BI/WL_249

Review of Issues Relating To Increasing the

Number of Provisioned Dolphins at Monkey Mia

Carl Beck February 2002

Contents

Introduction

The Human-Dolphin Interaction that occurs daily at Monkey Mia is an internationally renowned tourist attraction.

In a "Review of Dolphin Management at Monkey Mia, Dr Barry Wilson, 1994" (Appendix 1) the primary aims of Dolphin Management at Monkey Mia was given as:

> *To facilitate contact between people and wild dolphins at Monkey Mia in order that people may enjoy the experience and learn from it, and that in order to sustain important commercial tourism operations, while at the same time protecting the animals from undue risk and ensuring that they maintain their natural functions as members of the wild dolphin community in the vacinity.*
>
> And as a corollary
>
> *To put in place a management program that ensures long term sustainability of the people-dolphin interaction at Monkey Mia beach, including recruitment of new animals to the team of provisioned dolphins to replace those lost through mortality over the years.*

A "Supplementary Review of Dolphin Management at Monkey Mia, January, 1996, Dr Barry Wilson" (Appendix 2) also stated in Section 5 *Recruitment to the beach dolphin group* that the number of provisioned dolphins is now so low that the long term sustainability of the human-dolphin interaction must be in question unless new individuals are recruited. This review then goes on to identify the recruitment of juvenile females born to provisioned adults as the preferred method of recruiting additional dolphins to provision and specifically the targeting of "Piccolo" (daughter of "Puck") in 1997 for recruitment to the feeding group.

An initial attempt to provision Piccolo was carried out in 1998 after DR Janet Mann confirmed she was completely weaned. This attempt was unsuccessful, however in the last 6-12 months Piccolo has shown a much stronger interest in the beach interaction and the feeding. Therefore it is likely that a further attempt at provisioning of Piccolo in the near future may have a high likelihood of success.

1. Current Situation

The Department is currently managing the feeding program of 3 adult female dolphins as part of its Dolphin Interaction Program at Monkey Mia in the Shark Bay District. At present all the dolphins included in the feeding program are over 25 years of age.

Recently there has been significant interest from the local tourism operators and Shire Council in when additional dolphins will be provisioned and the Departments inaction at present is beginning to draw criticism. Both the local tour operators and the Shire feel that failing to increase the number of dolphins being provisioned at Monkey Mia could have adverse long-term economic impacts on the community.

Equally there is currently a negative feeling among Conservation and Animal Welfare groups world wide against the provisioning of Wildlife and any attempt to increase the number of dolphins provisioned at Monkey Mia may draw criticism from these groups.

Although a decision was made previously to provision Piccolo (1998), the current negativity being expressed by animal welfare groups in relation to this type of activity means it would be prudent for the Department to review its position on this matter..

2. Proposed Trial Methodology

Given that part of the main objective of the dolphin management at Monkey Mia is the protection of the dolphins and that the site is internationally renowned in both the tourism and scientific communities it is important that any trial to provision additional dolphins is carried out in a scientific manner.

The methodology to be used in the event the department decides to attempt to provision Piccolo is described in the internal departmental document "Piccolo Feeding Trial Proposal, Carl Beck & David Charles 2002" (Appendix 3). This includes a significant level of scientific monitoring of the trial by internationally recognised scientists Dr Amy Samuels and Cindy Flarerty.

As Piccolo is currently showing interest in the human interaction it is important that if she is to be provisioned this occurs in the near future as any delay is likely to see her spend less time at the beach and reduce the likelihood of her accepting food. Ideally the best time to undertake the trial would be in September 2002 to allow it to be undertaken when visitor numbers are lower and the Research Scientists are available.

3. Costing

The cost of implementing the trial and scientific monitoring required to bring Piccolo into the feeding group is estimated at $37 000 (see detailed break down in Appendix 3).

4. Funding Sources

Currently the Shark Bay District does not have the funds available to cover the above $37 000 estimated for the trials implementation.

Initial approval has been received from the Departments Sponsorship Committee to allow prospective sponsors to be approached regarding securing these funds.

An initial approach to international wildlife sponsorship group "Care for the Wild" was rejected as this group felt the project was outside their conservation ethic which does not support (actively discourages) provisioning of wildlife.

If a decision is made to pursue the attempted provisioning of Piccolo it may be most appropriate to approach local Shark Bay businesses such as the Monkey Mia Dolphin Resort & other tourism operators for sponsorship. It is felt these are the most appropriate sponsors as they are the business that will gain the most benefit and are currently pushing for the increase in provisioned dolphins.

In the event that sponsorship funding is not located it may be necessary to allocate Parks & Visitor Services funding to this project.

5. Recommendations

Shark Bay District Staff recommend that:

1. The proposal to trial the provisioning of Piccolo be reviewed by relevant senior departmental staff (Marine Conservation Branch & Directors).

2. If the decision to trial the provisioning of Piccolo is made then the methodology in Appendix 3 should be adopted & Dr Amy Samuels & Research Scientist Cindy Flahety be sponsored to carry out this research.

3. That if the decision to trial the provisioning of Piccolo is made that sponsorship to cover the cost of the project is sought.

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REVIEW OF DOLPHIN MANAGEMENT AT MONKEY MIA

Submitted to the Executive Director, Department of Conservation and Land Management

by

Dr Barry Wilson FTS
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20 September, 1994

1. INTRODUCTION

As a result of intensive promotion by the tourism industry, the Monkey Mia dolphins have become a major attraction. The number of people visiting the area and taking part in the feeding activity has increased far beyond what was imagined ten years ago when regular feeding ("provisioning") was initiated.

When regular provisioning began, concern was expressed that regular feeding may have detrimental effects on the dolphins. This concern has been raised again in the light of subsequent experience.

Problems and dangers associated with feeding wildlife are well documented. For example, feeding bears and elk in Yellowstone National Park in the US has resulted in serious consequences to humans, wildlife and property (Meagher & Fowler, 1989; Gunther, 1992). Animals become habituated to being fed and become aggressive to the point of being dangerous. There are also changes in behaviour that make them more vulnerable to disease and injury. There is now clear evidence that feeding dolphins in the wild has similar consequences.

In the United States, detrimental consequences of feeding wild dolphins have been documented since 1988 and have led to the wildlife authorities prohibiting the activity in that country (section 2). The same consequences are occurring at Monkey Mia. There are two areas of concern.

1. *Negative impact on dolphin welfare.* There is strong evidence provisioning has caused changes in the social behaviour of the Monkey Mia dolphins and that the mortality rate of provisioned animals is significantly greater than that of non-provisioned dolphins in the vicinity of Monkey Mia.

2. *Continuity of the meet-the-dolphin process.* So far, no infant born to the provisioned females has recruited (past weaning) to the beach group since regular provisioning began. If the present infant mortality rate continues there will be no juvenile recruits to the people-dolphin interaction process.

This review examines the history of the matter, reviews available data and recommends changes to management procedures.

1.1 The aim of dolphin management at Monkey Mia

The draft management plan for the Monkey Mia Reserve (1993) cites two objectives of dolphin management:

"6.7.1. Interaction Management. The objective is to manage the interaction between dolphins and people to protect the dolphins and to preserve the quality of the visitors experience."

"6.7.2. Dolphin Feeding. The objective is to ensure that dolphins remain wild animals and retain their social structure and natural foraging abilities."

The second quoted objective is not a statement of the reason feeding takes place but an objective of management once the decision to feed the dolphins has been made. Although it is obvious that dolphins enjoy receiving free hand-outs and the contact with people, it cannot be argued that they are fed for their benefit or to ensure that they remain wild etc. Dolphins are fed at the beach for the enjoyment and benefit of humans.

An oft-stated principle of management is that the welfare of the dolphins must always be the primary concern. Yet, there is now clear evidence that provisioning has detrimental effects on the dolphins' health and social relationships among their own kin (see section 4.2). It follows that the aims of management must be reconsidered.

If welfare of the dolphins were to be the *sole* concern, then provisioning individuals at the beach should cease. On the other hand, if some minimal degree of detrimental effects on the dolphins were judged to be acceptable, with a net benefit from the human perspective, a case could be made for provisioning to continue. It is this, second, view that is adopted here. However, it begs the question of what degree of detrimental effects is judged to be "acceptable".

For the purposes of this review, "an acceptable level" of detrimental effects is deemed to be a mortality rate that is within the range of what is believed to be normal in the wild, and a situation wherein provisioned animals spend most of their time behaving as normal wild dolphins without becoming dependent on human hand-outs. The evidence presented below clearly shows that this level is not being achieved at present. Changes in management procedures are essential.

It is important that dolphins continue to visit the beach at Monkey Mia because a very large number of people get immense enjoyment from the experience of contacting them there at such close quarters. There is no doubt that that experience, and the information acquired by people about wildlife and environmental management issues, make a significant contribution to the growth of a conservation ethic in our community.

There is also a significant economic aspect - the recent rapid growth of tourism in Shark Bay has been largely the result of promotion of the Monkey Mia dolphins. Many human livelihoods now depend on continuation of the meet-the-dolphin phenomenon. These educational and economic benefits must be judged against any detrimental effects on the dolphins.

The key factor in maintaining the interaction of people and dolphins at Monkey Mia is undoubtedly provisioning. It is true that interaction may occur without feeding (as is the case at Safety Bay) but the scale of the interaction that occurs at Monkey Mia depends on daily feeding at the beach.

The primary aim of dolphin [illegible] Monkey Mia could be stated thus:

To facilitate contact between people and wild dolphins at Monkey Mia in order that people may enjoy the experience and learn from it, and in order to sustain important commercial tourism operations, while at the same time protecting the animals from undue risk and ensuring that they maintain their natural functions as members of the wild dolphin community in the vicinity.

Assuming that this primary aim is agreed and achievable, it follows that a corollary should be:

> *To put in place a management program that ensures long-term sustainability of the people-dolphin interaction at Monkey Mia beach, including recruitment of new animals to the team of provisioned dolphins to replace those lost through mortality over the years.*

If the recommended changes do not significantly reduce the present problems of high mortality and behavioural change, then consideration must be given to prohibiting hand feeding.

1.2 The aims of this review

This review was commissioned by the Executive Director of the W.A. Department of Conservation and Land Management (CALM) on 13 July, 1994, with the terms of reference shown in Attachment 1.

The aims of the review are to consider the events since provisioning at Monkey Mia began in terms of management procedures and what has been learned about dolphin natural history, to identify means of reducing the detrimental effects of feeding to an acceptable level, and to suggest means by which the meet-the-dolphin phenomenon at Monkey Mia beach can be sustained indefinitely.

2. THE UNITED STATES EXPERIENCE

The following brief notes are drawn from a report published by the US National Marine Fisheries Service (NMFS) (Bryant, 1994).

In 1988 the US Marine Mammal Commission expressed concern that commercial operators had commenced "feed the dolphin" cruises off the coast of South Carolina. Given the well documented experience in that country of detrimental consequences of feeding wild animals, the Commission regarded this activity as "harassment" in terms of the Marine Mammal Protection Act. Regulations were introduced by the NMFS prohibiting it.

Following introduction of the regulations, applications by commercial operators in the south-eastern US for permits to feed wild dolphins were denied. Suits were filed by the operators in the US District Court seeking to invalidate the regulations or compel the issuance of permits. In the course of this litigation the NMFS commissioned six marine mammal scientists to independently review the impacts of feeding dolphins in the wild. All of the consulting scientists concluded that feeding wild dolphins alters their natural behaviour in ways that are harmful to them

By 1992, 20 commercial cruises and 50 charter operations were actively feeding dolphins, effectively in breach of the regulations. Wherever these activities occured, dolphins became habituated to accepting food from humans. Habituation substantially altered normal behaviour by creating dependancy, negatively modifying foraging strategies and social behaviour and encouraging animals to approach vessels and humans where they beg for food. There are numerous reports of people being bitten by aggressive dolphins seeking handouts and of people maliciously as well as accidentally injuring inquisitive, begging and stealing dolphins.

In October, 1993, after several rounds of decisions and appeals, the Circuit Court found that the NMFS had substantial evidence to show that feeding wild dolphins disturbed their normal behaviour and could make them less able to search for food on their own. Accordingly, amendments to the Marine Mammal Protection Act were finalised in April, 1994, formally establishing the NMFS regulations.

The NMFS now grants permits for feeding captive dolphins for public display purposes. It has introduced a "rule" defining "public display" in such a way that feeding them in the wild is specifically excluded.

3. THE BUNBURY EXPERIENCE

As at Monkey Mia, people have fed dolphins at the beach at Bunbury for many years. In the late 1980s attempts were made to attract larger numbers of dolphins on a regular basis with promotion of the procedure as a local tourist attraction. This review does not consider in any detail the results of the Bunbury program but the following notes are relevant.

No comprehensive research on the Koombana Bay dolphin population has been attempted and there are no written data (at least none seen by this reviewer) on birth rates and mortality rates of the provisioned animals. However, significant changes in the behaviour of the provisioned animals have been reported (pers. comm. CALM Wildlife Officer R. Smith).

The frequency of dolphins begging from fishing boats and stealing bait from fishing lines and crab nets increased markedly following the introduction of regular provisioning. Complaints from fishers also increased, sometimes accompanied by threats against the dolphins. There was at least one incident of a dolphin being killed by a person (with a star picket), presumed to have been a fisherman. These observations are consistent with experience in the US reported by the NMFS (Bryant, 1994).

There is also evidence that the provisioned dolphins at Bunbury have visited the beach less frequently in recent months. At this time it is not clear whether this is a temporary change in behaviour or represents a trend.

4. FEEDING DOLPHINS AT MONKEY MIA

When the Monkey Mia Dolphin Information Centre was established in 1986, the question arose whether provisioning the animals at the beach would cause them to become dependent and lose the ability to fend for themselves. However, there were no precedents and the diverse opinions expressed were based on conjecture and documented cases of detrimental consequences of feeding other wild animals.

CALM proposed a feeding regime that was adopted by the Monkey Mia Reserve Management Committee in 1987. The proposal was made amid considerable public controversy, and after seeking veterinary advice derived from studies on captive dolphins (Gales, pers. comm., 1987; see also Cheal & Gales, 1991, 1992). This feeding regime has been in place, with some modifications, since that date.

4.1 The present feeding regime

The feeding regime initially adopted by the Management Committee was modified in 1989, again following veterinary advice, as follows:

- No more than one third of the estimated daily food requirements of the dolphins should be provided to each individual. For adults this was calculated at 2 kg per day.
- As an exception, larger amounts could be given to lactating females. This was based on the assumption that nursing mothers have a higher requirement.
- Additional rations could be provided to dolphins that reappeared after having been absent for some time. The argument for this was simply that it would induce them to stay around.
- Feeding times should be irregular.

These proposals were intended to encourage the dolphins to continue visiting the beach while preventing them from becoming dependent, based on the assumption that the animals would be compelled to catch the bulk of their needs at sea.

4.2 Experience suggesting the need for review

Subsequent experience has demonstrated that there is indeed a problem with provisioned dolphins becoming dependent, with serious consequences, even with the cautious feeding regime that was adopted. The evidence and the consequences include the following.

4.2.1 High infant mortality

Attachment 2, prepared by the CALM Shark Bay District Office, summarises the history of Monkey Mia dolphin calves since the late 1970s when daily provisioning of dolphins at Monkey Mia began.

Figure 1 shows the descendants of the four original adult females (Holey Fin, Surprise, Beautiful and Cookied Fin) that regularly visited the beach and were fed. Between them since 1975, those four have produced a total of 17 descendants (12 children and 5 grandchildren) that were seen and named. In addition there were up to 4 calves which did not survive more than a few days and were not seen or named.

Two of the original adult females (Holey Fin and Surprise) survive. Four of their twelve named children survive. Two of these (Nicki and Puck) have become provisioned females while the other two (Joy and Cookie) live nearby but do not accept fish at the beach.

Of the 17 named calves born to the provisioned dolphins since 1975, only 5 survive, i.e., a survival rate of less than 30% [= mortality of >70%].

Of the 11 named calves born since provisioning was regulated in 1986 only 2 survive, i.e., a survival rate of less than 20% [= mortality rate of >80%]. Only 1 has survived past weaning (Cookie - which does not take food at the beach). The other (Picolo) has not yet weaned.

An estimate of survivorship in the first year of life for a coastal population of this species in Florida is about 80% (Bannister pers. comm.). Most pre-weaning mortality there is from shark attack.

Researcher Andrew Richards (1993, pers. comm. August, 1994) has analysed cumulative survivorship of Monkey Mia infant dolphins (Fig. 2). He has shown that infant survival was dramatically lower for offspring of provisioned females than for offspring of non-provisioned females during 1985-93. The biggest difference was in survival of infants in the first year of life, that is 36% for provisioned v. 67% for non-provisioned mothers. These figures are highly significant statistically (Gehan's Wilcoxon test, $p = <0.02$).

If the figures were updated to the present, so as to include the deaths of Hobbit and Finnick, the difference would be even greater.

It seems most unlikely that the very high mortality of calves born to the provisioned females can be explained as entirely due to natural causes. Richards suggests the following explanations of the data:

A. Being a provisioned dolphin may have serious concomitant hazards for mothers and offffspring, including one or more of the following:

- prolonged exposure to polluted near-shore waters;
- exposure to human pathogens;
- provisioning may distract the mothers and offspring from attending to potential threats, especially shark attack;
- concentration of dolphins in the area may attract higher numbers of sharks;
- provisioned dolphins may accept poor-quality food items (or non-food items) from boats, causing illness;
- provisions supplied from the Dolphin Information Centre may be nutritionally innappropriate.

B. Provisioned females may be a biased sample:

- the small sample of provisioned females may include a disproportionate number of individuals that are either at the beginning or the end of their reproductive careefs, thus affecting the survival of their offspring;
- dolphins that accept dead fish and human contact may do so because they have behavioural or physiological abnormalities in the first place.

There is no direct evidence that age and parity affect infant survival. However, the case of the matriarch Holyfin suggests that this possibility should be kept in mind. Holyfin is clearly close to the end of her reproductive life. Hobbit, a premature calf of Holey Fin, was a runt which could have been a genetic characteristic or a product of her own or her mother's malnutrition. Her observed death by shark attack could have been due to poor condition and vulnerablity or because of neglect by her mother.

Although a biased sample of females is a possibility it is not considered to be a likely explanation of the low infant survivorship of provisioned mothers. The four most likely explanations are to be found among those listed in A above.

(i) Pollution

During a period of 18 days in early 1989 seven of the provisioned dolphins disappeared. They included 3 calves (Koorda Fin [of Holey Fin], Nipper [of Nicki] and Puck's Baby [of Puck]), 1 adult female (Holly), and 3 adult males (including Bibi).

There was no doubt that the 3 calves were dead because they had still been nursing from their mothers. The adults were presumed dead because they were never seen again by the researchers who were conducting ongoing surveys of the Monkey Mia dolphins in the vicinity. Emigration is a rare event in bottlenose dolphin communities (Wells & Scott, 1990) and is an improbable explanation of the disappearances.

There has never been a satisfactory conclusion about the cause of these deaths. However, given that all 7 dolphins disappeared during the same period, it is reasonable to assume that they may have all died of the same cause and that it may have been related to the visits made by the provisioned dolphins to the beach. There was no evidence of comparable mortality of non-provisioned dolphins in the vicinity.

At the time, it was suggested that there may have been a pollution event at the Monkey Mia beach, resulting from sewerage contamination. Dolphins are known to be susceptible to pathogen induced mass mortalities (Bannister pers. comm.) It is known that contamination with faecal bacteria did occur about that time (*EPA Bull.* 381, March, 1989) and this explanation is feasible though unproved. [The contamination was stopped immediately and has not recurred.]

(ii) Pathogen induced disease

Marine mammals, including dolphins, are known to be vulnerable to pathogen-induced disease. There are indications that morbillivirus may be responsible for unusually high mortality of dolphins presently occurring in the Gulf of Mexico (Bryant, 1994). Infectious disease may have been the cause of the 1989 mortality event at Monkey Mia. If

so, contact with humans at the beach would seem to be implicated, because there was no comparable mortality in the nearby non-provisioned dolphins.

(iii) High predation

Predation is believed to be a significant cause of mortality of dolphins in Moreton Bay where 36% of the population show evidence of shark attack (Bannister pers. comm.). It is known that Monkey Mia calves are frequently attacked by sharks. Welcome was attacked in March, 1992 but survived. Finnick was attacked in March, 1993 but survived (Fig. 3). Hobbit was attacked and killed in March, 1994 (Fig. 4). [The common month may be coincidental.] It is likely that many of the Monkey Mia calves that have disappeared were victims of shark attack.

Normally, calves are protected from predation by adults in their group. The vulnerability of calves to shark attack is increased if they stray from their group and if the adults are not paying attention. This was apparently the situation when Hobbit was killed. Witnesses reported that she was playing by herself about 70 m from the beach where her mother and other adult females were interacting with people.

(iv) Inadequate nutrition

It can be assumed that, in the wild, the dolphins choose as prey, species of fish that possess the required nutritional qualities, just as other wild animals are known to vary their diet according to the nutritional requirements of the time. No information is available on which fishes are selected by the dolphins under various conditions. Nor is there any information on the relative nutritional values of the fish species eaten.

It is feasible that the selection of frozen fish given to the dolphins is nutritionally inadequate or inappropriate, especially when females are nursing infants. In accepting a significant proportion of such hand-out food the animals may become malnourished, leaving them vulnerable to disease and shark attack.

Whichever way the infant mortality figures are inspected, it is clear that the mortality rate of Monkey Mia dolphins, especially the calves is very high and difficult to explain as due entirely to natural causes. The conclusion that the high mortality is associated in some way with beach provisioning is inescapable.

In this reviewer's opinion, the most likely explanations are:

1. Infants nursing from provisioned females become malnourished and therefore more vulnerable to mortality from disease or predation. They may become malnourished **because:**

   a) their mothers spend so much time at the beach that the calves do not learn to catch enough fish for themselves

   or

   b) the food received by the mothers is nutritionally inappropriate for milk production.

2. Behaviour of the mothers become abnormal in that they spend so much of their time begging for food at the beach that they do not pay adequate attention to their offspring, leaving them vulnerable to shark attack.

3. Behaviour of the infants becomes abnormal in that they do not form proper associations with other dolphins, leaving them vulnerable to shark attack.

4.2.2 Juvenile (post-weaning) survival

There are few data on survival of juvenile dolphins after weaning but available information suggests that there may be a problem here also.

Four juveniles born to provisioned Monkey Mia females since research began have survived past weaning (that is about two years of age). Two of these (Finnick and Holly) were provisioned but died within two years of weaning. The two that still survive (Cookie and Joy) have never accepted handouts and, since leaving their mothers, have never been regular beach visitors.

4.2.3 Impacts of feeding on behaviour

Researchers Janet Mann, Barbara Smuts and Amy Samuels (1993; pers. comm. August, 1994) have documented significant differences in the behaviour of provisioned dolphins compared with non-provisioned dolphins at Monkey Mia.

Their study included data on 32 infants, 9 of which were born to the provisioned females. They showed that infants of provisioned females spend less time in contact with their mothers overall. This appears to be due to the fact that provisioned infants spend less time in contact with their mothers when near the feeding area than when they are away from the beach.

The case of Finnick

Finnick was born to Nicky, a long-term provisioned dolphin, on April 16, 1990 and was weaned in early 1993. Janet Mann and Amy Samuels followed the growth of Finnick after his birth and have extensive data on his behaviour (pers. comm. August, 1994).

After weaning Finnick's behaviour differed significantly from that of his non-provisioned peers:

- He never left the vicinity of the beach feeding area during the daytime and obtained almost all of his food at the beach and by begging from recreational fishers in boats.
- Samuels' field data show that he was receiving "casual" feeds from fishers at an average rate of 2 times each hour, and considerably more from this source than from the controlled handouts at the beach. [In addition he was receiving consistently more than his quota from the rangers.]
- His hunting time progressively declined after he began accepting handouts.
- He did not form any alliance with other male dolphins as a young male of his age should have done.

- He became aggressive and began taking fish from the lines of fishers. Several times he inflicted injuries on people.

- He frequently made close and dangerous approaches to boats that were underway and travelling at speed.

These behavioural abnormalities are typical of wild animals that become dependent on hand feeding by humans.

Early advice from Dr Gales and Dr Mann was that feeding Finnick should be discontinued so that he was forced to forage for himself. This advice was adopted by the Management Committee at its meeting of August, 1993 but the decision was subsequently revoked.

By early 1994 it was apparent that Finnick's health was deteriorating. Blood samples were taken and revealed no sign of pathogens. It was concluded that his poor health was the result of poor nutrition, resulting from habituation to hand feeding.

Finnick disappeared on May 13 of that year. He may have died from malnutrition or from shark attack resulting from vulnerability due to his poor condition and lack of normal associations with other dolphins. Whatever the direct cause of death, there can be no doubt that it was due indirectly to his dependence on provisioning.

4.3 Aspects of provisioning that need review

The observations made by the researchers at Monkey Mia provide a strong indication that the changes in behaviour of the dolphins and the high mortality of calves born to the provisioned females have been direct or indirect consequences of provisioning. Aspects of provisioning that need to be addressed to mitigate these problems are:

(i) The quantity of food provided

One third of the estimated individual daily requirements is still considered to be a reasonable level of provisioning for maintaining regular visits by adult dolphins without making them dependent, although it is clear that it does cause behavioural changes.

However, feeding nursing females impacts upon their calves [see (ii)]. The present practice of providing larger rations to nursing females may exacerbate those impacts. There is a risk that food provided to nursing mother dolphins may not have the necessary nutritional balance for their condition and that providing more of it is unwise. It should be assumed that the dolphins are capable of obtaining for themselves more food if they need it, and of the right kind. Also, giving nursing mothers a larger ration encourages them to spend longer periods at the beach, to the detriment of their calves.

The present practice of providing larger rations to individuals that return to the beach after prolonged absence was intended to be an inducement to stay. There is no evidence that this is either effective or necessary.

(ii) Time spent by the dolphins at the beach

When nursing females are at the beach interacting with humans, calves with them are not learning to feed themselves or the normal patterns of interaction with other dolphins. The evidence discussed above suggests that this is having serious nutritional and behavioural consequences on the calves and may be related to their high mortality. It follows that feeding procedures should be implemented that keep the time spent at the beach to a minimum.

The present practice of feeding the dolphins at irregular times appears to result in them "hanging around" waiting for a feed. During these waiting periods the dolphins are interacting with people, which, in itself, is a positive thing. However, it seems wise to sacrifice that interaction in favour of reducing the impact of the beach-feeding sessions on the calves.

(iii) Feeding calves

It is imperative that calves do not become dependent on provisioning. The lesson learned from the fate of Finnick must not be ignored.

Providing even occasional feeds to suckling infants strongly reinforces begging behaviour and creates irreversible dependence (pers. comm., Prof. Janet Mann, August 1994).

As males are not wanted in the beach-feeding team, there is no advantage in feeding male calves and there are definite detrimental results from doing so. Under no circumstances should male calves be given hand-outs

Female calves naturally remain with their mothers for some time, and may continue suckling for more than four years. Infant females are probably the most appropriate candidates for recruitment to the provisioned dolphin group and a case could be made for introducing them to hand-out feeds during weaning. However, the risk in doing so is considerable. Since regular provisioning began, not one infant that has taken hand-out feeds has survived. Feeding female calves before they are fully weaned is not recommended. If, in future, recruits are needed, they could be sought from young adult females in the wild population.

The only infant alive at present, Picolo, is nearly two years old and entering the weaning phase. It is essential that no attempt be made to feed this individual until she is fully independent. As she will continue to associate with her mother after weaning, there will be later opportunities to recruit her to the provisioned team.

(iv) The nutritional quality of the fish provided.

In the absence of information on the relative nutritional values of prey species, it is imperative that a variety of local fish be offered to the dolphins.

It is known that freezing fish results in the loss of some nutritional values. It is imperative that fish provided to the dolphins be as fresh as possible. The aim should be to provide the same quality that would be desired by humans. Fish frozen for more than 3 months should not be used. Ideally, the fish should not be frozen but chilled and provided within a few days of capture of capture. Frozen fish should only be provided when fresh fish is not available.

(v) Uncontrolled feeding from boats

A particular problem is the practice of some fishers of feeding begging dolphins at sea. Although the natural good intentions of people who do this are readily understood, the truth is that it is detrimental to the dolphins and the dolphin management program. It is not quantifiable and the practice introduces an unknown element into management.

There is evidence that Finnick obtained a fair percentage of his food from this source and that it played a significant role in his eventual dependence on provisioning and demise.

When the problems that arise because of boat feeding are explained, most people respond appropriately. A determined effort at providing educational material would largely eliminate the problem. However, authority to introduce and enforce non-feeding regulations is needed for those rare occasions when people refuse to cooperate.

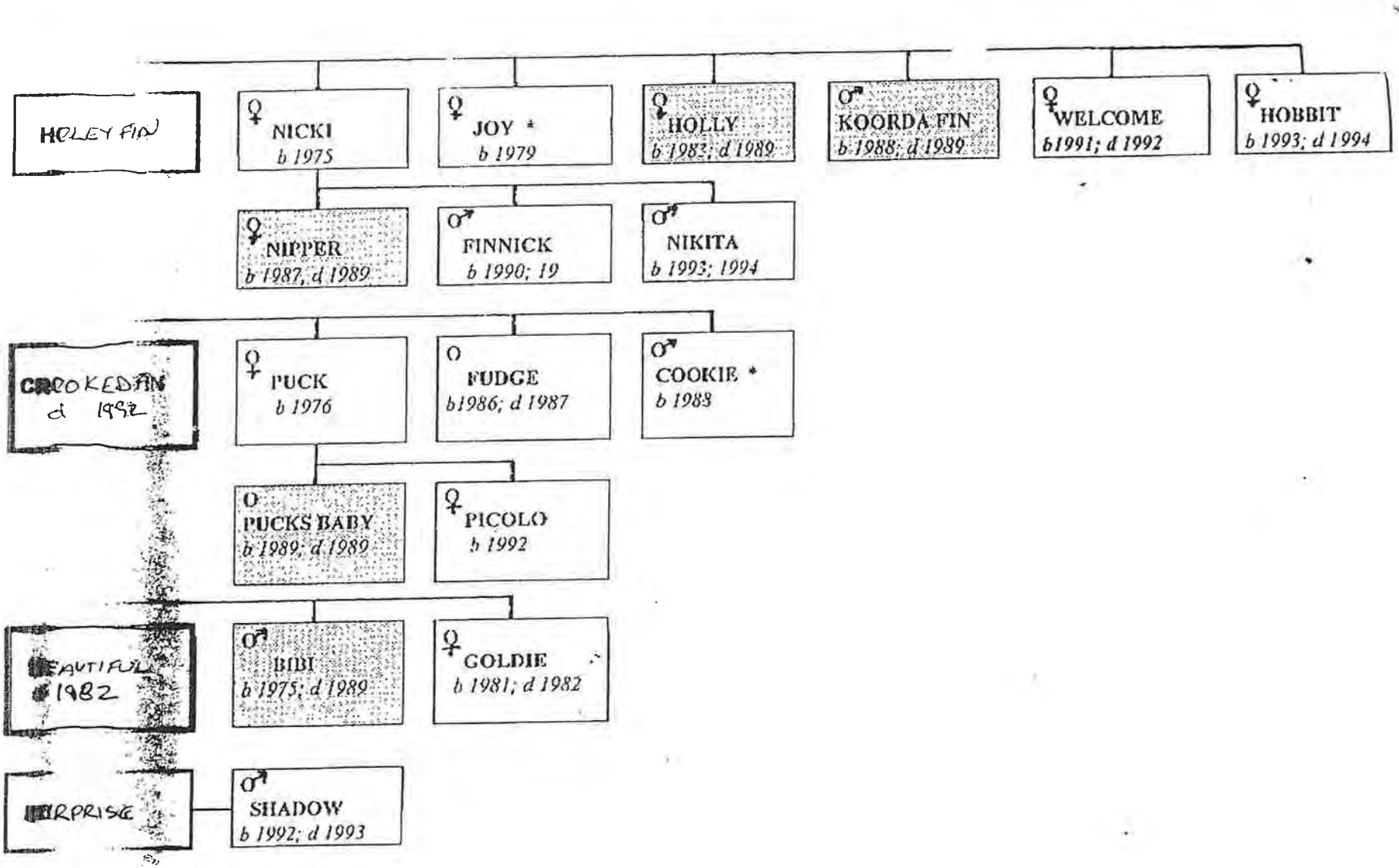

Figure 1: Calves born to provisioned Monkey Mia dolphins since 1975.

Key: Heavy lines - surviving original females. Double lines - deceased original female.
Dotted lines - deceased calves. Thin lines - surviving calves.
Shaded - deceased during 1989 suspected pollution event.
* - does not accept hand-outs.

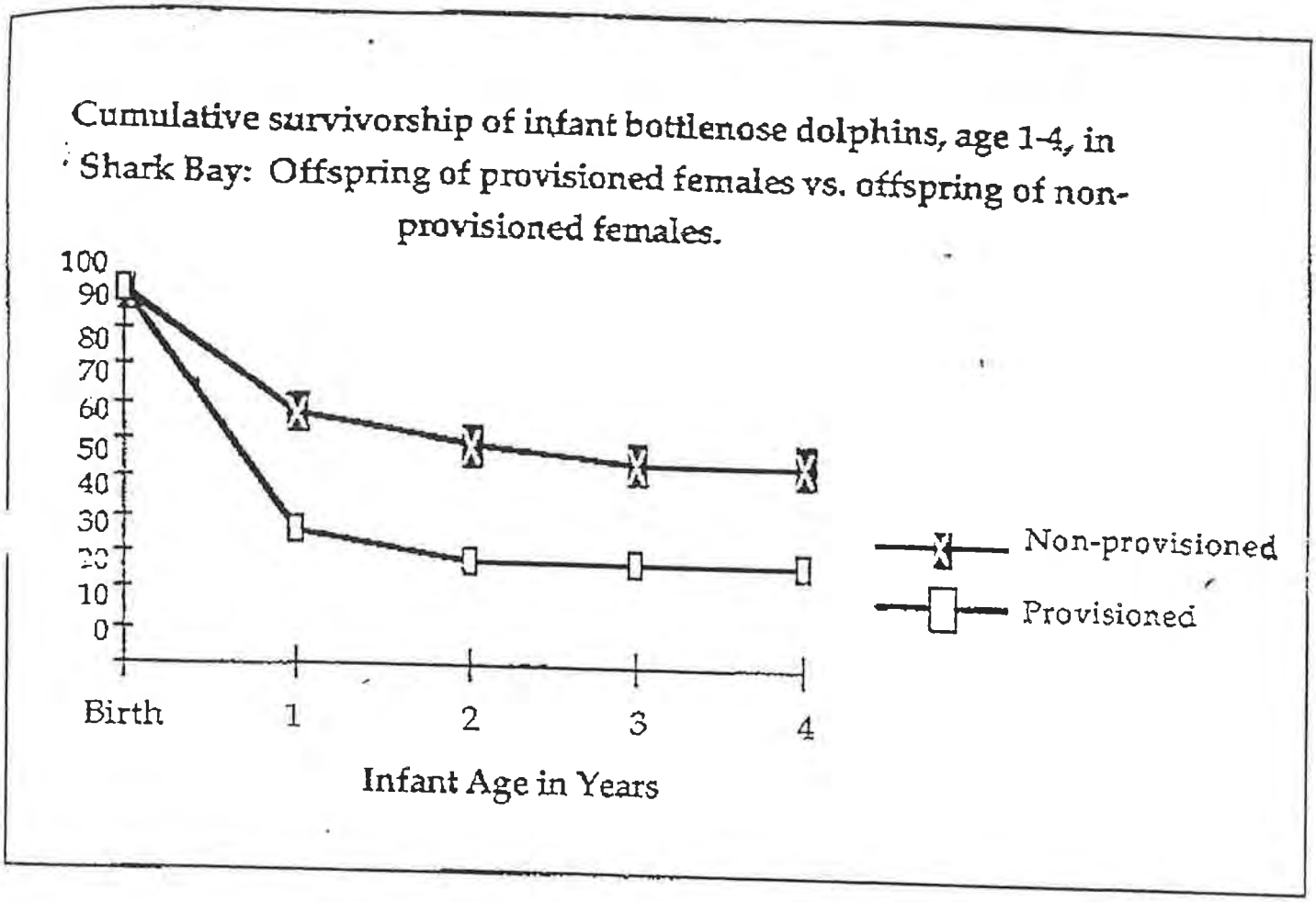

Figure 2: Differences in cumulative survivorship between infants of provisioned and non-provisioned females at Monkey Mia. (From Andrew Richards, August, 1994.)
N=11 infants of 5 provisioned females;
N= 62 infants of 43 non-provisioned females.

4.4 Recommendations

1. As a general rule, an average daily ration of 2 kg of fish per adult dolphin is probably an appropriate amount and should be continued but kept under review.

2. As a general rule, the present practice of providing larger rations to lactating adult females should be discontinued.

3. As exceptions to these general rules, consideration could be given to providing larger rations to individuals if there is evidence that they (or their calves) are in poor health, subject to specific veterinary advice.

4. The present practice of providing larger rations to individuals for a few days following their reappearance at the beach (after having been absent for some time) serves no purpose and should be discontinued.

5. Males should not be encouraged to become provisioned dolphins receiving regular daily rations at the beach.

6. Neither male nor female calves should be fed until they are fully weaned. After about 4 years, female calves could be started on regular rations, based on the principle of one third of daily requirement, estimated according to body weight.

7. Feeding sessions at the beach should be at regular hours, preferably twice a day. The actual times selected should be determined by on-the-spot management.

8. A major effort should be made to eliminate the practice of feeding dolphins from boats, at least in the vicinity of Monkey Mia.

   This should be done by extending the reach and scope of educational material, including at boat ramps and at other resort areas (especially in Denham and Nanga), and by ranger patrols personally speaking to people fishing from boats in the vicinity. A legislative capacity for enforcement is urgently needed, even though enforcement should be a last resort procedure.

9. There should be a review of the fish purchasing policy and increased effort to provide fish of high quality and large variety (that is in kind). Storage must not be longer than 3 months. A higher price may need to be paid.

10. Consideration should be given to providing a small chill room at the Information Centre for storage of fresh fish, with frozen fish kept as a back up.

5. MANAGEMENT

The Monkey Mia Dolphin Information Centre is situated on a reserve jointly vested in and jointly managed by the Shire of Shark Bay and the Department of Conservation and Land Management.

5.1 The Shire / CALM agreement

Recognising the values of the dolphin phenonemon, the two agencies put in place a joint management arrangement. For technical reasons (mainly associated with the provisions of the *Conservation and Land Management Act 1984*) the Agreement has not been formally signed and adopted but it is followed in practice by mutual consent. The contents of the draft agreement are reflected in the draft management plan for the Monkey Mia Reserve.

The Shire employs Rangers to manage the on-beach operation. CALM contributes technical management information and is responsible for managing the marine park and its wildlife (including the dolphins).

5.2 The Monkey Mia Reserve Management Committee

In keeping with the joint vesting of the Monkey Mia Reserve, there is a Management Committee comprising equal representation of the Shire and CALM, with an independent Chair. It has mainly a liaison function. Its terms of reference and the respective responsibilities of the vesting partners are spelled out in the draft agreement.

5.3 The Monkey Mia Research and Education Trust

An early initiative under the collaborative arrangements between the Shire and CALM was the establishment under the Local Government Act of the Monkey Mia Research and Education Trust in 1989. This was done with State Cabinet approval and a Government start-up contribution of $25,000. Terms of reference of the Trust were:

1. Furthering research on dolphins at Monkey Mia and their marine habitat.
2. Developing research and public education projects relating to the social behaviour and natural history of dolphins at Monkey Mia.
3. Developing public education projects relating to the marine environment of Shark Bay generally.

There was to be a scientific advisory subcommittee of the Trust with responsibility for review of research and education programs and allocation of funds.

After several meetings of the Trust its activities lapsed and it was disbanded in 1992 with its start-up funds allocated to projects.

6.4 Financial Arrangement

These are also spelled out in the draft agreement. Revenue from the Dolphin Information Centre (mainly gate takings and sales) is used to offset set-up and operating costs.

The point has now been reached where set-up costs have been recouped and there is an operating profit which is available to fund maintenance and further development of the facilities.

5.5 Management issues

Details of management and financial arrangements are not the subject of this review, except insofar as they affect the dolphin management program. In this respect there are several issues that need comment.

5.5.1 Scientific input to management decision-making processes

At present there is no direct means of achieving scientific input into management decisions that have an impact on the dolphin management program.

According to the agreement, CALM should be providing that input but no staff scientist is allocated to this task. The scientific advisory committee proposed when the Research and Education Trust was mooted was intended to provide the necessary advice but it did not eventuate.

The CALM District Manager has sought to resolve this matter by seeking scientific advice from the dolphin researchers working at Monkey Mia and other outside sources. Such advice has been freely given and has proved to be of critical value. However, it has been uncoordinated. There has sometimes been confusion in transmitting the advice clearly to the Management Committee and from there to the Rangers who have the task of implementing the decisions.

There is an urgent need for formal input of advice from one or more suitably qualified scientists and for clear lines of communication.

It is critically important that CALM designate a person qualified in marine science as the single coordinator of scientific advice to the Monkey Mia Reserve Management Committee.

[It has been argued that CALM must address its priorities to species conservation and that, as the bottlenose dolphin as a species is not threatened, it should be given no priority. This argument fails to recognise the legitimate need for management of a matter of considerable public interest and economic value.]

Such an appointment would not remove the need for a scientific advisory committee, as no individual is likely to have the range of population biology, social biology, ecological and veterinary skills required.

In the long term, the scientific committee advising the proposed Marine Parks Authority should have that function, as the activity lies within a marine park to be vested in the authority

In the short term, as an interim measure, a workable arrangement could be established formalising the input of the present dolphin researchers.

5.5.2 Ranger employment, performance and training

Although the Information Centre and the land it is situated on are jointly vested in the Shire and CALM, the marine park where the dolphins live and where the feeding sessions take place is vested in the National Parks and Nature Conservation Authority and CALM is the management agency.

Managing interaction of people and wildlife within a marine park is normally the duty of appropriately trained and authorised staff of the management agency. No Marine Park Rangers are employed by CALM at Shark Bay and there is no boat for marine patrol duties.

The Monkey Mia Rangers are employed by the Shire and their duties are confined to the Information Centre and activities in the Dolphin Interaction Area.

It is essential that appropriately authorised rangers are available for duties encompassing the wide range of public contact and environmental protection normally associated with management of a marine park, not restricted to a single facet of it. To achieve this there are three options:

(i) appoint separate CALM Marine Park Rangers, complementing the shore-based operations of the Shire Rangers;

(ii) expand the operations of the Shire Rangers to encompass patrol duties within the wider Marine Park, and devolve to them authority under the CALM and Wildlife Conservation Acts;

(iii) appoint the Monkey Mia Rangers as CALM officers.

Rangers operating from the Information Centre should function as Marine Park Rangers and their duties should be directed to supervising contact with the dolphins anywhere within the park, not confined to within a few metres of the beach.

It is essential that the standard of presentation of the people-dolphin interaction and interpretive programs be improved, whether or not the present staffing arrangements are to continue.

Interaction with the public in a high profile situation such as exists on the beach during dolphin feeding sessions requires considerable interpersonal skills. The Monkey Mia dolphin "show" has become an event of national and international significance and worthy of the highest possible level of presentation.

The Shire Rangers are committed to their task and provide an honest and effective program. However, they are virtually untrained for such a specialised job and there is a need for improvement in their performance. A training program developing their communication and crowd control skills, and also their knowledge of dolphins and the marine habitats of the park, is urgently needed.

In addition, there is a need for at least one person on-site who is able to develop the interpretive materials presented both by the Rangers and in the Information Centre. This

5.5.3 Hours of business

The present situation whereby Rangers are present only during normal working hours is unsatisfactory. Visitors who arrive after hours get in free! That is an obvious problem but, more importantly, interactions between people and any dolphins that arrive after hours are unsupervised.

5.5.4 Enforcement

The Rangers are employees of the Shire and at present have no authority to act on behalf of CALM when enforcement measures are required. The feeding sessions actually take place in the waters of the Marine Park, not on the Monkey Mia Reserve.

At least one person with the authority to enforce the marine park regulations and the Wildlife Conservation Act should be present at the Information Centre, or at least at Monkey Mia, at all times. This requirement will become essential if feeding the dolphins from boats is prohibited.

Assuming that it is impractical to base a Wildlife Officer at the Centre the only option will be to train several of the Rangers appropriately and assign to them the necessary authority to act on CALM's behalf. This action should be implemented without delay.

The issue would not arise if the Rangers were employed as Marine Park Rangers by CALM.

5.6 Recommendations

1. Scientific advice

   (i) CALM should designate a single staff member, with appropriate training in marine science, to act as the co-ordinator of scientific advice on dolphin protection and management at Monkey Mia and routinely provide that advice to the Management Committee.

   (ii) The scientific advisory committee to the proposed Marine Parks Authority, when it is appointed, should be specifically given a brief for providing advice on dolphin management and should include at least one member with experience of the biology of marine mammals.

   (iii) Until that advisory committee is established, an informal network involving the voluntary services of the present dolphin researchers at Monkey Mia should be utilised, coordinated by the CALM staff scientist referred to in (i).

2. **Ranger employment**

[redacted]

6. SCIENTIFIC RESEARCH

When the interaction of people and dolphins at Monkey Mia began there were few scientific data on the behaviour, social structure, reproduction and life history of bottlenose dolphins in the wild, there or anywhere else. Management procedures were proposed and implemented on the basis of information largely gained from animals held in captivity. For that reason, the principles of "experimental management" were adopted, on the assumption that scientific research under way would provide a basis for monitoring and re-evaluation of management procedures.

Dolphin management, especially provisioning, seeks to prevent the animals from becoming dependent and to maintain their health and normal social relationships. Such aims beg the questions of what are normal dolphin feeding rates, nutrition, social behaviour, reproductive rates, growth and survivorship. Clearly, these are the issues that need to be addressed by research.

In addition to research aimed directly at extending knowledge of dolphins, there is a need for better knowledge and understanding of the Monkey Mia marine environment.

6.1 Research program

Dolphin research

The Monkey Mia dolphins are the subject of an ongoing research program coordinated by the University of Michigan. To date, this research has been primarily into the social structure of the dolphin community in the area and the behaviour of the animals as individuals and as groups. Most of the animals in the vicinity, including the provisioned dolphins, are now known and information is building up on their individual history and social behaviour. Data are now available on mortality and birth rates in the wild that provide a comparative base for assessment of management procedures in respect of the provisioned animals.

There are still no data on feeding in the wild, that is, the quantity and variety of fish that are eaten. Nor are there data on predation and the frequency of shark attack. These are aspects of dolphin biology in the wild that are relevant to management and need to be researched.

Another American research group has been studying the same species of dolphin at sites in Florida. Also, a student at Murdoch University has begun a study of bottlenose dolphins in Cockburn Sound. These studies will provide useful comparative data.

The University of Michigan dolphin research program co-ordinator, Richard Connor, has prepared a summary of the current Monkey Mia research projects and additional topics which his group intends to investigate in future (Attachment 3). In this reviewer's opinion this **research program covers the topics most relevant to dolphin management and it is highly desirable that it is implemented.**

Other marine research

In addition to the present dolphin research program, there is a need for a broader research program at Monkey Mia addressing issues relating to environmental protection and a range of human recreational activities.

Most notably, the matter of water quality in the vicinity of Monkey Mia is of vital importance. The presence of the Dolphin Resort and the Information Centre, with so many visitors, and the boat ramp and fishing activities in the vicinity, creates a risk of contamination of the water by faecal bacteria and excessive nutrients. At the time of the 1989 suspected pollution event, the EPA conducted a once-off study of the adjacent waters of the marine park. The results were difficult to interpret because of uncertainty about the natural nutrient loads of the water. The massive seagrass beds that are such a feature of the Monkey Mis marine environment are known to accumulate naturally-produced nutrients and these are released erratically by wave and tide action. There are no data on this natural nutrient production, nor on water circulation in the area. These factors are crucial to an understanding of natural conditions and interpretation of abnormal and unnatural events, should they occur.

Another very important feature of relevance to the dolphins and also to humans recreating in the area, is the fish fauna. There has been no survey of the fishes living in the Monkey Mia area and no information is available on seasonal changes in the relative abundance and the habitat prefences of the species present.

The key to the high biological productivity of the Shark Bay marine environment is the extensive development of seagrass meadows with their associated micro and macro flora and faunas. Seagrasses are known to be highly sensitive to pollution. Base-line studies and on-going monitoring studies of the seagrass ecosystems at Monkey Mia would be most useful for long term management of the marine environment in the interests of both dolphins and humans.

6.2 Co-ordination of research effort

At present the only co-ordination of effort is achieved through the University of Michigan program. The only input to it from CALM is through the scientific licensing process whereby conditions are imposed on the activities, and informally through liaison between CALM district staff and the research team personnel on-site.

There is a need for formal liaison between CALM and the University of Michigan research team to ensure that the needs of management are incorporated into the research program and that results are conveyed to the Department. There is also a need for protocols to deal with likely proposals from other parties to carry out research on dolphins and their habitat at Monkey Mia. These functions should be the responsibility of a scientific advisory committee for the Shark Bay Marine Park, or the proposed scientific committee providing advice to the Marine Parks Authority, when it is appointed. These matters were discussed in section 5.5.2.

6.3 Funding for dolphin research

At present the University of Michigan dolphin research program at Monkey Mia is funded from private sources. CALM makes a contribution to the research. The Department provides the University with assistance in terms of accommodation and other facilities.

The University of Michigan research team has indicated that it has difficulty raising the funds for the program from US sources and intends to seek grants and donations from Australian sources in order to keep the program operating.

Given the importance of this program to the maintenance of the people-dolphin interaction process, in terms of the stated management objectives, consideration should be given to dolphin research when a research program for the Shark Bay Marine Park is developed, and to providing financial support for the University of Michigan project.

6.4 Research facilities

There are at present no research facilities available at Monkey Mia (or elsewhere in Shark Bay) for use by marine researchers. The University of Michigan research team operate from a caravan on the Dolphin Resort premises. Their conditions are substandard.

It has been proposed that provision be made at the Dolphin Information Centre for a small marine laboratory, funded from the operating profit of the Centre (see Draft Management Plan, Monkey Mia Reserve, 1993). This could be made available to the dolphin researchers and others carrying out approved studies on dolphins and other marine life and habitats of the area. The laboratory should be equipped with basic communications and other equipment, and the instruments needed for the water quality monitoring progam.

Also urgently needed is a suitable vessel at Monkey Mia, for use by CALM staff and the Rangers.

6.5 Recommendations [See also Rec. 5.6 and Rec. 7.1]

1. **CALM should adopt the dolphin research program documented by the University of Michigan research team co-ordinator (Attachment 2) as a provisional program for dolphin research in Shark Bay and collaborate with that team in seeking to have it implemented.**

   Additional marine research should be undertaken at Monkey Mia, including:

   - a water quality monitoring program;
   - a study of water circulation and nutrient flux;
   - a study of primary production from seagrass meadows;
   - a study of flora and fauna of seagrass meadows for use as a biological indicator of environmental health and change;
   - a study of the fish fauna of the area and the relative abundance and habitat preferences of selected species.

   When a Scientific Advisory Committee (either for the Shark Bay Marine Park or the proposed Marine Parks Authority) is appointed, the research program should be reviewed by that committee, in consultation with the University of Michigan group.

2. **When a marine research program is initiated, CALM should give consideration to providing financial support to the University of Michigan dolphin research program, either directly or by assisting the [illegible] apply to Western Australian and Commonwealth funding sources for such support.**

3. **Current proposals to add a small marine laboratory to the Dolphin Information Centre should be strongly supported. The laboratory should be available for use by CALM and other scientists but with priority given to marine research projects relating to the dolphin research program. Protocols should be established for allocating space at the facility.**

   Basic equipment, including a small vessel, should be provided for use of approved scientists allocated space to work at the laboratory.

7. EDUCATION AND INTERPRETATION PROGRAMS

The draft Monkey Mia Management Plan (1993) noted that Monkey Mia "has enormous potential for educating and informing the public on dolphin biology and habitats, and on the wider marine environment". The Dolphin Information Centre has this function. In this section, consideration is given to the effectiveness of the Centre in this regard.

Monkey Mia has now achieved international fame as a place where people and wildlife may interact. It is imperative that the information and interpretive programs there are of the highest possible professional standard.

When the Information Centre was established and staffed, the Marine Park and World Heritage status of the area was not an issue and the intention was simply to manage the interaction of dolphins and people. The situation now is very different. The actual interaction takes place, not on the Monkey Mia Reserve, but in the Marine Park and the interpretive issues that relate to the natural history of the dolphins are those concerning the marine environment and other animals inhabiting the park.

7.1 Rangers

The issue of Ranger performance and training was addressed in Section 5.1. The need for a Ranger training program was noted in that section.

Having observed the Rangers interacting with people at the beach and in the Centre, this reviewer believes that they are generally competent and well received. Nevertheless, it is clear that they lack adequate interpersonal skills and knowledge for the high profile role they now play. In addition, their activities are focused too narrowly on the dolphin feeding process at the beach.

7.2 Quality of the present interpretive material

The display material in the Centre is good but now dated and beginning to show its age. **There is a need for a review and update. In particular, there is a need for additional material** [illegible] of the Shark Bay Marine Park and the World Heritage status of the area.

Much of the signage in and around the Centre is now quite shabby and inappropriate for such a popular and important site. For example, the main sign on the entrance wall refers to the Dolphin Welfare Trust which no longer exists. An updated main sign accurately depicting the current management arrangement is urgently needed.

Appendix

2

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21 MAR RECD

Executive Director
CALM
Hackett Drive
Crawley

5 February, 1996

Dear Syd

In response to your request (12 December, 1995) for an assessment of new feeding procedures implemented following the 1994 *Review of Dolphin Management at Monkey Mia*, I visted the site over three days (17-19 January). With the assistance of Ron Shepherd, I discussed the issues with the Shark Bay Shire Clerk, the Monkey Mia Rangers, tourism operators and a number of visitors on the day and observed the procedures in operation. Subsequently I have discussed the issues with members of the research group (by telephone and fax). My report is attached.

Yours sincerely

Dr B.R. Wilson FTS

SUPPLEMENTARY REVIEW OF DOLPHIN MANAGEMENT AT MONKEY MIA - JANUARY, 1996

1. Introduction

In a report entitled *Review of Dolphin Management at Monkey Mia*, dated 20 September, 1994, a number of recommendations regarding management procedures and organisational structures at the Monkey Mia Reserve were made to the Department of Conservation & Land Management. These included recommendations relating to feeding (provisioning) the "beach dolphins" that were aimed at improving the sustainability of the dolphin-human interaction which has become such an important attraction to visitors to the area. This report reviews the implementation and effectiveness of those recommendations and considers measures that now need to be taken in continuing the dolphin management program and in meeting the management objectives.

2. Objectives of this report

The primary aims of dolphin management at Monkey Mia were given in the 1994 review as follows:

> *To facilitate contact between people and wild dolphins at Monkey Mia in order that people may enjoy the experience and learn from it, and in order to sustain important commercial tourism operations, while at the same time protecting the animals from undue risk and ensuring that they maintain their natural functions as members of the wild dolphin community in the vicinity;*
>
> and as a corollary:
>
> *to put in place a management program that ensures long-term sustainability of the people-dolphin interaction at Monkey Mia beach, including recruitment of new animals to the team of provisioned dolphins to replace those lost through mortality over the years.*

The specific brief for this assessment of the feeding procedures implemented following the 1994 review include four issues:

1. Are there any practical difficulties being experienced by the Monkey Mia rangers in implementing the feeding guidelines ....., and if so, are there appropriate modifications that can be made to the guidelines?

2. Are the feeding procedures functioning and meeting the welfare requirements of the inshore dolphins?

3. When should the female calf Piccolo begin to be offered fish?

4. Are the new feeding procedures impacting detrimentally on the public enjoyment of the Monkey Mia experience?

3. The 1994 recommendations

Before addressing the specific questions of the present brief, a review of the 1994 recommendations on feeding procedures and implementation thereof is necessary.

1. **As a general rule, an average daily ration of 2 kg of fish per adult dolphin is probably an appropriate amount and should be continued but kept under review.**

This recommendation is being followed with a minor amendment. The daily 2 kg. per adult dolphin is considered to be a maximum rather than a daily average. This appears to be an adequate amount to attract the animals to the beach whithout inducing dependence.

2. **As a general rule, the present practise of providing larger rations to lactating adult females should be discontinued.**

All three adult females that currently visit the beach and accept handouts are nursing calves. They are not being given larger rations and there are no apparent ill-effects.

3. **As exceptions to these general rules, consideration could be given to providing larger rations to individuals if there is evidence that they (or their calves) are in poor health, subject to specific veterinary advice and direction from the Management Committee.**

In July, 1995 the adult female *Holeyfin* was observed to be in poor condition and apparently suffering stress. In keeping with this recommendation, and after taking veterinary advice, she was offered extra rations (up to 4 kg per day with vitimin supplements) but her condition did not improve. Her body was discovered on the 27th July. A subsequent post mortem revealed the cause of death to be a stingray barb wound in the chest.

There have been no other instances where this recommendation would have been relevant.

4. **The present practise of providing larger rations to individuals for a few days following their reappearance at the beach (after having been absent for some time) serves no purpose and should be discontinued.**

The practise has been discontinued.

5. **Males should not be encouraged to become provisioned dolphins receiving regular daily rations at the beach.**

Males that have occasionally visited the beach have not been fed and they have not been encouraged to return.

6. **Neither male nor female calves should be fed until they are fully weaned. After about 4 years, female calves could be started on regular rations, based on the principle of one third of daily requirement, estimated according to body weight.**

At the time of the 1994 review, Puck was nursing Piccolo. Since then Nicky and Surprise have both given birth and are presently nursing calves. None of the three calves are yet fully weaned and none are being fed. However, Piccolo will soon be fully weaned; the possibility of beginning to feed her is a specific issue in this report and is considered in section 4 (iii).

7. **Feeding sessions at the beach should be at regular hours, preferably twice a day. The actual times selected should be determined by on-the-spot management.**

The intention of this recommendation was to ensure that nursing females would not be induced to "waste" time at the beach waiting for food, to the detriment of the natural training and social conditioning of their calves.

Interpretation of this recommendation was the subject of further discussion with the Rangers after adoption of the report. It was agreed that feeds should be confined to the morning (between 0800 and 1300) and that there should be no more than three feeding sessions each day. The

agreed preferred times for those sessions were 0830, 1030 and 1130. However, the Rangers believed that it was not possible to strictly confine the feeds to those times. It was agreed that each feed could occur at any time within a 30 minute period either side of those preferred times, subject to the circumstances prevailing. This procedure has been followed until now but has not proved satisfactory (see section 4 (i)).

(8) **A major effort should be made to eliminate the practise of feeding dolphins from boats, at least in the vicinity of Monkey Mia.**

?

On April 4, 1995, a regulation under the Wildlife Conservation Act was introduced prohibiting the practise of feeding dolphins within the Shark Bay Marine Park, except at the designated Monkey Mia Dolphin Interaction Area under the supervision of authorised personnel. The regulation was accompanied by an educational program aimed at informing visitors of its existence and purpose. As a result of this action, the practise of feeding dolphins from boats has virtually ceased.

9. There should be a review of the fish purchasing policy and increased effort to provide fish of high quality and large variety (that is in kind). Storage must not be longer than 3 months. A higher price may need to be paid.

A review of fish purchasing policy was conducted and an arrangement made for provision of better quality material from the local fishery. Better quality has been achieved and the fish are not being held frozen for more than 3 months. Fish is thawed in fresh water on a daily basis and any that are unused are given to the pelicans rather than held over until the next day for the dolphins.

However, the arrangement has not always proved satisfactory in terms of the variety of fish provided. At times, only two species of local fish (bream and yellow-tail) can be obtained and the objective of having a wide range of local species to offer the dolphins is not always achieved. Further attention is needed to ensure that the recommendation is implemented.

10. Consideration should be given to providing a small chill room at the Information Centre for storage of fresh fish, with frozen fish kept as a back up.

Following veterinary advice, no action was taken on this recommendation as there is doubt about the quality of fish that is kept chilled and not frozen.

? a notice rather than a regulation

4. Issues referred to in the brief

(i) Practical difficulties in implementing the feeding guidelines.
Restriction of feeding sessions to the morning has posed no difficulties. In effect, there were rarely any afternoon feeding sessions prior to the 1994 review so that there has been little change in this respect.

The attempt to concentrate the feeding sessions to three preferred times during the morning has been unsuccessful. The dolphins have not responded to this attempt and they continue to come into the beach at random times, when they feel like it, any time after 0700. The result has been that, on some mornings, the duty Rangers have had to choose between holding the dolphins without feeding for extended periods until the preferred times, or feeding them and letting them go. For example, when the dolphins turn up at 0900 they would have to be held until 1000. A period of 1 hour while the dolphins are held at the beach defeats the purpose of the recommendation. It also tends to create frustration in both the dolphins and the people.

In practise, the dolphins "come in" at random times and cruise up and down the Interaction Area, allowing visitors to meet them at close quarters, until they are fed. The Rangers have generally deferred feeding for as long as possible, until the preferred time or, in their judgement, until the situation has become unsatisafctory.

This result is not unexpected. Had it been possible to strictly limit the feeding sessions to specific times the dolphins may have learned to accept it. But the "windows" of 30 minutes either side of the preferred times has given them an unclear message.

However, the objective of reducing the time nursing females with calves spend at the beach has been met in another way (see section 4 (iv)) and the guidelines relating to feeding at preferred times during the morning may be discontinued. This would allow the Rangers to feed the dolphins whenever the circumstances warrant it, provided that there were not more than 3 feeding sessions during any one morning. The circumstances warranting feeding would be:

* when the dolphins had been "in" more than about 30 minutes;
* if the dolphins were exhibiting signs of frustration with the delay or their behaviour was proving difficult for any other reason.

The impact of this amendment on visitor experience is discussed in section 4 (iv).

(ii) Feeding procedures and the welfare requirements of the dolphins
As noted in section 3.2, each of the three adult females now regularly coming into the beach is nursing a calf. The objective of limiting their time there, so that the calves have adequate opportunity to experience self-feeding at sea and natural social interactions with the off-shore dolphins, remains highly relevant. That objective appears to have been met by banning boat feeding.

Effective banning of boat feeding outside the Interaction Area has resulted in the adults and calves coming into the beach only during the mornings, except when they are fishing and feeding themselves in that area. This is demonstrated by data (recorded by the Rangers) on the time spent by the dolphins at the beach during the afternoons. It has significantly decreased since the regulation banning boat feeding was introduced.

In this review, the relatively brief periods the adults now spend at the beach are considered unlikely to have any detrimental effect on the welfare of the calves.

(iii) Feeding Piccolo

Recommendation 6 of the 1994 review proposed that female calves should not be fed until they are fully weaned. This is likely to occur sometime prior to 4 years of age. Piccolo is now 3 years and 1 month old. The question of whether or not to begin attempting to feed her at the beach now arises.

The behaviour and skill development of young dolphins at Monkey Mia have been under intensive study for several years by American researchers Dr Janet Mann and Dr Amy Samuels. Although their work is not yet complete, the information they have obtained provides a helpful base for consideration of the issues involved in recruiting juveniles to the provisioned dolphin group and they have been consulted during the preparation of this review.

There is evidence that Piccolo's mother, Puck, was herded late last year (periods 3-4th, 14-17th and 23-28th of October) so that she may be 3-months pregnant. In that case she is likely to reject Piccolo sometime in the near future.

Following the 1994 review the Rangers were requested to monitor Piccolo's behaviour. She appears to be still suckling from Puck. Through December, Piccolo had been staying very close to her mother and spending less time foraging and playing on her own than previously. This behaviour is consistent with researcher's observations that some dolphins spend more time with their mothers during the weaning period than they do in the months prior to weaning.

There is no clear demarcation between suckling and foraging stages in juvenile development. Janet Mann has advised that young dolphins learn to catch fish quite early (even as young as 4 months) and that their skills develop progressively until after weaning. Harvey Raven, skipper of the *Shotover*, advised that he has often observed Piccolo fishing for herself in the channel and that she is capable of feeding herself. Nevertheless, it is important that there is clear evidence that Piccolo is completely independant before she is offered handouts.

Dr Mann has requested that no attempt be made to feed Piccolo until she has had an opportunity to study her behaviour in the wild and establish unequivocally that she is fully weaned. Dr Mann is expected to be at Monkey Mia in June and plans to undertake this study through the mid-year period. As there is no urgency in the matter at this stage, this is clearly the desireable course of action (inaction).

It must be understood that Piccolo may not ever accept fish at the beach although her interest in human contact suggests that she is likely to do so. There is some evidence that Piccolo showed some interest in handouts about 12 months ago but none recently. Her uncle Cookie (son of Crooked Fin) and Joy (daughter of Holeyfin) though raised by "beach dolphins" showed little interest in human contact and have never accepted handouts. They now live off-shore.

[Note:
Both the other two calves currently coming to the beach with their mothers are still suckling. The 4-month old male Hollikin (son of Nicky) will never be fed at the beach and it is at least 2 years before feeding the 1-year old female Shock (daughter of Surprise) becomes an issue.]

(iv) Impact of feeding procedures on visitor experience

The human-dolphin interaction is promoted as a natural one in which the dolphins come and go as they choose. Implementation of the 1994 recommendation (3.7) that feeding sessions be at regular hours was not intended to serve the purpose of assisting tourism operators manage their programs. (Although some coach tour operators have tended to try to program their arrivals around the preferred times.) In the event, feeding sessions within windows around preferred times have not functioned with any regularity and there has been little change or impact on visitor experience compared to that which prevailed previously.

Equally, discontinuing the preferred time procedure will make little change as it was ineffective and dolphin visits were randomly timed in any case. Random times are more in keeping with the image of a natural situation with the dolphins making the decisions.

On the other hand, the ban on boat feeding has had a big impact on some visitor experience. Though the practise had an unacceptable impact on dolphin welfare and was rightly prohibited in order to sustain the Monkey Mia human-dolphin interaction, many people enjoyed feeding the dolphins with spare fish, either at sea or on return to the beach. Implementation of that recommendation (3.8) has undoubtedly diminished the frequency and nature of human-dolphin interaction at Monkey Mia.

The ban on boat feeding has also reduced the frequency of human-dolphin interaction through reducing the time the animals spend at the beach, especially during the afternoons. This affects those people spending the whole day at Monkey Mia or staying at the resort but it does not affect the bus tour visitors who come in the mornings to take part in the feeding sessions. Nor does it affect the operations of the off-shore dolphin-watch boat tours - in fact it may actually assist them as the beach dolphins fed at the beach in the mornings spend the afternoons off-shore and the visitors may get to see the same animals hunting in their natural situation.

The resort management and the operator of the off-shore dolphin-watch boat tours expressed satisfaction with the success of the boat-feeding ban, in spite of the lack of dolphins at the beach during most afternoons. They also saw no problems with a return to feeding at the beach at random times during the mornings. Both emphasised the importance of the principle that the dolphins come in when they choose, and the "natural" image which that principle conveys to visitors.

Coach tour operators were not consulted during this review.

5 Recruitment to the beach dolphin group

Although not included in the brief for this review, this issue came up during discussions.

Notwithstanding the comments in 4 (iv), there is a problem with reduced dolphin-hours at the beach. This comes about not because of changed feeding procedures but because of the loss of Holeyfin during the year which has reduced human interaction with adult dolphins by 25% (though compensated in part by the presence of the two new calves).

As a result of the 1989 [alleged] pollution event, the beach dolphin group of 8 adults was halved (4 adults and 3 calves disappeared). With the loss of Holeyfin, the beach group is now down to 3 adults and 3 calves. In the past, survivorship of the calves has been very poor. Even if the present management procedures redress that problem, one of the present calves is male and will not be fed at the beach and there is no surety that either of the two females will eventually recruit to the beach group.

There are two problems with this situation. Firstly, the numbers of provisioned dolphins is now so low that the long term sustainability of the human-dolphin interaction must be in question unless new individuals are recruited. Secondly, the "dolphin-hours" during interaction periods are now significantly less than before. The result of the latter is that individual people do not get the same experience as they did before.

Thus, the question arises whether attempts should be made to recruit additional animals to the beach group. There are two possibilities.

1. Attempt to recruit Piccolo and, in two year's time, Shock.
2. Attempt to attract some of the adult females from the off-shore group.

The first of these options is discussed above (4 (iii)). Assuming that juvenile survivorship remains satisfactory, and that the three adult provisioned females continue to breed successfully, recruiting juvenile females is clearly the prefered option for building up the provisioned group. The study planned for 1996 (pers. comm. Janet Mann) of Piccolo's weaning behaviour and skill development will provide vital understanding of the issues involved. That study should be completed before any attempt is made to feed Piccolo.

Regarding the second option, it is not recommended that any attempt be made to attract dolphins to the beach by feeding and training at sea. Though feasible, such action would discredit the image of the dolphins coming to the beach of their own choice. A less problematical approach could be to encourage adult female dolphins that occasionally visit the beach to become regular visitors. Two that currently do so, and that show mild interest in human interaction, are Joy's Friend and Lick.

There is some anecdotal evidence that the three present beach dolphins physically deter others from joining their group. If that is the case, attempts to encourage Joy's Friend and Lick may not be successful. There is also a possibility that successfully recruiting additional off-shore adults might disturb the social stability of the existing group.

For these reasons, it is not recommended that any attempt be made to attract adult dolphins to the beach at this time. The practicability and consequences of recruiting additional adult dolphins might be explored but, for the immediate future, emphasis should be on recruiting young female dolphins born to the present provisoned adults.

6. Recommendations

6.1 Beach feeding procedures.

(i) Restriction of feeding sessions to the morning between the hours of 0800 and 1300 should be maintained.

(ii) Attempts to focus feeding sessions to within hour periods ("windows") around 0830, 1030 and 1230 should be discontinued. Rather, the duty Rangers should decide on the spot when it is appropriate to feed the dolphins, depending on the times they come in and the circumstances prevailing, but keeping in mind the objective of limiting the time nursing dolphins spend at the beach. Adults with calves should not be deliberately kept at the beach (that is, without feeding) for periods longer than 30 minutes.

6.2 Boat feeding

The education program informing visitors of the regulations banning boat feeding, and the reasons for them, should be maintained. Consideration should be given to issuance of a supplementary information sheet detailing the successful results of the positive public response to the regulations.

6.3 Feeding of Piccolo

While Piccolo remains attached to Puck and there is evidence that she may be still suckling, no attempt should be made to offer her food. The situation should be reviewed after study of Piccolo's behaviour at sea by Dr Mann later in the year. When Dr Mann has confirmed that Piccolo is completely weaned and independant she could be offered food and recruited, if possible to the provisioned dolphin group. This is unlikely to occur until late in the year or early in 1997.

6.4 Recruitment of additional dolphins to the beach group

A beach group of 5 adult female dolphins, plus whatever calves (males or females) they may have, is recommended as ideal for management purposes at the beach and is achievable. There are two recruitment options.

(i) Recruitment of juvenile females.

The recommended strategy is recruitment of juvenile females born to provisoned adults.

* As a target for the near future, an endeavour should be made to recruit Piccolo in early 1997 and Shock in 1998-9.

* Results of the current study of Piccolo's weaning behaviour and skill development should be formally reviewed in December, 1996 and a decision made at that time about initiating feeding.

* Feeding Piccolo should be carefully managed and documented so that there is a knowledge base when the time comes to recruit Shock and other juvenile females.

(ii) Recruitment of adult females.

For the time being, no attempt should be made to attract adult offshore dolphins to the beach.

If recruitment of Piccolo and Shock is not successful (that is, by the end of 1998), other options for sustaining human-dolphin interaction at the beach should be considered, including enlisting the assistance of local fishermen in attracting adult offshore females as was done originally. However, this strategy should be one of last resort.

Appendix

3

Piccolo Feeding Trial Proposal

Introduction

The Department of Land Management (The Department) is currently managing the feeding program of 3 adult female dolphins as part of its Dolphin Interaction Program at Monkey Mia in the Shark Bay District.

At present all the dolphins included in the feeding program are over 20 years of age. As a result members of the Shark Bay Community and the tourism industry have raised concerns about the sustainability of the Dolphin Interaction as an environmental educational and tourism attraction if younger dolphins are not initiated into the feeding group.

In the report entitled "Supplementary Review of Dolphin Management at Monkey Mia, 1996", Dr. Barry Wilson stated, "The recommended strategy [for maintaining a beach group of dolphins] is recruitment of juvenile females born to provisioned adults." There is general agreement among dolphin researchers, CALM staff, and the local community that recruitment of juvenile daughters born to food-provisioned dolphins is the preferred option for attracting new dolphins to provisioning at the beach. As juvenile daughters (but not sons) typically maintain a close association with their mothers after weaning (Samuels, Richards and Mann, 1996), recruitment of juvenile females is not expected to substantially alter natural social relationships. In addition, offshore dolphins have natural feeding specialisations that appear to occur along female family lines (*e.g.*, sponge carrying). Thus, offering fish to juvenile females born to provisioned dolphins might be perceived as carrying on the family feeding specialisation of the Crooked Fin/Puck and Holeyfin/Nicky families.

It is also generally agreed that provisioning of juvenile females should not occur until research observations indicate that each one is fully weaned, independent, and capable of foraging and socialising like offshore dolphins in Shark Bay. This is to ensure that juvenile dolphins do not become dependent upon fish handouts from humans.

Piccolo the juvenile daughter of the provisioned adult dolphin, Puck, appears to be a good candidate for recruitment to food provisioning at Monkey Mia. This will be the second attempt at introducing Piccolo into the feeding program. The initial feeding trial was conducted in August 1999 and although Piccolo chose not to accept a fish, she still visits the beach on a regular basis to interact with the visitors.

Pre Trial Monitoring

In the years and weeks prior to the initial feeding trial in 1999, the Samuels (Dr Amy Samuels) and Flaherty (Research Scientist Cindy Flaherty) research team made an especial effort to observe Piccolo, both at the beach and offshore, in order to ensure that she was fully independent and to provide baseline information about her behavior prior to offering any fish. These data are part of our on-going study of the juvenile dolphins of Shark Bay; however, in order to assist CALM and to ensure Piccolo's welfare in this effort, They have invested an inordinate amount of time to monitoring Piccolo at the expense of the rest of their research.

In addition to their observations of Piccolo, the on-going study of other juveniles, both at the beach and offshore, serves as a basis for evaluating Piccolo's behavior before and after being offered fish at the beach. This project has been very carefully planned such that the data they have in hand from past years, plus the data to be collected during the upcoming trial, comprise the only available dataset anywhere in the world to systematically monitor the behavior of a dolphin before and after the advent of food provisioning.

Feeding Trial

The proposed trial to feed Piccolo is scheduled for March of 2002 this is subject to the availability of Samuels or Flatherty. The proposed plan is to offer fish for two weeks or ten trials then stop if Piccolo has not accepted the offered fish. Once the provisioning attempt has been stopped monitoring will continue for a minimum of 6 weeks after the trial.

If Piccolo accepts the offered fish, she will continue to receive one fish per day until the personnel listed in the protocol have reviewed her situation. Monitoring will continue for a minimum of three months after the initial trial. Any changes in fish offered should only be introduced at a time when monitoring can be conducted.

A protocol has been devised by Charles (David Charles Operations Officer Monkey Mia Reserve) and Samuels and reviewed by experienced dolphin trainers at the Brookfield Zoo and the Dolphin Connection in the United States. (protocols attached)

Monitoring of the feeding trial

Monitoring for this trial consists of three parts:

1. During the first month before the first fish is offered Samuels will conduct intensive observations of Piccolo at the beach and offshore. This will enable Samuels to train an assistant in the techniques needed for the offshore observations.
2. At the onset of the feeding trial, Samuels and an assistant will conduct detailed observations of Piccolo at the beach and offshore. Monitoring of Piccolo should continue for a period of at least 6 weeks after the first fish has been accepted. If changes are made to the amount of fish offered monitoring should continue for a further three months. (this will depend on how Piccolo reacts).
3. Follow up assessments will be conducted at 3-month intervals for 12 months after she accepts fish. These will be conducted at the same schedule as for the trial period for two weeks.

Timing

It is proposed to commence the feeding trial for Piccolo in March of 2002 depending on Samuels commitments in the United States. This will allow the initial trial to be completed before the school holidays.

Departmental Staff Commitment

To ensure the smooth running of the project and the commitment to protect the dolphins health and welfare it is envisaged that the Departmental staff will need to be available to supervise or assist as follows.

Feeding trial
One additional staff member rostered on for attempted Piccolo feeds each morning for between 2 – 6 weeks. Consultation between Charles and Samuels will need to occur after each attempt and changes made to protocols as needed.

Non Departmental Staff

Dr Amy Samuels and / or Cindy Flaherty will conduct Observation during the trial and will be responsible for data analysis and final report. The use of an assistant will be required this will be a student selected and trained by Samuels and / or Flaherty. This may be an opportunity to involve an Australian student.

Samuels and Flaherty have been collecting comparative (baseline) data on Piccolo and other juveniles since 1993. They have developed protocols for monitoring behaviour at the beach and offshore and assisted in the design of protocols for offering fish to Piccolo.

Samuels monitored and collected data at the first trial in August 1999. With this experience and background Samuels and Flaherty are vital to the success of this project.

Cost

A general 3month-field season costs in the vacinity of around $25,000 Aus. With the prospect of the project running longer than 3 months $ 30,000 will cover any extra costs. Samuels and Flaherty will supply a detailed break down of costs at the completion of the project.

The cost estimate is as follows

Summary of costs

Research Scientist Costs (including intitial monitoring)

Travel Airfares etc	$10 400
Boat Servicing & Storage	$ 150
Boat Fuel	$ 900
Equipment & Supplies	$ 900
Equipment Repairs	$ 900
Volunteer Food Allowance	$ 900
Salary (Flaherty)	$10 000
Consultancy Fee (Samuels)	$ 2 000
Total	$26 150

Follow Up Monitoring by Research Assistant

Travel (bus from Perth)	$ 800
Boat Fuel	$ 200
Equipment & Supplies	$ 200
Equipment Repairs	$ 600
No Site Transport (Fuel)	$ 330
Food	$ 1000
Salary	$ 8 000
Total	$11 130

Grand Total	**$37 280**

These estimates cover a full six-month period, writing of a report and possibly a scientific paper.

Funding Sources

No funds are currently available for this proposal. Therefore it is proposed to investigate the opportunity to access sponsorship for the feeding trial.