to the overall management strategy has been extremely slow. These include a walking track

management plan, the camping management plan, a visitor management strategy, a fire management plan, and a wildlife management plan. In particular, the intersection of tourists with wildlife is almost as critically important as that with the lakes. Dingoes on Fraser Island are one of the purest strains of dingoes in Australia. Dingoes are seen as a major problem due to the recent attacks on tourists. However, tourists often entice the dingoes with the promise of food in order to get better photos. It is inevitable that incidents will occur, especially when the promised food is not delivered. The Queensland authorities must actively police their own policy in this regard.

Ecotourism and the Fraser Island Perched Lakes

The minimalist impact definition of ecotourism (Whelan 1991; Figgis 1993; Weiler 1993), with the addition of environmental education and cultural appreciation (Ceballos-Lascurain 1987; Hall 1994), has been adopted in the main by responsible government agencies in specifying appropriate ecotourism strategies. The Australian Conservation Foundation (ACF) for example, in its Tourism Policy (ACF 1994), specified six characteristics that it considered essential to ecotourism:

- Visitation to enjoy nature, wildlife, culture, and archaeology;
- A high degree of interpretation;
- High quality, low-impact design in all infrastructure;
- Promotion of conservation knowledge and ethics;
- The provision of net benefits to environmental protection;
- The provision of net benefits to indigenous communities and other affected communities.

According to Buckley (1994) however, *in practice* the Australian tourism industry and government agencies have been inclined to focus on the product side and to define *all* visitors to the world heritage environment as ecotourists.

The reality

In the Fraser Island context this has been particularly evident. It has been possible for the Queensland Government (National Parks and Wildlife Service – NPWS) to promote more intensive visitation in the National Park by claiming that all visitors are ecotourists, and by definition therefore assume that they will have little or no impact on the lakes. However, such a favourable outcome will always be predicated on the ability of park managers to successfully appeal to the desire in many tourists to protect the environment they have come to experience (Wheeller 1993). Such appeals are designed to change the way people view these environments, and thus enable them to suspend disbelief at the discontinuity between their personal experience of increasing numbers, and lack of real engagement with the ecosystem. But as Pearce and Moscardo (1985) point out, using the attraction of nature as a justification for increasing visitor numbers, without appropriate planning and the matching of particular types of visitors with particular environments, can put at risk the very attractions that are supposed to benefit from this “low impact” form of tourism. The “reality” of the ecotourism experience then on Fraser Island at this point in time is largely made up of the presentation of natural attractions such as the

Lakes as a means of *selling* the overall tourism product, rather than of ensuring sustainable impact on their environment from tourism (Figures 2–4). Tourists actually consume the important environments rather than protect them. This has meant that park managers are faced with considerable environmental pressure from the very people who might have been expected to be predisposed towards their protection. In consequence, the visitor is often left to impact on the environment as he or she will while camping or “bush-bashing/sand dune bashing” in four-wheel drive vehicles, as long as there is little or no impact on those areas marked off as “environmentally fragile” (Cichin-Sain and Knecht 1998).

The process

The Fraser Island experience therefore makes a good case study of the factors that have to be taken into account when tourism (and ecosystem) planning is undertaken. All island operators are licensed by the Queensland Department of Environment and Heritage (DOEH) and are subject to rules and regulations regarding that environment, and in the interest of their own businesses they do appear to abide by these. A permit system controls both the number of visitors able to be landed by each company and the locations that they may visit. Obviously, those who conduct tours using their own vehicles/facilities or who contract to the island resorts potentially have a much greater level of control over what actually happens on the island than those who simply hire out vehicles to groups of visitors. But even the latter do insist upon organised information sessions prior to travel.

However, if tourists come with their own vehicles, there are no compulsory information sessions and a lot of people therefore go to the island without any prior instructions on how to act within that environment.

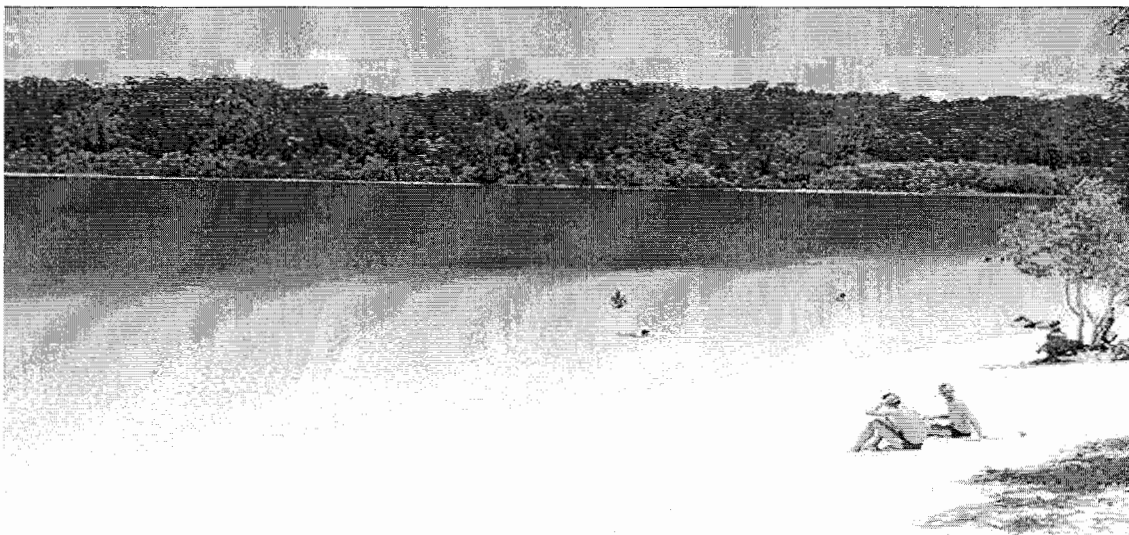


Figure 3: Tourists at Lake Mackenzie



Figure 4: Tourists at Lake Mackenzie



Figure 5: Lake Wabby and the Sandblow

Such independent travelers receive only a set of pre-printed brochures from the Department as they buy their visiting and/or camping permits on the barge to the island.

In assuming in this way that ecotourism means little environmental impact, the DOEH has contributed to the environmental and now community problems generated by tourism to the island.

Printed guides to the National Park are distributed once tours are booked or visitors obtain permits to land, ostensibly so that they may understand the nature of the Island's environment. Available data shows however that few visitors actually read the information made available to them on Fraser Island's ecosystem, although some 70 percent of respondents to various surveys conducted over the past 5 years indicated that they had received a copy (Cooper and Erfurt 2003). It would appear that these guides are not read in their entirety, being either thought not applicable to the particular situation (of 4WD driving, camping, or understanding signage in English), or are thought to be not particularly useful when gaining actual information on the Island. Small wonder then that in this situation tourists seem content with only sketchy outlines of how to treat the environment, and instead of careful behaviour take full advantage of the "freedom and flexibility" of personal transport to indulge their other passions in the absence of more structured experiences. These passions range from sand and bush "bashing," to an almost complete disregard of environmental protection instructions (signage) at the lakes. In fact, it has been noted by Park Rangers that various groups have appeared to disregard signs just *because* they were in English and not in their native language, despite understanding the message!

The data

The data on which the above discussion was based were obtained from a number of disparate sources (Queensland National Parks and Wildlife Service (NPWS) 1996-97; City of Hervey Bay Tourism & Development Board 1998-2001; Cooper 2000; Cooper and Erfurt 2003; Hadwen 2002). The objectives of the surveys undertaken by these organisations and authors were to identify the impact of visitors to Fraser Island, and the Lakes in particular, and to identify the level of awareness of the current range of recreational experiences available and potential interest in experiences that were not undertaken during visits to the Island. The NPWS study for example, involved surveying 20 groups of backpackers of varying sizes at various locations on the Island. A total of 112 responses were obtained in this way. Each respondent was asked to comment on aspects of their experiences ranging from sources of information about Fraser Island, through their length of stay in Australia, to the type of experience they had on Fraser Island. Cooper and Erfurt reported on five years of surveys covering some 800 respondents.

All of these surveys provide information on the problem in persuading visitors to take environmental (and other) messages seriously. In this regard, it should be noted that the reasons why many visitors choose 4WD camping tours as their preferred way of visiting Fraser Island are to do with cost, the freedom and flexibility to decide on the nature of the tour and stopping places, and "adventure," while the opinions of other backpackers, and the need for a permit appeared to have little effect on the decision (Cooper 2000). In such a context environmental information has a very low profile.

Within this pattern, the information sessions for escorted tour groups and those hiring 4WD vehicles are very similar, comprising of observations on required behaviour and illustrative videos on the environment being delivered, usually the night before

travel. These in no way could be classified as *training* sessions though, as Cooper and Erfurt (2003) show. Only 28 percent of respondents provided training, and this was essentially only related to driving skills and behaviour in emergencies. While the information given out covers a wide range of topics regarding environmental protection on Fraser Island, and in the case of vehicle hire firms, on how to drive a 4WD vehicle, the time available for digesting the information doesn't allow for much comprehension, or the development of an ability to apply the whole lot when on the island. Indeed, from the 4WD hire people's point of view the main emphasis is to keep the vehicles away from saltwater, because any damage from this source will cost the *driver*, who is solely responsible for the vehicle

What Could Be Done?

There seems no doubt that in common with managers of National Park tourism world wide the managers of the Fraser Island environment will face increasing pressure from visitors for the foreseeable future, and that many of these visitors will not fully absorb the environmental messages that they receive. There also seems no doubt, from the information presented in this paper, that park operators and private providers *are* interested in protecting the environment they make money out of but paradoxically, just at the point where their clients might become a useful resource with respect to environmental conservation, many of them are let loose in off-road vehicles, without adequate controls. Responding to the obvious problems inherent in this pattern of behaviour, a number of tour operators have long advocated controlled access to the environment through structured tours, and are finding that there is increasing demand for these as a solution to this paradox. However, a more radical solution may be found in making active environmental protection the *core* of a visit to the Island, restricting "sand bashing" and other recreational pursuits to very tightly controlled areas as a *reward* for success in a programme of rehabilitation (Cooper 2000). The key would be to excite sufficient numbers of visitors to see the value in an experience involving rehabilitating/conserving a World Heritage value environment rather just visiting it.

Visitor "volunteers" made responsible for the revegetation and/or cleanup of a particular lake as a condition of entry could gain both tour operators and visitors' environmental "credits" (which might be recognised in some way in relation to the cost of permits), and worldwide recognition for their efforts through appropriate publicity. While space does not allow a full exposition of the advantages to be gained from such an approach, the most obvious would be that of practical assistance to the conservation activities of the DOEH on the island. Such an approach would be of assistance both in terms of labour for conservation tasks, and in terms of lessening impacts on creeks and camping grounds through a feeling of "ownership through effort" that is currently missing. Another advantage would be the opportunity for local and international educational and conservation institutions to form partnerships with backpacker hostels, resorts and 4WD hire companies in the provision and support of such programmes. This would benefit the mainland economy through the creation and dissemination of knowledge about the local environment, as well as providing a sound conservation footing for subsequent activities on the Island. Visitor action programs such as these, which are becoming more common in the management schemes found in North American and European National Parks, have an advantage in that reducing impact

problems is forcefully pointed out to the visitor as a condition of their permit to visit. While there would need to be spot-checks by Rangers, this would be no more onerous for DOEH resources than the current system of clean up *after* the visit.

A Possible Regulatory Framework

Part of the regulatory framework for such an approach already exists, in the Australian Federal Government's *Environment Protection and Biodiversity Conservation Act 1999*. Section 3A, Principles of Ecologically Sustainable Development contains the following standards:

- (a) Decision-making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations;
- (b) If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- (c) The principle of inter-generational equity—that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations;
- (d) The conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making; and
- (e) Improved valuation, pricing and incentive mechanisms for use of the environment should be promoted.

In turn, the Queensland Government has recognised the importance of effective management of the recreational use of Fraser Island, through the declaration of the Fraser Island Recreation Area under the authority of the Queensland *Recreation Areas Management Act 1988*. Day-to-day management is under the control of the National Parks and Wildlife Service (QNPWS). All vehicles entering the island (except landholders' vehicles and other specially exempt vehicles) must have a vehicle access permit and be registered under the *Main Roads Act (1920-1984)*. Permits are also required in advance for camping in the Fraser Island Recreational Area, covering almost the whole of the Island and, as noted above, an information kit is provided with the purchase of the permit. The further measures required are site capacity constraint enforcement, a camping management plan, road categorisation and closure as appropriate, upgraded waste management facilities at the Lakes, the development of an accreditation scheme for tour and site operators based on sustainable development principles, and the introduction of individual visitor responsibility for environmental impact as a condition of entry.

Conclusions

This paper discussed the nature and impacts of ecotourism on the perched dune lakes in the Fraser Island World Heritage environment. The data used were taken from a number of sources covering the period 1996 - 2001. These data show that park managers and operators do see themselves protectors of the Fraser Island environment, but in many respects feel let down by short-term visitors who see themselves on an “anything goes pass,” rather than as groups who may be more able than most to understand that conservation is required in a fragile environment, and the revenue raising aspects of the Island permit system.

To be able to deliver on the promise of environmental management of the perched lakes through ecotourism in the Island tourism context, it is important that managers and tour operators do not assume *fair play* on the part of visitors, when these are not given a strong message on the requirements of environmental protection, especially in a world heritage setting such as Fraser Island. In assuming that ecotourism means little environmental impact, the DOEH has contributed to the environmental problems generated by tourism to the Island. Tour operators and park managers alike would like to see greater control over visitors (and greater investment), and would be prepared to support alternatives to the present system of permits. One alternative has been briefly discussed, that of the environmental rehabilitation contract outlined in this paper. By introducing this component into the “permit to land” in the National Park, both the visitors who want to enjoy the environment of the lakes and the environmental managers who must control their activities could benefit.

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