

The rehabilitation and release of bottlenose dolphins from Atlantis Marine Park, Western Australia

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Introduction

Bottlenose dolphins have been held in captivity for a long period of time both as display and research animals. A combination of improved reproductive rates of dolphins in captivity and a closure of facilities in response to financial and public pressure constraints have led to moves to release some dolphins back into the wild. In the future this trend may increase. To date little follow-up work has been done on released animals, and the fate of most rehabilitated dolphins is questionable.

In 1987 two dolphins, 'Joe and Rosie' were released after a period of seven years in captivity as research animals. This release project was documented in a National Geographic film 'Back to the Sea'. Unfortunately the results of this project are ambiguous as it is unclear whether or not the dolphins were ever sighted after their release. A single mature male dolphin was released from an Aquarium at Port Elizabeth Museum in South Africa and although no specific effort was made to track the animal he was sighted on several occasions post release (G. Ross, pers. comm.).

More recently a release program took place in Florida in 1990 involving two subadult male dolphins held in captivity for a period of two years and released at the original capture site. This was a successful release where the dolphins have been sighted on numerous occasions over the past 2 years post-release in their original home ranges (Bassos *et al.*, 1991). A less successful recent rehabilitation project is the 'Into the Blue' program. This project involved the release of three dolphins in the Turks and Caicos islands which was not the original capture site for any of the dolphins. The fate of these three animals is unknown as there is no substantial evidence that the dolphins were resighted at sea (McKenna 1992). This latter project has raised significant concern among the scientific community about the consequences of releasing animals at sites other than their capture site.

There are also quite a large number of examples of dolphins that have been maintained in captivity for short periods (often rescued as stranded animals) and then returned to the sea. Few, if any, of these cases were documented and thus the fate of these animals is largely unknown.

Atlantis Marine Park (AMP) was constructed in 1981 at Two Rocks, 60 km north of Perth, Western Australia. Seven Indian Ocean bottlenose dolphins, *Tursiops truncatus*, were subsequently captured between January and July 1981 from the local coastal population and were maintained as show animals for the duration of the marine parks existence. Due to a successful breeding program three viable calves were born in 1989. The closure of AMP in 1990 led to the rehabilitation and release of the captive dolphins. The following account is a report that details the attempted return to the wild of a group of captive-born and wild-born dolphins (*Tursiops truncatus*) that were held for public display at AMP for ten years and as such is the first attempt of its kind.

The dolphins

Atlantis Marine Park was built and owned by Tokyu Corporation of Japan in the Yanchep/Two Rocks area. For financial reasons AMP was closed down on 12 August 1990. Efforts to relocate the dolphins to other captive facilities were unsuccessful. In consultation with the Government Fauna authorities a decision was made to rehabilitate the dolphins back to the wild. The project was fully funded by Tokyu Corporation.

At capture in 1981, the dolphins were estimated to be between 3 to 5 years of age. The group consisted of three males and four females. All four females became pregnant in 1988, resulting in the successful births of three female calves. One adult female gave birth to a stillborn calf that year, and to an infant that survived only a few weeks the following year (see Table 1 for information on names, ages and relationships). Throughout their

Table 1.

	Name	Approx. age at time of release	Offspring
Males	Nero	14-16	Echo/Nakita
	Frodo	14-16	*
	Rajah	14-16	*
Females	Mila	14-16	Nakita/Luka
	Rani	14-16	Echo
Juveniles	Echo	3	
	Nakita	3	
	Kia	3	
Calves	Luka	2 months	

*Due to the high degree of genetic relatedness between Frodo and Rajah it was not possible to determine paternity for Kia.

captivity, the dolphins were trained in a variety of behaviours both for exhibition and general husbandry. The calves were not formally trained, but did exhibit similar behaviours to the adults on training cues.

Two adult females have died since the closure of the marine park. Both deaths were believed to be stress related involving negative social interactions among the animals. One adult male exhibited symptoms of a stress related illness for a period of eight months after the closure of the marine park. Again the stress factor was believed to involve the social dynamics within the dolphin community. We do not believe the actual closure of the park was a factor in these mortalities or illnesses. Rather the problem seemed to stem from the perturbation of a confined group of sexually mature *Tursiops* with a high proportion of males. The two remaining adult females became pregnant in the early stages of the rehabilitation project. One female gave birth to a male calf in November 1991, resulting in a total of nine animals to be released; three adult males, two adult females (one pregnant), three 3-year-old, captive born calves and one new born calf (Table 1).

The rehabilitation program

The rehabilitation program was planned to proceed in several stages after the closure of AMP. The course of action to be followed included an initial period of time in the marine park followed by movement to a sea pen constructed in the adjacent Two Rocks marina. Finally the dolphins would be taken out to sea. The rehabilitation work began while the dolphins were still housed at the marine park facility. The animals were no longer partici-

pating in shows, human interaction with the dolphins was reduced and the emphasis on training changed. A behavioural study on the captive dolphins and a survey study of the local wild population were both initiated. The captive dolphins were exposed to live fish and a reduction in the chlorine concentration in their water. Outlined below are the various rehabilitation activities that began in the marine park, the purpose for instigation and the outcome of each phase.

Captive behaviour study

Quantitative behavioural data was collected while the animals were held in the marine park for a six month period from April through September 1991. The focus of this study was to identify association patterns within the group and the nature and stability of these associations. In addition, an activity time budget was calculated for each individual. These data would serve as baseline information in order to detect changes in social patterns as well as activity throughout the program and to see if the social structure while in captivity would be the same as that found in the wild.

Preliminary results showed that each individual had a primary associate. This was seen in the tight proximity between associates, consistent synchronous breathing and the tendency to engage in activities as a unit. A secondary level of association existed in the form of subgroups. The subgroup structure became more defined over time and reached the point of complete exclusion, i.e. the dolphins remained only with their subgroup members at all times. This sharp division was brought to an abrupt and dramatic end by the establishment of a new alliance between two males from opposite subgroups (Rhind 1991). This event serves as an example that the tight bonds evident in primary associate relationships may be transitory. It was also during this time that one of the female deaths occurred and the ill male recovered. Although the presence of a primary partner seems to be an important aspect of the social structure it may also have detrimental effects.

Activity budget data showed that all animals spent an appreciable amount of time swimming and milling. The adults tended to rest more than the calves and the calves tended to engage in more socialising activities. Among the adults the males socialized more than the females (Rhind 1991). This finding could be relevant in the later stages of the release as sociability might be an important factor in the integration into a wild population.

Wild dolphin survey

An offshore survey of the local bottlenose dolphin population began in February 1991 with the

intention of continuing for the duration of the release project. The purpose of this aspect of the study was to define the population parameters in the release area in terms of population size, pod size, group structure, foraging strategies and sites and ranging patterns. These data were collected in order to have a basis for comparison with the released animals to determine whether they were adjusting adequately to the ocean environment and integrating into the local population. It was necessary to collect data on individuals to determine pod composition, details of movement and behaviour as well as to have background information on new associates of the released dolphins.

The study area covered a 38 km coastal strip 9 km wide. Surveys were run aboard a 6.7 m twin-hulled aluminium craft (Abcat, Australia Boating Manufacturers) powered by twin 90 horsepower motors (Yamaha). When weather conditions were acceptable a transect within the range was determined based on previous trials and the prevailing weather conditions. Records were kept of the duration, area covered and weather conditions throughout all surveys. For each sighting of a group of dolphins a data sheet was completed, recording location by latitude/longitude and proximity to reefs and other natural landmarks and environmental data such as weather conditions, water temperature, depth and bottom type. Group composition of the dolphins was recorded including number of dolphins present, age and sex class if determinable, group activity, spread, direction of movement, speed and dive type. In addition any behavioural comments were noted.

Photo identification of dorsal fins was used as the method to distinguish individuals (Würsig and Würsig 1977). All animals' dorsal fins were photographed using a Nikon F-4 camera with a Nikon 70-300 mm autofocus zoom lens and Fujichrome 100 film. The film was exposed at a 200 ASA setting to compensate for water glare. Slides were later analyzed to determine the presence of known individuals and to identify new individuals. This process was done by projecting the slides against a white background and closely examining the dorsal fin. If distinctive nicks or marks were present the fin was compared to the catalogue of known individuals. If it had not been previously sighted and photographed a silhouette drawing was completed by fastening a sheet of paper onto the projection screen and outlining the dorsal fin. Distinctive marks were filled in, the animal was named and added to the photo identification catalogue.

We have completed 140 group sightings. The photo-identification catalogue contains 200 individuals. A number of these individuals have been resighted several times and many have been seen

with some of the same associates on more than one occasion. The average group size is 9 animals, although groups of 20 to 30 individuals are common as well as sightings of single animals and mother/calf pairs. The majority of our sightings have occurred in conjunction with a broken limestone reef system that runs parallel to the coast at approximately 1.9 and 5.7 km offshore. It is possible that these reefs represent prime foraging areas for the dolphins. A number of sightings of single animals and mother-calf pairs have occurred in shallow sandy areas, close to shore. This seems to be another foraging area. We have no conclusive information on the range of the local population, but believe it covers a larger area than our study site.

Fish trials

Live fish were added to the diet of the dolphins to expose them to gut parasites experienced by wild dolphins as well as to assess and possibly develop foraging skills. Live fish feeds were monitored on an experimental basis. Seventeen trials were run between March and September, 1991. Locally caught fish were used and included a range of benthic, pelagic and demersal species including herring (*Arripis georgianus*), whiting (*Sillago schomburgkii*), skipjack (*Pseudocaranx dentex*), wrasse (*Ophthalmolepis lineolatus*, *Pseudolabrus perilus*) and sweep (*Scorpius georgianus*). During each session the animals to be fed were separated into one pool. The drains were covered with screens and the water level dropped slightly to keep fish off the lip of the pool. A number of observers were stationed around the pool and one observer with mask and snorkel entered the water. A predetermined number of fish were poured into the water on a cue at which time a stopwatch was started. The observers called out the name of any dolphin seen catching a fish and the type of fish, if possible. This information and the time were recorded. General behavioural notes of the dolphins were also recorded. The trial ended when all fish had been consumed.

The dolphins showed a marked improvement in ability to catch fish over time. All dolphins were capable of chasing and catching fish. The adults were more proficient than the captive-born calves. Among the wild-born adults the dominant animals tended to be the most aggressive and efficient in capturing live fish. The calves tended to chase for longer periods of time and had a higher rate of 'missing' fish. During the later trials the calves became competitive with each other and would all chase the same fish.

Husbandry

Throughout the time the dolphins were maintained in the marine park and the sea pen they underwent

periodic health checks. All animals were trained a variety of behaviours for these husbandry procedures and were very handleable. They were trained to allow mouth, full body, genital, blowhole and eye inspections. All dolphins were trained to slide out onto a platform scale so that regular mass readings and measurements could be taken. The dolphins were also accustomed to being placed in a sling for mass and length measurements and blood collection. A detailed discussion of the recorded weights and measurements over time can be found in Cheal and Gales (1992).

In addition to the husbandry behaviours, the dolphins were trained to respond to an underwater signal by approaching and stationing at the site of the signal. These behaviours could prove invaluable during the open ocean phase of the project as it would be possible to recall the animals to the research vessel and complete a physical examination including body weight. Unfortunately the dolphins did not respond to the underwater recall signal once out at sea.

Chloride was removed from the salt water in the dolphin pool for a period of time in order for them to develop a typical bacterial skin flora. The dolphins were monitored for any skin problems. The elimination of chlorine from their environment caused no effect. The dolphins encountered no other physical problems during the captive phase of the project.

Freeze branding

All dolphins were marked with a freeze branded number on 12 March 1991. Copper numbers, 0.05 m high were cooled in liquid nitrogen and held on each side of the dorsal fin for 30 seconds. These brands proved to be an easy means of identification over time for the research team as well as for interested public reporting sightings of the released animals. They are still easily legible 2 years later on some of the dolphins, although they are beginning to fade.

Change of environment

The movement to a sea pen was deemed a necessary step in the preparation for open ocean work for several reasons. It was seen as a halfway point between the marine park environment and the open ocean. A sea pen presented the opportunity to expose the animals to a realistic ocean environment complete with sandy bottom, limestone rock and various types of marine life, including schooling fish, all within the safety of a confined area. In addition, the sea pen represented a large increase in living area which would give the animals more space to move around as well as allow for the next phase of the training program to take place.

The dolphins were transferred on 2 October 1991 to a sea pen constructed inside the Two Rocks marina. The new enclosure covered a rectangular area 30 m by 100 m and a depth of 1 to 3 m (see Fig. 1). The pen was enclosed by limestone rock walls on all sides with a metal mesh gate wide enough to allow the research boats to enter the enclosure in the ocean-facing wall. A system of floating walkways and isolation pens were constructed in one area of the pen and were used as feeding platforms and areas of interaction. A sand beach was installed in one corner of the pen as an area to capture the dolphins when necessary for general husbandry checks. Good quality sea water was pumped into the enclosure at a turnover rate of one complete pen volume per day. This was to overcome some problems with hydrocarbons and poor turnover inside the marine. No chlorine was added to the water and water quality was tested regularly.

The dolphins made the transition to this new habitat quite easily. They were cautious at first and remained in one corner of the pen. By the end of the first week they were ranging throughout the pen. Behaviour patterns settled back into what had been seen previously at Atlantis. Some social problems that existed in the marine park pools were alleviated by the size of the new enclosure, allowing the animals to maintain a greater distance when in conflict. One male was virtually ostracized from the main group, however this did not develop into a debilitating, stressful situation as he could avoid the other animals easily. The only change within the dolphin group was the birth of a healthy male calf to Mila on 28 November 1991. This new addition caused no problems among the dolphins but led to some variation in subgroup structure.

The most important component of this phase was to train the dolphins to work reliably from boats so that they could then be taken out to sea on controlled excursions, thus making the transition to the open ocean more gradual. Three different boats were used for this exercise; a 2.5 m inflatable dinghy, a 5.5 m centre console aluminium power boat and a 6.7 m twin hulled aluminium craft. The inflatable dinghy was introduced initially to accustom the dolphins to boats. The dolphins all responded well to this phase of the project and rapidly learnt to ride the bow and wake of the boats. The underwater recall was used in conjunction with the boat training and again the response was excellent. Unfortunately neither the recall nor the boat behaviours were exhibited by the dolphins at sea. After the initial period at sea some of the dolphins would approach the boat and bow ride or follow alongside, but not consistently and not on response to the recall.

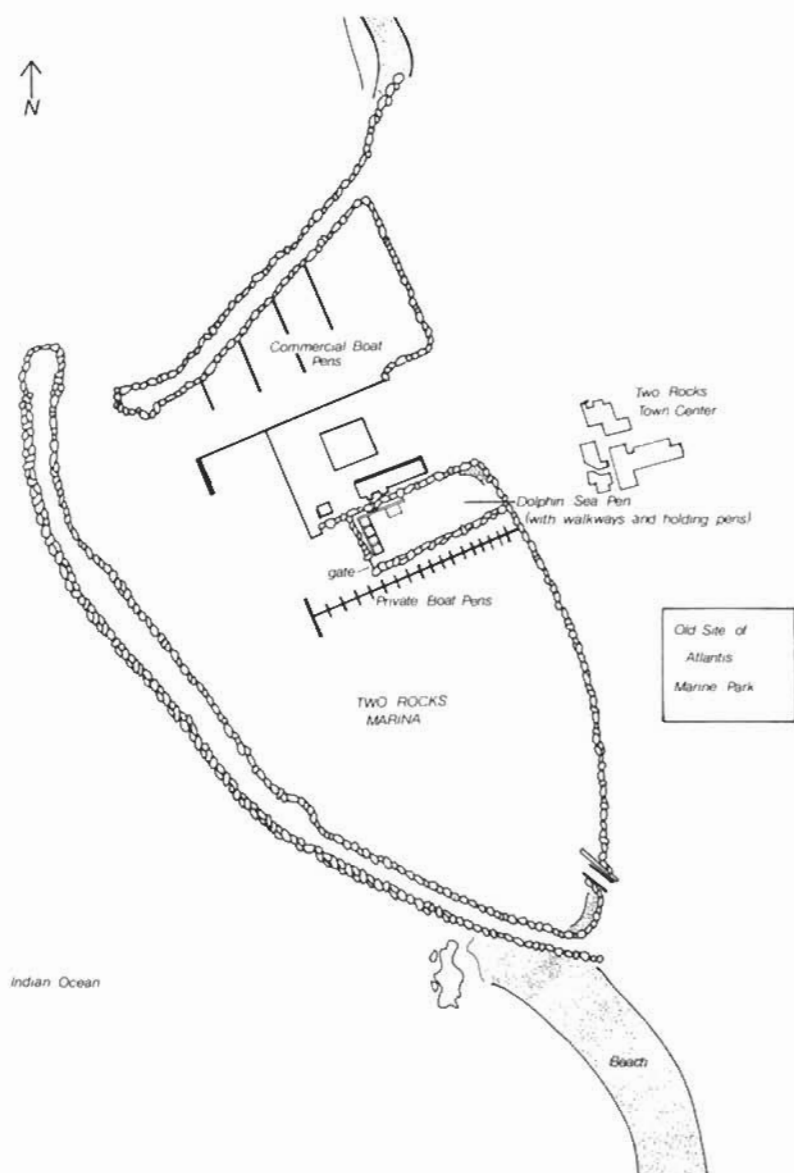


Figure 1. The sea pen inside the Two Rocks marina.

Live fish were still used as a supplement to the dolphins' diet of frozen fish. A large school of yellowtail was introduced into the sea pen in the hope that the dolphins would begin foraging for themselves. Although the dolphins seemed to take minimal notice of this school, they would chase and eat live fish that were individually thrown to them. The average size of the yellowtail in the school was approximately 0.1 m, these fish may have been too

small for the dolphins to consider as a food item worth the effort of chasing.

Tags

The ability to track the dolphins was considered highly important as it would be necessary to monitor the dolphins while at sea in order to evaluate the success of the project. Radio tracking devices were attached to the dorsal fins of the five

adult animals. It was decided not to put tags on the juveniles as they were still growing and any additional stress to them could prove detrimental. Furthermore, it was expected that these animals would continue to associate with their tagged mothers.

Satellite tags were considered too large for the purposes of this exercise. Radio tags (VHF) used were model MOD 225 configuration transmitters (Telonics Inc., Arizona, USA). The tags transmitted pulses in the 151 MHz band every 0.5 seconds through a 0.15 m flexible transmitting aerial. The theoretical battery life was nine months. The components were sealed in a rectangular waterproof metal casing with a metal mounting plate soldered onto the back for attachment onto the dorsal fin. The entire unit weighed 101 grams. The receiving equipment consisted of a TR-2 telemetry receiver with a TS-1 scanner/programmer and a TDP-2 digital data processor (Telonics, Arizona, USA). All units were housed in a waterproof customized case (Sexton Photographics, Oregon, USA).

The tags were attached with two 6 mm diameter, plastic, delrin bolts through the dorsal fin. A washer of neoprene was placed between the skin surface and the metal plate of the radio tag on one side of the fin and between the skin and the nut on the other side. The point of puncture for both holes was marked on the dorsal fin, a local anaesthetic administered to the surface tissue and two holes drilled using a 6 mm laboratory cork borer. Antibiotic cream was applied to the puncture site, and the delrin bolts were inserted. A washer of neoprene was placed over the bolts on either side flush against the skin surface. The radio tag was placed on the left side of the dorsal fin and stainless steel nuts were used for attachment on both sides. As a cautionary measure the bolts were positioned through the dorsals of the three male dolphins several days before the tracking devices were attached to ensure there would be no physical complications from the procedure. No problems were encountered, and all adults were fitted with tracking devices one week prior to release.

The intention of this project was to follow the dolphins for a period of up to 9 months at sea. In order for the tags to stay on for the maximum amount of time a non-corrosive metal was used for the nuts. Part of the proposed project involved monitoring the dolphins regularly, in terms of physical assessment and complications with the attachment sites for the radio tags. The animals had been trained several behaviours that involved interaction with the research boats in order to facilitate physical checks of body condition and equipment wear. Removal of the tags at the termination of the project was planned to involve a

brief recapture of the dolphins and removal of the tags. In the eventuality of dolphins not being tracked it was likely that the base of the transmitters would eventually corrode and the unit fall off.

Release

The gate to the sea pen was opened on 13 January 1992. From that time the dolphins had free access to the open sea. (See Figure 2 for a timeline of daily sightings and associations for all dolphins and Figure 3 for maps depicting the area of South Western Australian coastline where the released dolphins were sighted.) The dolphins showed no initial reaction to the removal of the gate except a reluctance to go through the gateway. All feeding sessions at this time were conducted aboard one of the research boats with the aim being to lead the dolphins through the gate and around the marina. Within the first day all dolphins had ventured through the gate and back into the sea pen several times. The most reluctant animals were the dominant male and the pregnant female, the most adventurous were the three juveniles. During each feeding session the dolphins were led further from the sea pen. There was always a point at which the animals would leave the boat and return to the vicinity of the pen, often passing through the gate.

On 14 January 1992 the lone male, Rajah, followed the research boat out of the marina, while the rest of the dolphins returned to the sea pen. Rajah left the boat once outside the marina and milled briefly in the area. He would not follow the boat back into the marina, but headed straight out to sea. Within ten minutes he had his first encounter with wild dolphins, two subadults. Rajah appeared very excited, racing in circles around the two stationary dolphins. He then left them and continued travelling southward at 13–17 kmph. Half an hour later he encountered another group of dolphins. He changed direction, joined this group and slowly travelled north with them for one hour. The group consisted of two juveniles, one adult and a mother calf pair that joined and left the group along the way. Rajah was seen associating predominantly with the pair of juveniles, engaging in social contact interactions as well as synchronously surfacing with both. Rajah seemed to have no problem keeping pace with the wild dolphins, however he was always first to surface for a breathe after a long dive, sometimes surfacing several times before the rest of the group surfaced. For an unknown reason Rajah left the group and returned to a rapid southward travel.

Due to weather conditions the research boat was forced to leave Rajah after three hours. At that time he was approximately 11 km south of Two Rocks marina and continuing southwest. The radio

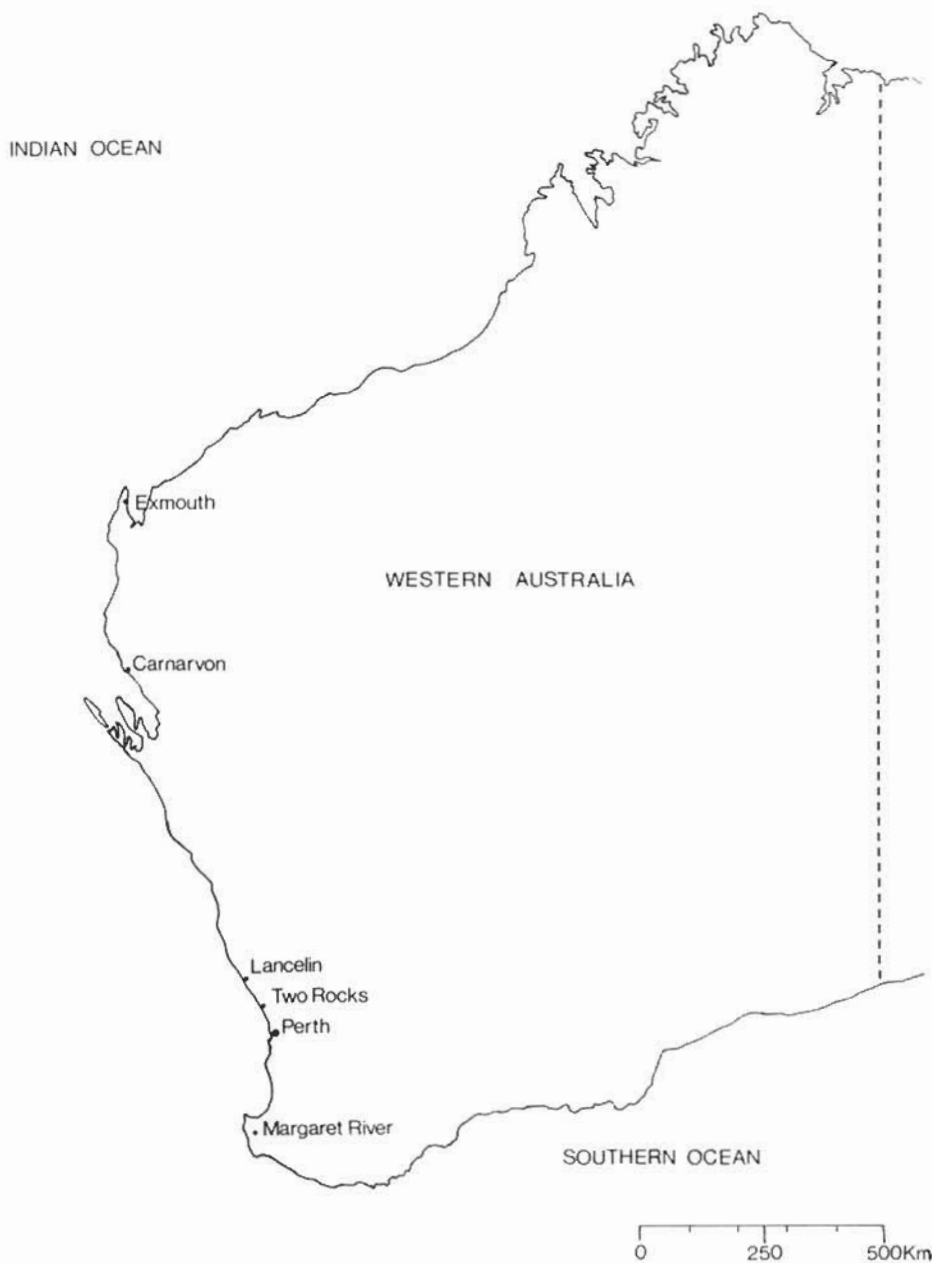


Figure 3a.

tracking equipment had proven successful in this initial trial. No problems had been encountered in finding or tracking Rajah and it was possible to monitor his respiration intervals.

Although Rajah was not sighted by us again at sea, we did receive reports of his movements from the public, as well as two radio tracking fixes heard

during land trials which gave his general location. Over the course of four days he travelled to Cockburn Sound, some 76 km south of Two Rocks. He then changed direction and on his tenth day at sea was reported at Lancelin, 64.6 km north of Two Rocks. On the following day Rajah was located directly outside the Two Rocks marina. He

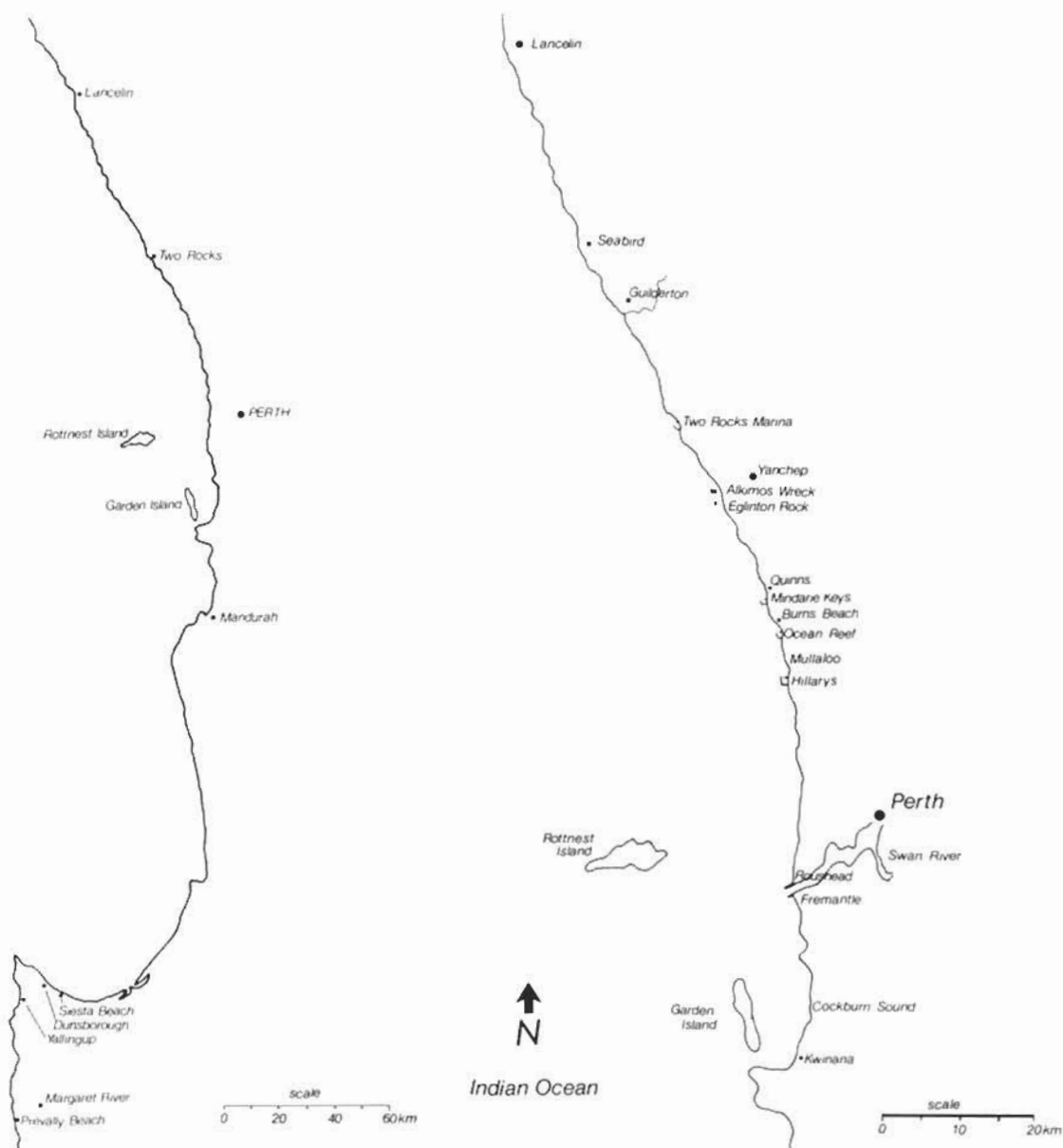


Figure 3b and c.

Figure 3. Maps covering the area of Western Australia where the Atlantis dolphins were sighted post-release.

approached the research boat with a good deal of excitement and followed the boat into the sea pen enclosure. He had lost a significant amount of weight while at sea (18 kg equalling 10.8% of his pre-release weight), evidence that he had not been foraging successfully, if at all. In addition, Rajah had a number of small cuts on his tongue, possibly the result of attempting to consume inappropriate

prey items, such as spiny fish or lobster. Based on this information Rajah was reinstated in the sea pen with the intention of re-establishing his normal body weight and health.

The other dolphins left as a group in the early hours of 16 January 1992, four days after the gates had been removed. The group was found 3.8 km north of Two Rocks marina travelling north in a

rapid and erratic fashion. One of the juvenile dolphins (Echo) had been left behind in the marina and was caught and transported out to the group aboard the research boat. She immediately joined the group and all continued erratic travel northward for several hours to a reef 19 km north of the release site. The group slowed down at this time, milled near the reef then turned and travelled slowly south. The dolphins were no longer displaying the excited behaviour of earlier and approached the boat on several occasions for brief periods. They passed just outside the Two Rocks marina, continuing south at the end of the day.

The following day the group was located 45.6 km south of Two Rocks, near Hillarys marina. The group remained together, milling near the southern rock wall of the marina for most of the day. We received reports that the calf beached itself on several occasions and had to be helped into deeper water. By the end of the day the first split in the group occurred. The male pair—Nero and Frodo—and one of the juveniles—Kia—were no longer seen with the other dolphins. Kia was not sighted by us again, while Nero and Frodo were discovered 4 days later in Cockburn Sound. During this time the group of females and juveniles moved slightly northward and remained in a small area 15.2 km south of the original release site. They were sighted daily as a group for the following four days.

On the six day post-release the group of females split again. The juvenile, Echo, was reported alone near Hillarys marina wall, begging for fish. The following day the pregnant female, Rani, was sighted alone in the same location, signalling another group split. On the eighth day the group had fragmented completely and were dispersed over a large area. Mila and her calf remained in the Ocean Reef area. Nero and Frodo were still reported to be together in Cockburn Sound. Rani was reported at Guilderton beach. The juvenile, Echo, was found at Rous Head beach just north of Fremantle harbour. She was in poor condition and was recaptured and returned to the sea pen. She had lost 10 kg, since release, representing 8.5% of her body weight.

Rani and the remaining juvenile—Nakita—were not sighted by us after this date. There was a report of one juvenile, possibly two, with freeze branded numbers on their dorsal fins within a group of wild dolphins near Sorrento beach. This sighting was never confirmed.

Mila and her calf remained in the Ocean Reef area consistently for the following 20 days. Towards the end of this time it was evident that both were losing condition. Attempts were made to feed Mila from the research boat, however, after four weeks at sea the young calf disappeared and can be presumed dead. After the disappearance of

her calf, Mila began following all boats in the area begging for fish. Her range remained within the vicinity of Hillarys to Two Rocks. During this time her radio tag failed and we were relying on reports given by local fishermen in order to find her. Although Mila was gaining some weight this choice of foraging methods in addition to her obvious decline in body condition prompted the decision to recapture Mila. Two unsuccessful attempts were made to entice Mila into a beach area and recapture her. On 28 February 1992 (44 days post-release) Mila voluntarily slid-out onto the deck of the research vessel, was restrained and returned to the sea pen to join Echo and Rajah. Mila weighed 133 kg upon return to the sea pen, showing a 23 kg loss, representing 14.7% of her body weight while in the wild. It is probable that her weight loss was greater than that shown at recapture as for the last 2 weeks at sea Mila was regularly receiving fish handouts from boats.

The male pair were last sighted together at Cockburn Sound on 23 January 1992, 9 days after leaving the enclosure. Nero was next seen on 31 January 1992 for a period of three days associating with Mila and her calf in the Ocean Reef area. Frodo was reported on the same day at Prevally beach (352 km south of Two Rocks). Over the next two weeks Frodo was reported several times in the Dunsborough to Yallingup area. The final sighting occurred on 16 February 1992 (31 days post-release) at Siesta Beach where a film crew filmed footage of Frodo interacting with people in shallow water. The film footage showed Frodo to be in fine condition. Later that day Frodo's radio signal was clearly heard during an aerial survey in the same area, evidence that his radio tag was still working properly, over six weeks after the tag was deployed.

There have been no sightings confirmed by the research team since 28 February 1992. However, on 8 March 1992 we did receive a report of a dolphin with a transmitter sighted alone near Yanchep Lagoon. More recently, we received a report of a dolphin with a transmitter seen at Cape Range National Park, Exmouth (1300 km north of Perth) on 4 September 1992 and a report of an adult dolphin with a transmitter accompanied by a calf estimated to be approximately 1 year old sighted near Wedge Island, Lancelin on 5 January 1993. Unfortunately no photographs were taken for either of these sightings and the reports cannot be confirmed. We have also received information of a sighting that took place in May 1992. This sighting involved a dolphin seen every day over a one week period interacting with people in a beach area near Carnarvon (981 km north of Perth). There were two other dolphins seen with this individual, however neither of these animals came in close to people nor seemed to have anything on their dorsal

fins. We are confident that this sighting involves one of our released animals although photographic evidence has been insubstantial. Since the release the boat survey work has continued in the hope of finding the released animals. The study area now extends from Lancelin to Fremantle, a 120 km stretch of coastline.

The three dolphins that were bought back into captivity, Mila, Rajah and Echo, are now kept in a new enclosure at Hillarys Marina, in Perth. Care for these dolphins is provided by UnderWater World, a commercial aquarium based at Hillarys. Because these dolphins fared badly on their first attempt at rehabilitation, and because we have so little information on the fate of the remaining animals, it is not the intention to attempt a second release. Rather, these dolphins will be kept permanently in a large netted enclosure within the marina.

Conclusions

Assessing the success, or otherwise, of this project is a difficult task. Clearly there are two possible scenarios at each end of a spectrum. One is that all the dolphins that were not returned to a captive environment died, the other is that they all managed the transition and are now a functional part of the wild dolphin population. The truth probably lies somewhere between. The major reason for the ambiguity of the results was our inability to effectively track the dolphins whilst they were at sea. The VHF radio tags we used were reasonably effective initially, however, they were short-lived and only effective over a short range. It is thus imperative that more advanced and appropriate technology be tested and used in future marine mammal release programs. Our program clearly demonstrated that the transition from captivity to the wild for long-term captive and captive born dolphins is a difficult one, even following considerable preparatory efforts. If the distances travelled by these dolphins are indicative of what might be expected in other such experiments, then we believe it is inappropriate to release any dolphins in the future without a small satellite and VHF tracking capacity. It is certainly inappropriate to release any dolphins without a capacity to find and follow them.

There are undoubtedly some aspects of this release that we would change with the benefit of hindsight. For example, it may have been prudent to have provided more control over the initial access the dolphins had to leave the enclosure for the first time. Perhaps the gate should not have been left open as early as we did. However, every project is constrained by different factors. In our case we were constrained by: a lack of alternatives other than the release of the dolphin group, a set budget and time frame for the project, and a lack of previous data on which to base our strategy. Perhaps our experiences will at least reduce the latter obstacle for future release projects (if they are indeed appropriate).

It is important to note that this program was not based on the premise that a dolphin is necessarily better off in the wild than in appropriate conditions in captivity. Rather, there were not any realistic alternatives for this dolphin group beyond a release attempt. Releases of dolphins from other facilities in the world will likely occur. However, it may not be the most humane approach for those dolphins and, if undertaken, should be run as a careful scientific experiment with realistic alternatives for those animals that do not manage the transition.

References

- Bassos, M. K., Wells, R. S. & Norris, K. S. (1991) Assessment of the Readaptation to the Wild of Two Young Male Bottlenose Dolphins After Two Years in Captivity. Abstract from the Ninth Biennial Conference on Marine Mammals, Chicago, IL, 1991.
- Cheal & Gales (1992) Growth, Sexual Maturity and Food Intake of Australian Indian Ocean Bottlenose Dolphins, *Tursiops truncatus*, in Captivity. *Aust. J. Zool.* **40**, 215-223.
- McKenna, V. (1992) *Into the Blue*. The Aquarian Press, London.
- Rhind, S. (1991) A Quantitative Study of the Behaviour of Captive Bottlenose Dolphins (*Tursiops truncatus*). Honors thesis, Murdoch University.
- Würsig B. & Würsig, M. (1977) The Photographic Determination of Group Size, Composition and Stability of Coastal Porpoises (*Tursiops truncatus*). *Science*, v. 198, No. 4318.

