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Tourists and albatrosses: the dynamics of tourism at the Northern Royal Albatross Colony, Taiaroa Head, New Zealand

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Wildlife tourism attractions in New Zealand, like those elsewhere in the world, have experienced rapid growth in demand since the mid-1980s in association with the ecotourism phenomenon. Fortunately, the body of research on the impacts of tourism upon wildlife, both domestic and international, is beginning to reflect this growth. This article presents a consideration of wildlife tourism as it has developed in the New Zealand context. Specifically, it addresses the complexities of understanding the impacts of *non-consumptive* wildlife tourism. This term describes tourist engagements with wildlife that take place in the habitat of the focal species without the deliberate disturbance or removal of that species. To this end, the case of the North Royal Albatross Colony, Taiaroa Head, New Zealand, is examined. Various secondary data sources are employed to test the application of Duffus and Dearden's (*Biological Conservation* 1990, 53, 213–231) conceptual framework to this bird colony, with all components of the framework proving to be upheld. It is concluded that site users, contact wildlife species and the natural habitat of the focal species all demonstrate various dimensions of change over time. Several conclusions are drawn from this study. First, that in the absence of deliberate management intervention, wildlife tourism attractions evolve over time to the detriment of both the visitor experience and the focal wildlife species. Secondly, the impacts of tourism upon wildlife transcend tolerance. In other words, wildlife species may appear to be perfectly tolerant of tourists while significant impacts still occur. Thirdly, the application of the core components of Duffus and Dearden's framework dictates that wildlife impact research is not transferable, but rather research of this nature is both site- and species-specific. Finally, it is recommended that research in this domain should involve long-term monitoring of wildlife impacts. Many significant impacts go undetected in the absence of time series data. Failing this, research into the impacts of non-consumptive wildlife tourism must give consideration of the possible long-term biological consequences of tourist engagements with wildlife species.

Keywords: albatross, tourism, non-consumptive, impacts

Introduction

The Royal Albatross is one of the most engaging of all birds, a fact that led R. C. Murphy, in 1912, to comment that 'I now belong to a higher cult of mortals, for I have seen the Albatross'. The Albatross is a sub-Antarctic seabird which boasts a wingspan of up to, and in some cases, over three metres. With this impressive wingspan the Albatross is well adapted to spend the vast majority of its life roving the southern Pacific, Atlanta and Indian oceans in the most hostile of marine latitudes. The 'roaring forties', 'raging fifties' and 'screaming sixties' are labels used by mariners to describe the southern latitudes adjacent to Antarctica. But for the South Island of New Zealand, Cape Horn (South America) and the Antarctic Peninsula and scattered sub-Antarctic Islands, these latitudes comprise thousands of miles of endless ocean. Beautifully adapted to this environment, one of towering waves and hostile weather patterns, are three species of Great Albatrosses; the Wandering

Albatross (*Diomedea exulans*), the Southern Royal Albatross (*Diomedea epomophora epomophora*) and the Northern Royal Albatross (*Diomedea epomophora sanfordi*). These birds spend between 80 and 85% of their lifespan at sea, returning to land only to engage in the biennial breeding cycle. The Great Albatrosses breed on a limited number of remote sub-Antarctic Islands with one exception. A colony of Northern Royal Albatrosses was established at Taiaroa Head, South Island (New Zealand) in the late years of the First World War (1914–1919). This colony of breeding Albatrosses was viewed by a small number of visitors, mostly local residents, until 1964 when the area became a protected Flora and Fauna Reserve. However, in 1972 the commercial guiding of visitors into the reserve to view the Royal Albatross Colony was initiated. As such it is the longest established cases of commercial wildlife tourism in New Zealand. This article examines the course of tourism development at Taiaroa Head with consideration given to the sustainability of wildlife tourism at this site. The article is set within a framework for wildlife tourism in New Zealand. A range of secondary sources are then employed in applying Duffus and Dearden's conceptual framework to the wildlife viewing situation at Taiaroa Head.[1]

Wildlife resources in New Zealand

New Zealand boasts some of the most fantastic wildlife resources for tourism. This country '... can lay claim to some of the most bizarre forms of wildlife in the world'.[2] Nowhere else can tourists find a bird that lays an egg one-quarter of its bodyweight (Kiwi), a mountain parrot (Kea) and the nearest living ancestor of the dinosaurs (Tuatara). These species have no equivalents anywhere in the world.[2] This situation arises from the fact that New Zealand separated from the ancient supercontinent Gondwanaland over 80 million years ago. This continental shift predates the evolution of mammals. In the absence of predatory land mammals, New Zealand's bird life evolved in a predator- and competitor-free environment. Many species have become victims of their evolutionary heritage and are, because of it, extremely ill-adapted to cope with change.

New Zealand wildlife has been profoundly susceptible to impact since the first of three successive waves of human arrival in New Zealand. The first of these was the arrival of Polynesian settlers approximately 1000 years ago. This was followed in the late eighteenth century by the arrival of Europeans. Both periods of human colonization 'triggered a wave of extinctions'.[2] In the 1000 years since human settlement of New Zealand, half of all native bird species have become extinct.[3] Many of those that survive face the risk of extinction. The third of these three waves of human arrival has been the contemporary phenomenon of international tourism.

Structure of wildlife tourism in New Zealand

Duffus and Dearden[1] describe three dimensions of wildlife–human interaction. These include consumptive (hunting, fishing), low-consumptive (zoos, aquaria, serpentaria) and non-consumptive (wildlife observation, photography) uses. All three dimensions demonstrate widely varying qualities of experience, management demands and potential impacts upon the wildlife setting and the focal species. In the New Zealand context, consumptive wildlife tourism operations are relatively few and tend to serve specialized niche markets. Big-game fishing (Bay of Islands) is an example of consumptive wildlife tourism in New Zealand. Similarly, recreational fishing in the lakes and back country rivers of southern New Zealand and the central North Island present predominantly North American anglers with the opportunity to catch trout and salmon. Low-consumptive forms of wildlife tourism in New Zealand include visits to zoos, aquaria, sanctuaries and oceanaria. Much of New Zealand's native birdlife is so rare that first hand observation involves either visiting sanctuaries (such as Kapiti Island, Mount Bruce Wildlife Centre and Tiritiri Mantangi Island) or conservation efforts such as the Black Stilt Aviary (Twizel), Kiwi House (Otorohanga), and Takahe (Te Anau Wildlife Centre) captive recovery programmes. These programmes offer tourists the opportunity to appreciate the protection of endangered wildlife species. Third, non-consumptive tourist–wildlife contact takes place in the natural settings of the focal wildlife species. New Zealand abounds with marine wildlife and it is here that much tourist demand for non-consumptive wildlife experiences is satisfied. Traditionally, tourist contact with marine wildlife has involved deliberate encounters with marine bird life. Various bird species have been drawn increasingly into contact with tourists in recent years (*Table 1*).

More recently, tourist demand has extended to experience marine mammals with many new operations experiencing phenomenal growth in the process.[4] While concern has been expressed for the intrusion of tourists into wildlife environments, several cases of non-consumptive wildlife tourism have been the focus of impact research in New Zealand. Examples include the study of high use sites such as Taiaroa Head[5] and popular species such as the Northern Royal Albatross Colony,[6] Kaikoura Whale Watch,[7] Yellow-eyed Penguin watching on the Otago Peninsula[8] and Dolphin watching in Kaikoura.[9] However, the precise accuracy of wildlife tourism research in identifying the long-term biological consequences of human

interaction with wildlife is a question that is central to this paper.

Incidental visitor impacts

Associated with the growth of tourist interaction with marine mammals in New Zealand, but barely represented in the research literature, has been an increase in incidental tourist contact with wildlife. This term describes the fact that tourists may encounter and perhaps impact wildlife when engaging with the species is not the primary aim of the visitor exprience or takes place in complete ignorance of the encounter on the part of the tourist.[10] Incidental tourist contact with marine mammals and birdlife certainly takes place in New Zealand. Tourists visiting tracks in the conservation estate (National Parks and other protected areas) are also likely to contact Kiwi, Kea or various other native species (Weka, Kaka, Yellowhead, Blue Duck), knowingly or otherwise. Butler[11] documents the potential for tourists tramping along river margins in the Nelson Lakes National Park to incidentally impact the endangered Blue Duck. This raises the concern that most back country tracks in New Zealand follow river margins where many wildlife species may be impacted. Gaze[13] confirms the possibility that increasing tourist traffic lights may be causing the disorientation of Westland Petrels each evening as they return from the sea to their burrows along a 10 km coastal strip to the south of Punakaiki (West Coast). These cases confirm the potential difficulties of identifying and

Table 1 Examples of wildlife tourism in New Zealand, adapted from Duffus and Dearden's tripartite classification

Wildlife tourism classification	New Zealand actives	New Zealand locations/settings
Consumptive	Big game fishing	Bay of Islands
	Trout/salmon fishing	Various harbours, lakes and rivers
	Wilderness fishing	Greenstone, Irisburn rivers (among others)
	Duck shooting	Lakes, rivers, estuaries
Low-consumptive	Wildlife viewing	Kapiti Island
	Saddleback, stitchbird, kokako	Mount Bruce Wildlife Centre
	Island bird sanctuary	Tiritiri Matangi Island
	Black Stilt observation	Black Stilt Aviary, Twizel
	Kiwi observation	Kiwi House, Otorohanga
		Kiwi House, Napier
	Takahe observation	Te Anau Wildlife Centre
	Marine wildlife observation	Kelly Tarlton's Underwater World
	Marine wildlife viewing	Seaworld, Napier
		Various Aquaria
Non-consumptive	Royal Albatross Colony	Taiaroa Head, Dunedin
	Whalewatch	Kaikoura
	Dolphin watch	Bay of Islands, Kaikoura
	Yellow-eyed Penguins	Otago Peninsula, Dunedin
	Little Blue Penguins	Oamaru, North Otago
	Gannet Colonies	Muruwai, Auckland
		Cape Kidnappers, Hawke's Bay
		Cape Farewell, Golden Bay
	Westland Petrels	Punakaiki, West Coast, South Island
	Kiwi	Halfmoon Bay, Stewart Island
	Various wading birds	Various coastal and estuarine environs
	White Heron (Kotuku)	Whataroa, West Coast
	Albatrosses, penguins, sealions	Sub-Antarctic Islands
	Nature watch cruises	Various harbour, river, inlet cruises
Incidental	Blue Duck	Nelson Lakes National Park
		Mount Aspiring National Park
	Kea, Kaka	Fiordland National Park
		Mount Cook National Park
		Westland National Park
		Mount Aspiring National Park
	Kiwi	North-west Circuit, Stewart Island
		Heaphy Track, Kahurangi National Park
	New Zealand Fur Seals	Otago Peninsula, Nugget Point and others
	Hooker Sealions	Otago Peninsula, Catlins coast
	Yellow-eyed Penguins	North-west Circuit, Stewart Island
	Wading birds	Various estuaries and rivers
	Stewart Island, NZ Spotted shags	Taiaroa Head, Otago Peninsula
	Little shags	Otago Peninsula
	Weka	Heaphy Track, Kahurangi National Park
	Yellowhead	Dart Valley, Mount Aspiring National Park

overcoming the incidental impacts of wildlife tourism. The detrimental impacts arising from this form of human–wildlife interaction are an urgent priority for researchers and park managers.

Research context

Growing demand for all dimensions of wildlife tourism in New Zealand confirms the need to investigate the potential impacts of wildlife–tourist interaction. Duffus and Dearden's[1] conceptual framework of wildlife tourism forms the basis of this paper. They identify the dynamic nature of any form of tourism that involves the engagement of visitors with wildlife. In doing so they state that non-consumptive wildlife tourism resources 'exhibit evolution and change in terms of the nature of the users and the sites where the activity takes place'. The nature of the user demonstrates a propensity to evolve as the public image of the wildlife attraction changes. This takes place primarily through the growth of publicity and the development of facilities at the site. The dynamics of wildlife tourist typologies are illustrated by Duffus and Dearden[1] employing Butler's[11] concept of the tourist area lifecycle (*Figure 1*). Their expert–novice continuum suggests that tourists visiting a specific wildlife setting cannot be considered an homogeneous

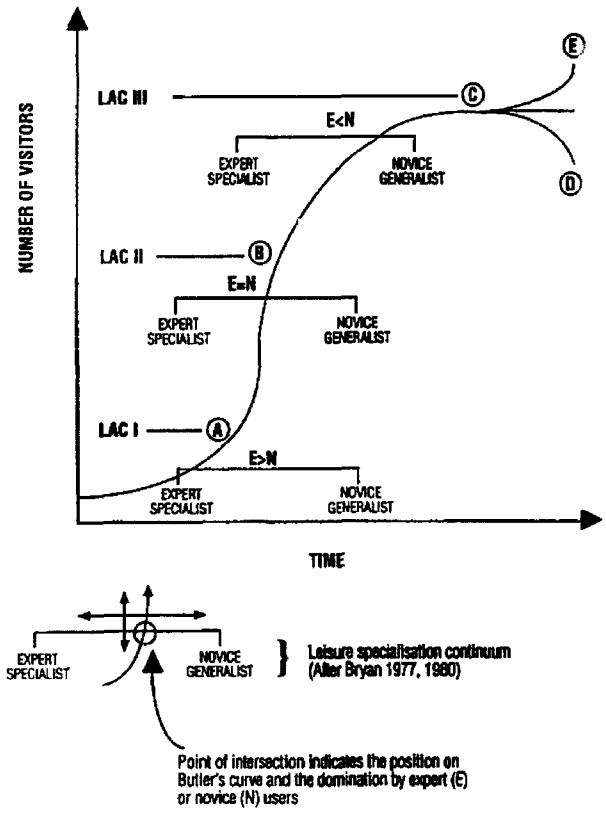

Figure 1 Duffus and Dearden's[1] conceptual framework for wildlife tourism

population over time. Rather, in the formative years exploratory visitors or 'specialists' tend to visit the wildlife setting. These tourists are generally few in number and high in previous experience and knowledge. They place little pressure on the ecology of the setting or the social system of the host community. They are motivated by a genuine interest in wildlife and conduct themselves in a manner that is consistent with the minimization of visitor impacts upon the focal species.

The dynamics of non-consumptive wildlife tourism dynamic is confirmed by the fact that, with increasing awareness of the attraction, the number and characteristics of the visitor mix evolves. A less ambitious or 'generalist' visitor profile will emerge. 'There will be a concomitant demand for more facility development, more mediation and increased pressure on both the social system and the ecosystem of the host area'. Specialists and generalists will be drawn into conflict as they compete for a limited resource. Due to a lack of genuine interest, the provision of information for generalist visitors becomes introductory rather than supplementary. In catering for wildlife generalists the appeal of the attraction to wildlife specialists will be compromized. This progression in visitor profile has been researched and documented in greater detail since Duffus and Dearden's[1] initial publication[14] and used widely with general reference to ecotourism.[4] It is clear that evolution of the visitor profile will have implications for the management of visitors. However, Duffus and Dearden's[1] conceptual framework indicates that any evolution of the visitor profile is likely to also hold implications for the wildlife resource itself.

Indeed the second aspect of Duffus and Dearden's conceptual framework addresses this probability. They employ the Limits of Acceptable Change (LAC) management planning framework to illustrate that an evolving visitor profile is unlikely to take place in the absence of impact upon the wildlife setting. Indeed, logic dictates that increasing numbers, the development of facilities and the evolving visitor profile will have ramifications for the focal species and the ecology of the site generally. The probability that this course of events will unfold is sufficient to confirm the need for longitudinal research and monitoring of wildlife tourism resources. An examination of the relationship between user specialization and site evolution at the Taiaroa Head Albatross Colony (Dunedin, New Zealand) presents the opportunity to test the dynamics of wildlife tourism as illustrated in Duffus and Dearden's[1] conceptual framework.

Taiaroa Head (*Pukekura*)

Taiaroa Head, known to local indigenous Maori as *Pukekura*, is an exposed headland on the Otago

Peninsula, southern New Zealand, situated a mere 30 km from (and indeed within the limits of) the city of Dunedin. This is a site that attracts a spectrum of visitor interests. Taiaroa Head boasts a relatively rich cultural history, having been developed in pre-European times as a defended *Pa* settlement by local Maori. This is a site of great significance to Maori and a lengthy genealogy tells much of the Maori ancestors who lived on and in the general vicinity of *Pukekura*. The site also has a colonial military history, having been developed with trenches, gun emplacements and other fortifications in the late nineteenth and early twentieth centuries. Taiaroa Head overlooks the narrow entrance of the Otago Harbour and as such provides an impressive scenic setting within a comfortable one-hour drive of Dunedin. However, in the eyes of a growing body of domestic and international visitors to Taiaroa Head, it is the presence of marine wildlife on the headland that provides the greatest lure of attraction.

While Taiaroa Head abounds with various marine species, most tourists are attracted by a small breeding colony of Northern Royal Albatrosses that was initially established by seven colonizing birds approximately 80 years ago. Each year, a small number of breeding pairs return to the headland to engage in the biennial breeding season. While this species is not actually endangered, its breeding range is, aside from the small Taiaroa Head colony, limited to two extremely remote outlying islands of the Chathams group to the east of the New Zealand mainland. Taiaroa Head, therefore, represents the only mainland breeding colony of Northern Royal Albatrosses and indeed any of the family of Great Albatrosses. This fact sets Taiaroa Head apart as a wildlife experience that is unique in the world. It is this uniqueness as well as the awe-inspiring sight of a gliding Albatross and the serene nature of the birds that has made Taiaroa Head a tourist attraction of world repute.

Taiaroa Head was designated a Flora and Fauna Reserve in 1964. As such it is part of New Zealand's conservation estate, a generic term used to describe all national and marine parks and reserves that are administered by the Department of Conservation (DOC). Guided tours of the Royal Albatross Colony, which involves taking visitors into the Reserve, have been conducted since 1972. The right to operate these guided tours on a restricted basis was granted in that year to the Otago Peninsula Trust (OPT) which was formed in 1967. A review of OPT Annual Reports provides a detailed insight into the development of tourism at the headland throughout this 26-year public history. These reports explain that for 16 years small groups were welcomed to and guided from a small Harbour Board cottage into the wildlife area to view one or more of the few nesting pairs of Northern Royal Albatrosses. Two afternoon tours were restricted to groups of no more than ten, on 3 days of the week. In the early to mid-1980s this formula began to change.

With increasing daily tours and days of operation an expanding number of visitors could be taken into the wildlife reserve to observe Albatrosses. A specialized viewing facility, the Richdale Observatory, was completed in 1983. This observatory was situated on the southern side of the headland so as to command a view of approximately one-third of the total nesting area. The capacity of this viewing facility allowed the size of each guided tour to be increased from 10 to 15. In 1988, construction of a new reception facility set immediately outside the wildlife reserve began. The Reception Centre was opened by Princess Anne in March 1989. By 1991 up to 21 daily tours were available (depending on the hours of daylight) departing half-hourly between 9.30 am and 8.00 pm on every day of the year except Christmas Day.[15] These figures alone begin to provide an initial illustration of the dynamics of site use.

Methodology

The methods developed for this programme of research involved the identification, reviewing and interpretation of a wide range of secondary sources in an attempt to identify evidence of dynamic change at Taiaroa Head since 1972. Primarily this involved the analysis of visitor registers that have been collected by the Otago Peninsula Trust as a prerequisite to allowing visitors into the wildlife reserve as dictated by the DOC and its predecessor (prior to 1987), the Wildlife Service. This required all visitors since 1972 to register the date of their visit, the time of their daily tour, name, address and nationality. These secondary data were employed to provide an insight into the numbers of visitors, tour size frequency, visitor nationalities and seasonality. Other secondary sources used in this research included OPT Annual Reports (1972–present), monthly visitor counts collected by Taiaroa Head staff (1989–1991) and data recorded from a door counter situated at the entrance to the reception centre since its completion in 1989. Visitor book entries that had been gathered over many years were also employed in order to detect any evidence of changing visitor comments throughout the 1972–1998 public sequence. These sources, were used in an attempt to identify and interpret evidence of site user evolution at Taiaroa Head.

A review of Department of Conservation research publications was undertaken in an attempt to identify evidence of site ecology evolution at Taiaroa Head.[6,16,17] Much of this work has drawn upon nesting records from the Albatross Colony dating to the arrival of Dr L. E. Richdale in the

early 1930s.[6,16] Furthermore, a number of research theses from the University of Otago, particularly the Zoology Department, were used in this analysis.[5,18] These sources were employed to examine the dynamics of site users and site ecology at Taiaroa Head since 1972. As such, the aim of this research was to test Duffus and Dearden's conceptual framework for non-consumptive wildlife tourism in applying the framework to the Taiaroa Head Royal Albatross Colony.

Dynamics of site users

The fact that visitors to the Albatross Colony must enter the designated Reserve to access the Richdale Observatory dictates that each must sign a visitor register (nominally an application to the Department of Conservation to permit access to the Reserve). An examination of these visitor registers provides an intriguing insight into dimensions of site user evolution throughout the public history of the Royal Albatross Colony. Such an analysis reveals various aspects of significant change in tourism patterns at the headland.[15,19] First, the fact that growth in visitor numbers to Taiaroa Head closely reflects Duffus and Dearden's growth curve is noteworthy (*Figure 2*). It is clear that annual visitor numbers to the colony have increased dramatically, particularly since the advent of the modern ecotourism phenomenon in the mid- to late-1980s. Duffus and Dearden[1] indicate the periods of rapid increase in visitor numbers usually coincide with the development of facilities. The development of the new reception facility in 1989 coincided with a doubling of visitor numbers within a very short timeframe. In 1994 OPT annual reports ceased to record visitor numbers to Taiaroa Head.

Further analysis of OPT visitor registers was undertaken in order to allow a comparison of visitor patterns before and after the completion of the new

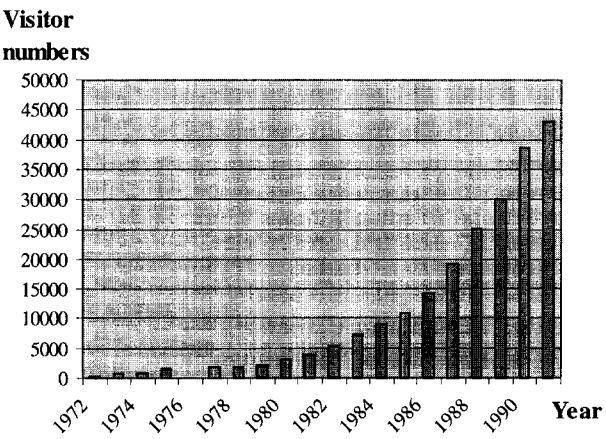

Figure 2 Visitor numbers to the Taiaroa Head Flora and Fauna Reserve to observe Albatrosses from the Richdale Observatory (1972–1992)

reception facility in 1989. Duffus and Dearden[1] note the likely role of facility development in the evolution of site users. Indeed, this analysis reveals that the origins of visitors to the headland have also changed significantly over this period (*Table 2*). In 1987/1988, 19088 visitors undertook guided tours of the breeding colony. Of these 8682 (45.5%) were international visitors to New Zealand with the USA (2811), Australia (1445) and Britain (1257) the most frequently represented of 47 visitor nationalities. By 1990/1991 (after the development and opening of the new reception centre) visitor numbers had doubled to 37885.[15] Furthermore, in the intervening years the international visitor component had increased to 55.7% of the total and Germany had become the dominant source of international visitors. Indeed, predominantly non-English speaking visitor nationalities, including German, Swiss, Austrian, Japanese and Korean visitors, had increased most dramatically. A total of 75 nationalities were represented by visitors to the Richdale Observatory in that season.[15] This is likely to have resulted in the increasing complexity of visitor interpretation and communicating appropriate visitor conduct in the Richdale Observatory to an audience with varying command of the English language.

Through these changes, and perhaps implicated to them, seasonal extremes of visitation have been greatly accentuated. Since the opening of the new reception centre (March 1989), monthly visitor counts have been collected by Taiaroa Head guiding staff. These records reveal increasingly extreme seasonal visitor patterns (*Figure 3*). The seasonal component of wildlife tourism is well documented.[20] However, the fact that high growth in visitor numbers at this site has taken place almost exclusively in the high season is a cause for particular concern. This trend is considered typical of an attraction that lures an increasing proportion of its visitors from international origins. Secondary data generated from visitor registers also reveal an increase in average tour size, particularly during the late-1980s and early-1990s. Despite the development of a spacious new reception centre and, once again, perhaps implicated to it, tourists are now *more* likely to experience a crowded reception area and viewing facilities. *Table 3* illustrates that after the development of the new reception centre, the average number of people on each tour increased significantly. However, this table does not reveal that the average tour size varies across the hours of the day. By 1990/1991 most afternoon guided tours were operating at maximum capacity and, therefore, in a particularly crowded Richdale Observatory. This is due in large part to the arrival of increasing numbers of visitors on scheduled tour coaches with capacities up to three times that of the observatory.

These results confirm that in terms of user specialization, tourists visiting Taiaroa Head appear

Table 2 Changing patterns of Taiaroa Head visitor nationality, 1987/1988 and 1990/1991, pre- and post-Reception Centre development

Visitor origins 1987/1988			Visitor origins 1990/1991		
Dunedin	4033	21.1	Dunedin	5357	14.1
Otago/Southland	1001	5.2	Otago/Southland	1951	5.1
South Island	1627	8.5	South Island	2908	7.7
North Island	3098	16.2	North Island	5967	15.7
Subtotal (domestic)	9759	(51.1%)	Subtotal (domestic)	16201	(42.7%)
Australia	1445	7.6	Australia	3435	9.0
Japan	153	0.8	Japan	851	2.2
USA	2811	14.7	USA	4263	11.2
Canada	576	3.0	Canada	1113	2.9
Britain	1257	6.6	Britain	3584	9.4
Germany	1244	6.5	Germany	4704	12.4
France	37	0.2	France	139	0.4
Italy	40	0.2	Italy	96	0.3
Singapore	88	0.5	Singapore	292	0.8
Austria	95	0.5	Austria	271	0.7
Switzerland	476	2.5	Switzerland	1561	4.1
Norway	35	0.2	Norway	72	0.2
Sweden	249	1.3	Sweden	407	1.1
Denmark	176	0.9	Denmark	298	0.8
Subtotal (International)	8682	(45.5%)	Subtotal (International)	21086	(55.7%)
Other Asia	130	0.7	Other Asia	354	0.9
Other Pacific	83	0.4	Other Pacific	172	0.5
Other nationalities	365	1.9	Other nationalities	72	0.2
Subtotal (others)	578	(3.0%)	Subtotal (others)	598	(1.6%)
Indecipherable	69	0.4	Indecipherable	134	0.4
Total	19088	100%	Total	37885	100%

to be evolving along the lines discussed by Duffus and Dearden.[1] The growth curve of increasing visitor numbers is a close reflection of Butler's[13] tourist area life cycle curve as employed by Duffus and Dearden. It emerges that the point to which wildlife experts are likely to outweigh novices within the visitor population was encountered at Taiaroa Head in the mid-1980s. From this point, tourists of varying 'wildlife specialization' have been drawn into competition for a limited resource. The development of facilities in the late 1980s may be linked to the further evolution of site users. Changing visitor patterns since 1989 expressed in visitor numbers will certainly have resulted in novices becoming numerically superior to wildlife experts who, in all probability will now have been displaced from the setting.

The arrival of novices is certain to have implications for visitor expectations, behaviour and satisfaction. These visitors are least likely to hold accurate expectations of the wildlife experience that Taiaroa Head may provide. Indeed, secondary information drawn from visitor comments books at Taiaroa Head is replete with comments that arise only out of

Table 3 Average monthly tour size pre- and post-reception facility development during the 1987/1988 and 1990/1991 seasons

	1987/1988 season		1990/1991 season		
Month	**Average number of visitors/tour**	**Percent tours operating at capacity**	**Average number of visitors/tour**	**Percent tours operating at capacity**	**Percent change**
November	2.1	14.0	10.0	66.7	52.7
December	3.4	22.7	8.4	56.0	33.3
January	6.2	41.3	12.1	80.7	39.4
February	5.1	34.0	10.1	67.3	33.3
March	3.6	24.0	9.0	60.0	36.0
April	3.4	22.7	5.0	33.4	10.7
May	3.0	20.0	4.1	27.3	7.3
June	1.8	12.0	2.3	15.3	3.3
July	1.9	12.7	3.1	20.7	8.0
August	2.0	13.3	3.0	20.0	6.7
September	—	0.0	3.8	25.3	28.3
Mean	2.8	19.7%	8.7	43.0%	23.3%

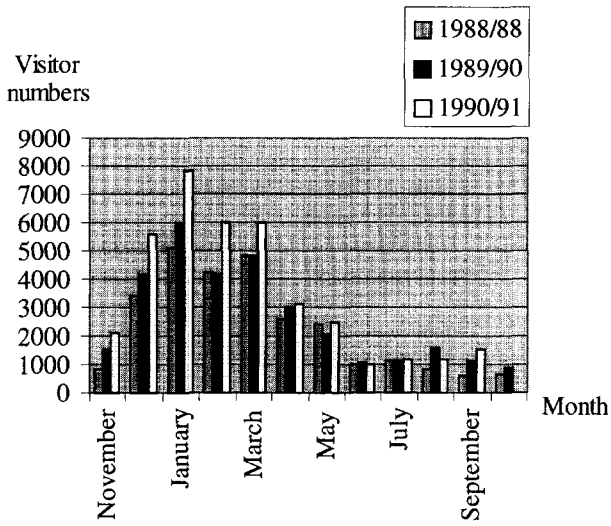

Figure 3 Patterns of visitor seasonality at Taiaroa Head by month, 1989–1991

poorly founded expectations. Visitor books with entries post-dating 1989 convey the expectation of handling Albatrosses, walking among crowds of nesting birds and the possibility of feeding birds with bags of bread. These comments accurately describe a set of impossible expectations. Clearly, as wildlife specialists have given way to novices, the unique status of this small breeding colony of Albatrosses has become insufficient to guarantee visitor satisfaction.

These are visitors who, while demanding introductory rather than supplementary information, also require the policing of behaviour. Inappropriate noise levels, the use of camera flashes and inappropriate behaviour in the observatory (often borne out of boredom) commonly accompany the arrival of wildlife tourists who comply with Duffus and Dearden's 'novice' label. These visitors are most likely to arrive at the site as part of a packaged tour. Therefore, the site has been reduced to one of many attractions in a scheduled itinerary and the motivation to visit is no longer one that is necessarily held by the visitor. Guide satisfaction is compromized as their role also changes. Where previously guides provided supplementary information to genuinely interested wildlife specialists, the arrival of novices results in guides policing the behaviour of visitors who lack a genuine interest in the wildlife species. These points illustrate various dimensions of quite dramatic site user evolution at Taiaroa Head.

Dynamics of site ecology

The second component of Duffus and Dearden's[1] framework for wildlife tourism (*Figure 1*) applies the Limits of Acceptable Change (LAC) concept to wildlife tourism. This is employed to illustrate the implications of evolving user specialization for the wildlife setting itself. Therefore, they explain, the period LAC I allows 'the maximum number of viewers with minimum facilities and negligible impact on the species or habitat' LAC I, the first period involving minimal physical impact, dates at Taiaroa Head from 1972 to the mid-1980s (*Figure 2*). Progression to LAC II has taken place at Taiaroa Head since 1985. This, according to Duffus and Dearden[1] may correspond with evidence of impact upon the focal species. They explain that 'the more wary members of the population may ... no longer tolerate human presence above these numbers'.

Once again, a review of Department of Conservation research findings lends support to this aspect of the framework presented by Duffus and Dearden.[1] Indeed, the Department of Conservation[21] reports that 'during the 1980s colony staff have become aware of an apparent change in breeding patterns as nesting birds are tending to move to areas away from the public view'. This very trend has taken nesting birds away from the observatory and into the more marginal nesting environs of the northern and north-western side of the Taiaroa Head wildlife reserve. The 1996 OPT Annual Report reviews the installation of video cameras on the northern side of the headland in order to allow, among other things, tourists to see birds nesting out of view from the observatory.

Nests located on the northern side of the headland are most exposed to the sun and least exposed to the cool prevailing south-easterly winds. This results in 'extremes of heat, dry weather and little wind' to an extent that may cause heat stress to nesting Albatrosses. Furthermore, the duration of the hatching period may be lengthened due to increased nest temperature and its implications for the hardening of the egg. The incidence of chicks dying during the crucial hatching period and 'fly-strike' (chicks becoming fly blown during the extended hatching period) may also rise under these circumstances. The probability of parent birds dying of heat stress during the incubation period is greatest on the side of the headland. McLennan *et al.*[22,23] employed Geographic Information Systems (GIS) to confirm that this side of the headland is also more steeply sloping. Both articles confirm the relative lack of appropriate (flat) nesting areas on the northern side of the headland with implication for nest site distribution.

These results have initiated further research into the impacts of tourism upon the ecology of Northern Royal Albatross at Taiaroa Head. Robertson[16] employs nesting records collected since the 1930s (when protection was first afforded to the Albatrosses by Dr L. E. Richdale) which confirms several significant impacts associated with human presence on the headland. These confirm, in the first instance, that the nesting distribution of Albatrosses at Taiaroa Head has gradually shifted *away* from

human presence. This has occurred despite the fact that these birds are extremely conservative in their nest site selection. Furthermore, the birds have moved from optimal to sub-optimal nesting areas in terms of nest site availability on the headland. Indeed Peat[24] confirms that 'about a quarter of the colony's one hundred birds owe their lives to daily caretaking and intervention [which takes] the form of assistance with hatching, fostering and supplementary feeding'.

The examination of longitudinal nesting records spanning 50 years confirms several other forms of impact that could not be detected in the absence of time series data. The age of chicks at departure from natal nests, distances chicks move from nests and age at fledging (the act of flying from the headland) are significantly different when nests exposed to human presence are compared with those out of view. Clearwater,[5] for example, reports that chicks that are within view of the observatory move an average 47 m from their natal nests (generally into areas beyond the tourist gaze) compared with an average of 12 m of movement from natal nests by chicks out of view. Reasons for this are not yet known, but reflection from the observatory windows,[17] noise and disturbance from camera flashes are almost certain to be contributing factors. The fact that parent Albatrosses returning from the ocean only feed chicks near their natal nests promotes the need for further research on these subtle changes in Albatross nesting patterns, distribution and behaviour. The age of chicks at fledging is also very significant. Albatross chicks fledge from Taiaroa Head in the weeks of late winter and early spring (August/September in the Southern Hemisphere). During the crucial weeks before fledging the parent birds return from the sea less frequently to feed the chicks. This arises due to the urgent need for chicks to lose weight prior to attempting to fly from the cliffs of Taiaroa Head (fledging). It seems certain that these chicks are being denied the appropriate time to both lose weight and exercise and develop the muscles of the wings sufficiently prior to fledging. In the last weeks of the 1996/1997 breeding season two cases of failed fledgings occurred. While this is not necessarily unusual, it is important to investigate the broader circumstances surrounding failed fledgings. The long-term biological significance of these findings is, as yet, unknown but surely worthy of further research.

Discussion

Duffus and Dearden[1] warn that the implications of exceeding LAC III are most serious and, indeed, likely to cause irreparable damage to the wildlife resource. LAC III is likely to result in the complete degradation of the resource. Indeed, Robertson[16] confirms 'the prime importance of comprehensive long term monitoring ... for even such an ostensibly passive resource, by nature tourism'.

All three forms of impact identified above confirm the urgency and direction of further research in this domain. These are forms of impact that cannot be detected in the absence of longitudinal research. Indeed Mills[18] reports on a detailed programme of research in this very field. It involved the observation of nesting Albatrosses at Taiaroa Head throughout the 1989/1990 breeding season. Observations of breeding birds were made in the presence and absence of onlookers in the Richdale Observatory. Mills concluded that no obvious changes in Albatross nesting behaviour could distinguish between whether or not tourists were present in the Observatory. The fact that impacts associated with tourism have been proved subsequently does not discredit this research. Rather it confirms a point that is central to this paper. That is, that apparent tolerance should not disguise the fact that serious impacts may still take place. Furthermore, the impacts arising from tourists entering a wildlife setting and engaging in non-consumptive interaction with wildlife must be researched and monitored on an ongoing basis (even if time series data do not necessarily establish causation). Mills'[18] research confirms that many such impacts cannot be detected over a day, a month or even over an entire breeding season. Research programmes and, more particularly, research funding, in this domain will be well served by observing this point.

This paper clearly unholds the conceptual framework presented by Duffus and Dearden.[1] It also confirms that the impacts of tourism upon wildlife are potentially severe and difficult to recognize in the absence of time series research. In the case of the Royal Albatrosses of Taiaroa Head, while ostensibly tolerant of human presence, significant impacts have occurred. While use of the site has clearly evolved, less obvious have been impacts upon the site ecology and the focal species. Only the most detailed longitudinal research reveals the broader ramifications for nesting distribution, chick survival at hatching, chick departure from natal nests and age of chicks at fledging.[16] Few such impacts of tourism could be identified in the absence of detailed long-term nesting records. For this, a great debt of favour is owed to Dr L. E. Richdale (who initiated nesting records at Taiaroa Head) and his successors. It is essential that research and monitoring of this nature continue and that the results generated be acted upon by those charged with the management of both site users and contacted wildlife species.

It is clear that research in this field must seek to identify the long-term impacts of wildlife tourism rather than evidence of tolerance or intolerance of human presence. It is probable that most wildlife

species will demonstrate some degree of tolerance when human engagements take place within the wildlife setting itself. This is clearly the case for Albatrosses nesting at Taiaroa Head.[18] Tolerance, though, should not enter deliberations on this subject. Rather, debate should centre on the long-term biological consequences of tourism. To further complicate the matter it is likely that any impacts of tourism upon wildlife will be site- and species-specific.[8] The ecology of the breeding colony at Taiaroa Head is such that impacts of tourism upon Northern Royal Albatrosses there will not necessarily be the same as impacts upon Northern Royal Albatrosses elsewhere. Rather, the impacts of tourism upon wildlife will be a function of the core elements as identified by Duffus and Dearden,[1] these being user specialization, the focal species and the setting in which the wildlife–tourism engagement takes place. Therefore, research into tourism impacts upon wildlife should not be seen to be, or treated as, transferable.

Conclusions

There can be little doubt that wildlife is one of the more fragile tourism resources. This point is confirmed by the sensitive relationship that exist within wildlife populations (breeding patterns), between predators and prey (feeding relationships) and, of course, between wildlife and non-consumptive tourists. This is particularly relevant to tourism in New Zealand where many species exist in small isolated pockets (examples aside from the Albatrosses include the endangered Blue Duck, Yellowhead, Kokako, Kakapo and Takahe) that are susceptible to impact, and possible extinction, more so than otherwise. Research in this field also confirms that this is a complex research area.[25] Baseline data, without which impacts that may be implicated to tourism are impossible to accurately quantify, are difficult to achieve. Furthermore, the difficulty of distinguishing impacts that are implicated to tourism from other causes will always be prone to contention. The body of literature on the impacts of wildlife tourism is gradually expanding. However, where examples of research into tourism impacts upon wildlife do exist, much is short-term research that is unlikely to expose long-term biological consequences of human engagements with wildlife. At the very least, short-term programmes of research should give consideration to the possible long-term impacts of tourism. A clear illustration of this point is provided by Gordon *et al.*'s[7] study of the impacts of tourism upon Sperm Whales off the coast of Kaikoura (New Zealand). This research presents statistically significant impacts caused by tourist observation vessels (shorter surface time between feeding dives if tourist vessels are present, for example) and then, crucially, gives consideration to long-term biological consequences thereof.

This study upholds all three dimensions of Duffus and Dearden's conceptual framework for non-consumptive wildlife tourism. As such, those who manage the Taiaroa Head Flora and Fauna Reserve (DOC) and visitors to it (OPT) must address the issues of dynamic change in contacted wildlife species, user specialization and site ecology at this setting. Clearly, in the absence of deliberate management action, all three will evolve to the detriment of the wildlife resource. This requires the collection and collation of time series data that will allow long-term monitoring of particularly focal, but also incidental wildlife species. Only then will appropriate management of the wildlife species, site users and the setting of the wildlife–tourist engagement be possible.

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