Back to the Blue

Returning two captive bottlenose dolphins to the wild

Born Free Foundation

Project Report Spring 2015

Compiled by Jeff Foster; Alison Hood and Andrina Murrell

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Executive summary

This *Back to the Blue* report outlines the efforts undertaken to rescue, rehabilitate and release two former captive dolphins. Tom and Misha, two bottlenose dolphins (*Tursiops truncatus*) had originally been captured from the wild off the western coast of Turkey and were subsequently used to perform and provide 'swim-with' opportunities in captive facilities in Turkey. Following a campaign, spear-headed by international wildlife charity the Born Free Foundation and a local network of concerned individuals known as the Dolphin Angels, Tom and Misha were rescued and re-homed in a specially constructed sea-pen where they underwent an extensive programme of rehabilitation prior to being released on 9th May 2012.

The programme was developed and managed by Jeff Foster, a marine mammal expert from the US whose previous experience included the management of the 'Keiko' rehabilitation project (Keiko the orca was best-known for portraying Willy in the 1993 film *Free Willy*); and the rescue, re-location and release of Springer, a young orca in Canadian waters who had become lost in Seattle's Puget Sound.

This report lays out the rehabilitation goals, the methods used to achieve these goals and how they were measured.

The project itself faced many challenges over its 20 months but was ultimately successful.

Throughout this period the welfare of the dolphins and their preparation for release were the highest priorities. Also, every effort was taken to control costs both as a necessity for the Born Free Foundation which ultimately managed and financed this initiative, and also in the hope that such a programme could be realistically replicated to help other captive dolphins return to the wild in the future.

The Born Free Foundation works to the principal that 'wildlife belongs in the wild', and throughout this project retained a cautiously optimistic approach to a successful outcome. However, the charity is not risk adverse and remained aware that calculated risks would need to be taken throughout.

Tom and Misha were tracked after release, both by a satellite tag attached to their dorsal fins and by a vhf tag, similarly attached. This post-release monitoring phase established that the project was a success and ultimately ensured the development of what we believe to be the most comprehensively documented dolphin rehabilitation and release programme ever undertaken.

NB: Whilst it is hoped this document will be useful to similar dolphin rehabilitation projects, it must be noted that certain aspects of the programme described below were developed specifically for Tom and Misha and their individual circumstances. Please contact the Born Free Foundation for further information.

Alison Hood
Born Free Foundation

Contact details:
Born Free Foundation
Broadlands Business Campus,
Langhurstwood Road,
Horsham,
RH12 4QP,
United Kingdom

T: +44 (0)1403 240170
E: wildlife@bornfree.org.uk
www.bornfree.org.uk

Introduction to Born Free Foundation

The Born Free Foundation (Born Free) is an international wildlife charity (Reg. No 1070906). The Head Office is based in Horsham, southern England, with regional offices in Kenya and Ethiopia. In addition Born Free has country representatives in Sri Lanka and South Africa and a sister organisation, Born Free USA, based in Washington DC, with a second office in Sacramento, California.

Our charity has a unique history. In 1964, Bill Travers and Virginia McKenna travelled to Kenya to star in the classic wildlife film 'Born Free', based on the best-selling book by Joy Adamson. Released in 1966, the film told the true story of George and Joy Adamson's fight to return Elsa the lioness to the wild.

Since the charity's inception in 1984, its work has focused on the conservation of wild animals in their natural habitat, the welfare of individual animals and exposing the inadequacies of captivity. This work is augmented by community projects and educational work in many countries where our conservation initiatives are based.

Field work projects cover many species and countries, from the endangered Ethiopian wolf in the highlands of Ethiopia to the tiger in central India. Work to expose the problems associated with the captive keeping of wild animals is worldwide, with a current specific focus on the European Union.

At the heart of all the charity's work is the individual animal. With an agenda based on 'Compassionate Conservation', the welfare of the individual is prioritised alongside the conservation and protection of a species. Over the years, Born Free has rescued many individual wild animals from appalling captive conditions and worked to give them a better life, either in a sanctuary environment or, where feasible, through rehabilitation and release back to the wild. While most of this work has focused on terrestrial animals, in 1990 Zoo Check (the charity that evolved into the Born Free Foundation) played a leading part in the '*Into the Blue*' project which involved the rescue, rehabilitation and successful release of three of the last remaining captive dolphins in the UK into the Caribbean sea. In 2010, Born Free rescued two captive dolphins and returned them to the wild as part of the *Back to the Blue* project in Turkey.

There are many issues associated with the keeping of wild animals in captivity, including cetaceans. To read more visit www.bornfree.org.uk.

Introduction to Tom and Misha

In spring 2010, Tom and Misha, two male bottlenose dolphins *(Tursiops truncatus)*, were discovered languishing in a hastily-constructed pool in Hisaronu, Turkey, having been transferred from a dolphinarium called Dolphin Therapy Kaş.

Their owner's aim was to cash-in on the summer season by offering 'swim-with' opportunities at up to £32 ($50) a time. Estimated to be between 12 and 20 years in age, Tom and Misha were wild-caught, reportedly originally captured from the eastern coastal area of the Aegean Sea, near Izmir, Turkey.

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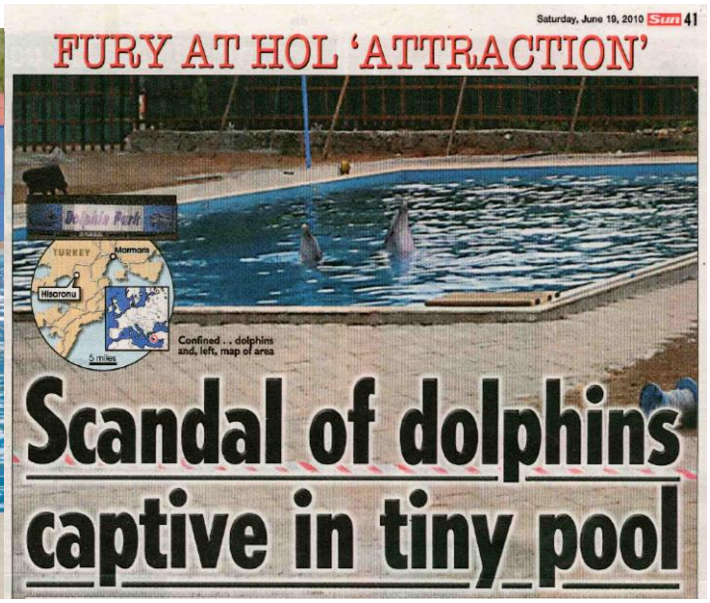
Tom and Misha's arrival in Hisaronu prompted considerable local concern for the welfare of the dolphins and that of the people who were paying to swim with them, unaware that the level of coliform MPN bacteria in the pool was circa. 11,000/100ml (US Standards state this level should not exceed 1,000/100ml). Kept in a chlorinated, unfiltered swimming pool-like structure no more than 17m long by 12m wide, the plight of Tom and Misha was desperate and generated a determined and widespread effort to free them.

In Turkey, a group of concerned people joined together and formed the 'Dolphin Angels'. Working on many levels from direct campaigning to research into legal challenges into the activity at Hisaronu, they raised Tom and Misha's plight internationally. Locally, tour companies, including Thomas Cook and TUI UK, boycotted the facility. Peaceful demonstrations were held at the pool in Hisaronu, a Facebook campaign was launched which attracted over 21,000 supporters, and legal routes for confiscation of the dolphins were investigated.

Born Free, working alongside *The Sun Newspaper*, and supported by Patron and TV actress Helen Worth, visited Turkey to investigate the situation and the feasibility of rescuing the two dolphins. A campaign was launched asking tourists not to take part in 'swim-with' programmes. As pressure mounted and fewer and fewer people paid to swim with Tom and Misha, their owner disappeared, leaving the dolphins and the few other assets at the pool to be seized by the creditors. Following

negotiations on behalf of Born Free, led by TV investigator Donal Macintyre and project lawyer Sule Beder, the dolphins were eventually offered to Born Free.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FURY AT HOL 'ATTRACTION'

Dolphin Park

TURKEY

Marmaris

Hisaronu

5 miles

Confined . . dolphins and, left, map of area

Scandal of dolphins captive in tiny pool

The resulting removal of Tom and Misha from their pool was an emergency response to an animal welfare crisis. If the two dolphins had remained at Hisaronu their health would have continued to deteriorate and they might soon have died. At best, any future they may have had would have been spent providing 'swim-with' opportunities for paying tourists, themselves largely unaware of the price being extracted from Tom and Misha and their distressing life in captivity.

The *Back to the Blue* project; managed in partnership between Born Free and Underwater Research Society (Sualtı Araştırmaları Derneği (S.A.D.)), was established to offer the dolphins the opportunity of returning to the sea. It was agreed the rehabilitation of Tom and Misha would be a process carried out under the guidance of a marine rehabilitation expert(s), identified and provided by Born Free, who would work closely with the team provided by S.A.D.

While the focus of this project was Tom and Misha, it was hoped the protocols and information gathered throughout the rehabilitation and release process would help establish the basis for a workable, realistic and cost-effective process that could be replicated internationally in the future.

The *Back to the Blue* project also aimed to highlight the plight of captive dolphins and the repercussions of the increasing demand for 'swim-with' opportunities on the animals concerned.

Back to the Blue **team**

Full-time ground team, Turkey

Jeff Foster:	Marine Mammal Rehabilitation Expert (US) Lead Consultant
Derya Yildirim	Site Manager
Michael Partica:	Marine Mammal Expert (US), supporting Jeff Foster
Amy Souster	Behavioralist/trainer

Veterinarian Specialists

Dr John A Knight	BVet, MSB, MRCVS; Zoo and Wildlife Management Consultant (UK); lead Veterinary Consultant
Dr Juli Goldstein	D.V.M. Assistant Research Professor, Marine Mammal Research and Conservation (US)

USA Marine Mammal Consultants

Stephen McCulloch:	Project Manager of the Marine Mammal Research and Conservation Programme at the Harbor Branch Oceanographic Institution in Florida, (US)
Jim Horton	Marine Mammal Specialist (US)

Born Free Head Office Team

Alison Hood	Project Director
Shirley Galligan	PR Director
Andrina Murrell	Project Support

Rescue of Tom and Misha

The first half of 2010 saw a comprehensive campaign by Dolphin Angels, Born Free and other organisations and individuals to secure the release of Tom and Misha. This was supported by an assessment carried out by Born Free into the feasibility of the rescue, rehabilitation and ultimately the release of Tom and Misha back to the wild.

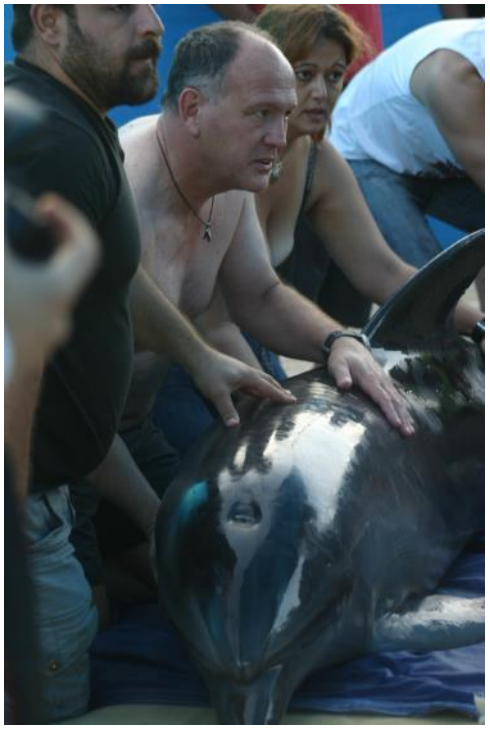

© BFF

Subsequently negotiations to secure the dolphins' release from Hisaronu and the transfer of their ownership to Born Free commenced.


© BFF

Working with Turkish NGO, S.A.D., and via an agreement brokered by lawyer Sule Beder, the ownership of the dolphins was transferred from the creditors to Sule Beder for rehabilitation to be undertaken by Born Free and S.A.D.

On 5th September 2010, following a last minute signing of the required agreement, Tom and Misha were removed from the pool, which was, by now, suffering considerable subsidence. Under the supervision of project vet John Knight and a team from British Divers Marine Life Rescue, the two dolphins were transferred by road to a temporary sea pen (owned by S.A.D.) located in a beautiful secluded bay in Karaça, south-west Turkey.


© BFF

The project was not without challenges from the start. There were just three days between notification that the dolphins could be moved from their Hisaronu pool and the actual relocation of them to Karaca. This was necessary to meet the

requirements of the local authorities and therefore required Born Free to quickly assemble the team and equipment on-site. Furthermore, vet, John Knight, estimated that rehabilitation had a 70% chance of success. However, there was no alternative option. Tom and Misha would not have survived much longer in the filthy water of their pool in Hisaronu. Born Free's senior team therefore agreed to undertake the required rescue and rehabilitation project.

Upon arrival at Karaca, Tom and Misha spent two months in their temporary pen while a new 30m diameter and 15m deep sea pen was ordered and manufactured, especially for their rehabilitation. S.A.D. provided the daily care team of Derya Yildirim and Erdem Danyer.

Stephen McCulloch joined the team in November 2010 and, along with organising the transfer of Tom and Misha from their temporary sea pen to their new facility, provided the initial training and impetus for the rehabilitation programme. Work commitments prevented Stephen from basing himself in Turkey and he subsequently introduced Born Free to Jeff Foster who became the lead consultant for Tom and Misha's rehabilitation programme.

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Rehabilitation

Tom and Misha were caught from the wild and expert analysis suggested they retained some of the survival skills that they had developed in their wild environment. Captivity had, however, undoubtedly not only eroded their fitness but also replaced their reliance on their wild skills and behaviours with dependence on their trainers. Taking into account their age (believed to be between 12 and 20 years), both being male and with a wild, natural start in life, Tom and Misha were considered suitable candidates for a rehabilitation and release programme. It is important to note that this may not be the case for all captive cetaceans and it is vital each situation should be judged on its own merits.

Rehabilitation goals

Rehabilitation goals are intrinsically linked with the criteria required for release. To ensure the responsible reintroduction of captive or semi-captive animals back into the wild, rehabilitation activities must focus upon ensuring the animals demonstrate that they have the appropriate skills and physical and mental condition required for release. Progress and challenges should be recorded against the following goals:

© Gavin Parsons

1. Ensure optimal physical condition

When dolphins are in captivity they become dependent upon humans, working very little for their food compared to being in the wild. In the wild dolphins are constantly swimming, not only to obtain food, but also for predator avoidance, play, or migration. Even when dolphins are sleeping, they are still moving and focusing on what is going on around them. In captivity these behaviours become unnecessary and they tend to lose their physical stamina. When the vast ocean is swapped for a small concrete pool, along with the loss of fitness, dolphins are forced to change their focus from an underwater environment to above water stimulus where their food and 'instructions' (the two indelibly linked) originate from.

A wild bottlenose dolphin's average swimming speed is 1.5-1.7 m/sec with bursts of speed up to 8.3 m/sec. A dolphin must consistently be able to hold its breath for up to six minutes.

Like a human in physical training for competition, dolphins must be muscular. They must be fit to handle many different situations, from hunting a school of sardines to avoiding sharks. Typically, the better shape dolphins in rehabilitation are in, the more likely they are to survive in the wild. To responsibly reintroduce dolphins back to the wild it is imperative to test for any known pathogens that can be transmitted from a captive situation to the wild population. Full health screening and assessment should be done prior to release.

2. Re-train to hunt, kill and consume live fish

In captivity, dolphins become completely reliant upon humans through the provision of food. In the wild dolphins are independent, feeding whenever they need/want to. They also feed opportunistically, based on prey availability, which is often scattered and mobile.

Dolphins in captivity must adapt to being fed at certain times during the day and additionally as a 'reward' for performing certain activities. Some dolphins may also face a reduction in food or rewards as a penalty when they do not perform as requested.

Captive animals are given a limited variety of fish; typically herring, capelin, mackerel, squid, anchovy and smelt. Often the fish the animals are given are not native to the animal's habitat. Consequently, the instinct to hunt and eat live fish, which may have a very different taste and texture to frozen fish, may be lost. Captive dolphins are therefore required to re-learn the ability to hunt for themselves and to kill and eat live fish of a species naturally found in the prospective release site.

3. Encourage a truly underwater existence

Wild dolphins spend up to 80% or more of their time below the water's surface, whereas captive dolphins spend over 80% of their time at the water's surface. Their reliance on human beings for food brings captive dolphins regularly to the surface of the pool. This behaviour is reinforced further due to the lack of enrichment, generally shallow water depth and low levels of stimuli, particularly below the water surface, in the captive environment.

It is important to encourage a shift in focus from above water (looking to people for food and signals) to below water and the deeper water column where dolphins will be expected to live and hunt effectively on their own.

4. Establish and encourage re-use of echolocation and hearing skills

Without optimum hearing and echolocation it becomes more difficult for the dolphins to hunt and navigate through the water. Dolphins hear and process sounds at a much faster rate and across a

wider and higher range than humans. Human range is only 15-20,000Hz while a dolphin's is 75–150,000Hz.

Echolocation is a tool dolphins use for monitoring their surroundings. They transmit high frequency sounds and wait for returning echoes to establish the nature of their surrounding environment or the size, speed, shape and direction of an object. This ability is essential when navigating at night or in low light/visibility areas. Dolphins only perform this skill when needed. In captivity they do not continue to produce 'clicks' because it burns far more energy than simple hearing and vision. There is also the strong likelihood that they stop using this skill because there is nothing 'new' to 'see' in the tanks. Confirmation that this skill is intact is vital for the success of their release to the wild.

5. Desensitise dolphins to dorsal fin tags

A key aspect of rehabilitating and subsequently releasing captive dolphins is having the ability to track them to assess their continued health and welfare. This information helps confirm the success of the release by providing information concerning the progress, behaviour and locations of the dolphins after release. It is therefore important the dolphins become used to small tags attached to their dorsal fins.

6. Learned behaviour

Although it was decided not to undertake 'recall' training in the case of Tom and Misha, it was recognised this could be a useful tool. Recall involves training a dolphin to come back to its carer using an underwater 'bridge'*. This would allow easier low-stress access to the dolphins once released should there be a problem or concern about their health during the post-release monitoring phase.

*A whistle that indicates the exact moment the animal performs what has been asked of it. This then becomes the 'bridge' between the behaviour and the reward.

7. Voluntary testing

Additionally, rehabilitation techniques which seek to encourage voluntary procedures, which permit testing (the taking of blood samples etc.), can facilitate the monitoring of the health of an animal during rehabilitation and even following release, if necessary.

Balancing act

Throughout the rehabilitation process it remains a delicate balance between the necessary conditioning of the animals to ready them for release, and ensuring they do not become dependent on the rehabilitation team. The goal is to lessen the dependency on the team and increase the dolphin's focus onto its natural underwater environment. During this period,

however, it is important to maintain husbandry behaviours such as fluke presentations for blood samples, tubing for rehydration and/or endoscopy/stomach content analysis, and exhalations for blowhole cultures so health could be monitored. With such a delicate line it is vital an expert team manages this process and ensures that clear, consistent and concise behavioural indictors are maintained throughout the project.

Site preparation and equipment

The locations* chosen for the rehabilitation of Tom and Misha were selected for their isolation from the general public, proximity to a marine sanctuary, and being within the habitat range of where the animals were believed to be originally captured.

It was vital to keep the site and equipment as sterile as possible. Dogs and cats were not allowed in the approximate area. Disease and cross-contamination are serious concerns when rehabilitating and reintroducing animals back to the wild. Additionally, the area should be as acoustically muted as possible, for example, with limited boat traffic.

* The *Back to the Blue* project was relocated after the initial 12 months to a site approximately 1 mile away. This followed the expiry of the 12 month agreement with S.A.D.

1. Water quality tools

Water quality tests were taken initially and after severe storms or heavy rains. Samples were taken at surface level and just off the sea bottom. Water temperature and salinity was measured daily.

2. Off-shore

A 30m diameter sea pen, up to 15m deep was purchased for the project and secured to the sea bed with anchors. This was located in front of the on-shore facilities to allow easy access, behavioural observations and to help enhance security.

© N Chapman

Within the pen:

- A medical pen was constructed with an adjustable floor in which the dolphins could be separated for husbandry or medical purposes.
- A stable platform was built, in-between the medical pen and the main pen, to allow the team to undertake feeding, rehabilitation and husbandry.

© N Chapman

Around the pen:

- A walkway was constructed around the pen to allow easy access to the entire perimeter of the pen. This was important for behavioural enrichment activities and live fish training.

© Jeff Foster

3. On shore:

- A wooden walkway was constructed between the living quarters, fish kitchen and jetty to improve cleanliness and safety and allow access in all weathers to and from the on-shore facilities.

- A pulley system was devised to allow boat tows out to the pen for regular feeding and training. Additionally this permitted feeding to not be directly associated with boat engine noise.
- Accommodation was provided for the rehabilitation team.
- A fish kitchen was adapted from a caravan to store and prepare fish.
- A dive locker was provided for dive kit, lifejackets and to keep equipment safe and clean.
- Transport in the form of a vehicle and a boat were provided.
- Each member of the team had a cell phone and on-shore facilities had internet access.

© BFF


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Methods

The rehabilitation of dolphins, particularly captive dolphins, is not an exact science, nor is it a practice that is regularly undertaken and well-documented. Each experience of rehabilitating dolphins is different due to many variables which include, but are not limited to, assorted locations, species, length of time in captivity, expertise used, funds available, health and temperament of the individual animal. Therefore, the predominant feature of dolphin rehabilitation is adaptability. Rehabilitation teams must adapt to numerous influences, not least the progress and reaction of the individual animal to the various processes undertaken.

Being wild-caught, it was anticipated Tom and Misha would retain some memory of wild behaviours including navigation, communication, socialisation, predator avoidance and food recognition. From their responses to their caregivers, it was judged both dolphins had undergone only limited training within their captive environment. Due to the levels of conditioning observed in Tom and Misha it was likely Tom had been held in captivity longer than Misha.

Being highly social animals, bottlenose dolphins can quickly become reliant on people for their social and food needs. While in captivity they do not use many of their natural skills and become complacent, relying on the provision of food from their carers. Tom and Misha needed to be given the opportunity to re-learn certain wild behaviours, and to build stamina and a desire to hunt.

To ensure successful rehabilitation, the team needed to encourage the dolphins to undertake numerous actions and activities throughout the day. The most effective way to guarantee this was to use fish and feeding as a tool at certain times. However, food was on no occasion withdrawn or withheld from the dolphins if they did not carry out a particular action. On occasion the team would adjust the dolphins' diets to simulate wild conditions and motivate the animals - providing the same weekly food totals but on specific days making less food available and on others more. This generated a gradual stretching of their stomachs and ultimately increasing the dolphins' weight. Optimum weights for release of Tom and Misha were to be a little heavier than their predicted wild weights to ensure they had some reserves while adapting to their wild environment

The methods described below outline the basic process used to rehabilitate Tom and Misha and prepare them for the challenges of life in the wild. Methods were assessed constantly and where necessary modified to ensure the appropriate welfare of the dolphins and optimisation of the rehabilitation programme.

1. Ensure optimal physical condition

It was important to keep the dolphins active and stimulated within the sea pen in order to build-up and maintain significant and effective muscle, endurance and reflexes. This was possibly the most vital rehabilitation tool. Initially an ethogram was used (a catalogue of the behavioural patterns of an organism or a species) to establish a catalogue of the daily behaviour of the animals, which indicated what the animals were capable of and what conditioning needed to be done prior to release.

© M Partica

Consistently working on the behaviours below made the dolphins fitter and more muscular, moving them closer to optimum condition for release.

© BFF

Methods used:

- The dolphins were encouraged to maintain constant average-level movement around the pen.
- High energy behaviours such as bows, tail walks, speed swims, or long periods of 'A to Bs' across the pen were encouraged. 'A to B's involved asking the dolphins to swim at speed from one location to another within the pen.

© BFF

© M Partica

- Behavioural enrichment tools used to mentally stimulate the animals and keep them active were sporadically introduced to the pen. Enrichment devices could be natural such as jellyfish, seaweeds and driftwood or artificial objects like feeder tubes, buoys or water hoses. Each of these devices would be left in the enclosure temporarily and changed often so animals did not lose interest. These items could be used as secondary positive reinforcements when the animals did something required.


© BFF

2. Re-train to hunt, kill and consume live fish

A dolphin's ability to use echolocation and its familiarity with its surroundings allows it to efficiently hunt. The animal's ability to determine the speed, size, and direction of a possible prey (or threat) is very important.

Transferring the dolphins' diet from frozen fish to live fish was a slow and calculated process, but was achievable (and was achieved).

Three concurrent steps were introduced as the dolphins were encouraged to undertake wild feeding behaviour to ensure self-sufficiency upon release:


© Jeff Foster

i. The gradual transition from frozen, dead fish of a species used by the captive facility, to alert, live fish of varied species appropriate to populations available in the release area. Tom and Misha had to learn to accept the different tastes and textures of their food

ii. Competition between the two dolphins was encouraged when hunting food

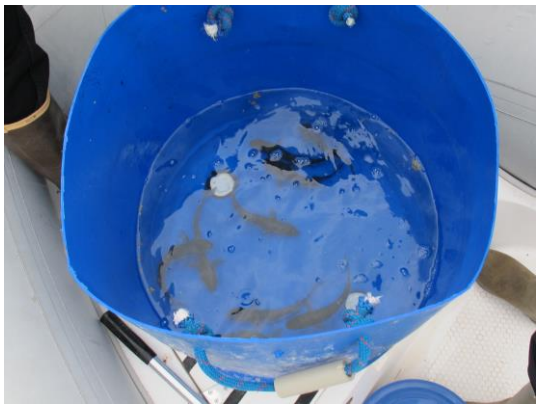
iii. See ‘Underwater existence’ below.

Methods used:

- Initially the dolphins needed to relearn to feed underwater. The carer changed from providing fish above water to holding fish underwater for the dolphins to take. This allowed the dolphins to re-learn their fish came from under the water’s surface, simulating how dolphins encounter prey in the ocean.
- Following this the team introduced stunned live fish. This coincided with training the dolphins to swim ‘variably’ under the water. In their natural environment, dolphins randomly swim up and down throughout the water column searching for food. Stunned fish are the halfway point between dead fish and fully fit live fish and represented the most effective way to transfer the dolphins’ focus to live fish.
- Once the animals were variably swimming under the water and eating stunned fish, the team introduced live fish to them. It took some time for them to start hunting the live fish but this was a key step in bringing them closer to introduction back into the wild.
- A practical method for performing this task was ‘broadcast feeding’. Broadcast feeds involved delivering a mixture of dead, stunned and live fish to the dolphins in order to create confusion and initially disguise the introduction of live fish to their diet. This allowed them to get used to the behaviour, ‘feel’ and taste of such a food source.

© Jeff Foster

- Broadcast feeding also created competition between the dolphins, which is of course encountered in the wild amongst dolphins. Monitoring this through underwater cameras (for this project kindly provided by Woods Hole Oceanographic Institute), allowed observation of this behaviour, which was difficult from above the surface.



© Derya Yildirim

- The live feeding training required a constant and reliable supply of live fish (between 4-5kg a day per dolphin for a minimum period of 30 days). This needed to be stored close to the sea pen. In a non-commercial activity, the fish were purchased and cultivated purely for the dolphins.
- Randomly feeding the animals at different times of the day helped to diminish food predictability.
- It was important to vary the amounts of food. Wild dolphins’ diets vary depending on the availability of fish.

The transition to appropriate species of fish that the dolphins would encounter upon release was incorporated during the conversion from frozen to live fish. The dolphins were provided with a variety of live, native fish not only to reward them for positive behaviours but also as a form of enrichment. It was important to determine their fish preference. Using their preferred food in the conditioning process the team were able to stimulate positive behaviour at critical times. Tom and Misha were provided with approximately 10 varieties of indigenous fish, freshly-caught and live. Due to the difficulties of acquiring a consistent supply of high quality fish and because of weather conditions, holding pens were used to stockpile live fish.

3. Encourage an underwater existence

As reported, wild dolphins spend up to 80% or more of their time *below* the water's surface, whereas captive dolphins spend over 80% of their time at the water's surface. It was therefore vital to encourage a shift of focus from above water (looking to people for food, signals etc.) to below water and the water column where dolphins must live and hunt effectively on their own. Much of this process has to do with endurance and muscle strength, but it was also important to sever their dependence on humans.

Methods used:

- Using remote feeding devices (where the dolphins could not see where the fish came from) the team were able to disassociate the supply of food from humans and to encourage continual swimming. A slingshot from shore was used to 'fly' fish directly into the pen. The team would wait until the dolphins were actively swimming, the fish would then be launched into different areas of the pen. Gradually the animals learned that if they were active they would often be rewarded.

© BFF

- At times, the team would feed the dolphins underwater. Though obviously creating a direct association with humans, this enabled close observation and a re-enforcement that their food source came from below the surface. Underwater feeding tubes and underwater remote-opening tubes were deployed in the pen. The feeding tubes had holes in them and when nudged by the dolphins, fish would fall out. The remote-opening tubes were tied to the side of the pen under the water level and the ends removed via an attached rope; thus letting the fish out for the dolphins.


© M Partica

4. Establish and encourage re-use of echolocation and hearing skills

A dolphin's primary sensory system is auditory. It is a highly developed system that includes biological sonar ability or echolocation.

Key skills, including hunting, communicating and more, undertaken by wild dolphins rely upon echolocation and hearing skills. Within barren tanks and hard, unforgiving surfaces in captivity, echolocation becomes unnecessary and potentially uncomfortable. In a captive environment the majority of the animals' focus is on above water activities, reducing the need for echolocation. It is therefore a skill which must be redeveloped and optimum levels confirmed before release.

Methods used:

- Using hydrophones (kindly provided by Woods Hole Oceanographic Institute) placed throughout the pen the team monitored the sounds the dolphins were making to determine if they were echolocating on their surroundings.
- The provision of live fish was one of the most effective ways to encourage echolocation.
- Underwater cameras were also used to monitor behavioural observations and the use of echolocation.

Additionally the team would regularly clean and undertake maintenance on the sea-pen nets while scuba diving. This attracted the dolphins' attention, keeping them focused underwater plus it was also possible, while diving, to actually feel the dolphins echolocating.

5. Desensitisation to tags attached to dorsal fin

A key aspect of rehabilitating and subsequently releasing captive dolphins is ensuring that they can be tracked. This allows the continued assessment of the animals' health and welfare, and also allows the progress and locations of the dolphins to be monitored. It was therefore important that the dolphins became used to the feel of small tags, which were attached through a small hole placed in their dorsal fins to ensure the minimum level of pain was inflicted. Three types of tracking devices were used. Firstly, satellite tags were used to remotely monitor the animals together with a very high frequency (VHF) tag (line of sight tags), used to pinpoint their exact location. These were attached with single pin attachments to the trailing edge of the dorsal fin. Pairing these two tags optimised the ability to monitor the animals and get visual assessment on the health of the animals post-release.

© BFF

The satellite tags were custom-designed for the individual animal for comfort and to minimise the drag on the tag. They were duty cycled (set to send signals at specific times) to relay the animal's location for six months to a year post-release. The VHF transmitter had a battery life of between 60 to 90 days post release. We used corrosive zinc nuts with stainless steel washers and surgical stainless steel pins to attach the satellite and the VHF tags. The use of these metals was designed to cause the zinc nuts to corrode and fall off, usually between 9-14 months after attachment. The third tracking device was an identification chip that was placed under the skin of the animal between the facia of the blubber (connecting tissue) and the muscle tissue. This chip was a permanent ID marker.

Tracking devices therefore consisted of satellite tags, VHF tags and a microchip.

Methods used:

- A spring loaded device (like a hair grip) that simulated the feeling of the tag on the dorsal fin was used. This device put slight pressure on the trailing edge of the dorsal fin allowing

the animals to get used to the weight and hydrodynamics of the tag without causing damage to the dorsal or tissue.

- Once the animals got used to the feeling of the dummy tag and the team felt confident that the animals would not rub it off or cause damage to the dorsal fin or the tag, the permanent tag could be attached.

6. Learned behaviour

It was vital that husbandry procedures were in place to allow the 'voluntary' taking of blood samples, the administration of fluids via a tube and other key procedures as necessary. This was an advantage during rehabilitation as it not only allowed for regular health checks, but enabled these to be carried out in a stress-free environment with the dolphins being relaxed about the procedures. It was far less stressful during the dolphins' rehabilitation for them to offer their tails for the taking of bloods than to physically restrain them when samples were needed. Following the dolphins' release, if there was any concern, it would probably be possible to re-enact these behaviours to get voluntary samples, allowing a full assessment without the need for capture.

Release

Release criteria

In advance of Tom and Misha's release, in their best interests as well as that of the indigenous populations of dolphins, the team had to determine and document that each of the rehabilitation goals were met sufficiently:

1. Ensure optimal physical condition

While it was vital the dolphins were visibly assessed by the relevant Marine Mammal Expert and the Project Veterinary Consultant, there were ways in which this could be further assessed and documented.

a) The dolphins' respiratory rates were regularly tracked throughout the project to measure their dive times.

b) Underwater cameras were installed in the pen to confirm the dolphins were eating the fish they caught.

c) Health Checks were undertaken and documented

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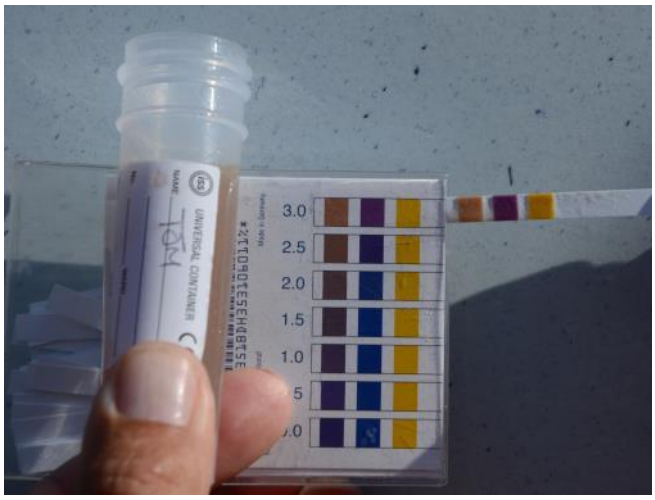

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2. Retraining to hunt, kill and consume live fish

It was essential to confirm Tom and Misha were capable of recognising live fish as a food source and were able to effectively hunt and catch the fish in their pen. Along with the visual observations made by the team, this was also documented and confirmed on underwater cameras.

© Jeff Foster

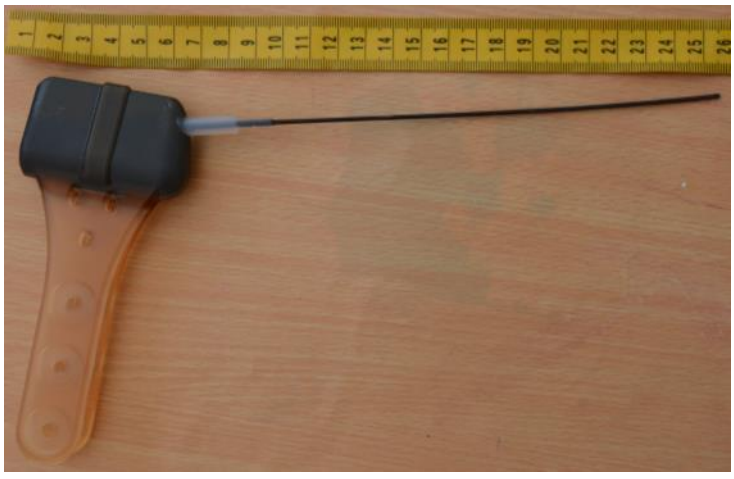
© BFF

3. Encourage an underwater existence

Transferring Tom and Misha's focus to below water from above water was an on-going process throughout the project. The transition was observed from the shore-line by the team and via the underwater cameras. Their behaviours were documented in the daily report forms (see Appendix 1).

4. Establish and encourage re-use of echolocation and hearing skills

Both Tom and Misha responded very well to bridge training via a high-pitched dog whistle, which signalled the end of a particular behaviour and thus their reward of fish. For example, when the dolphins were asked to undertake a specific behaviour, they continued with this until they heard this bridge which was randomly signalled. The fact that the animals continued with a specific behaviour until we blew the whistle showed they had hearing ability. This also worked with a finger snap or hand clap which had different tones. On a number of occasions Tom and Misha acoustically responded to and interacted with the wild dolphins in the area, indicating they had the ability to hear within normal dolphin hearing range. It is possible to test the frequency range in dolphin, but it is costly and it was apparent from the way the animals responded to audio cues that both animals could hear extensively. While diving, the team could often feel both Tom and Misha echolocate on them. This seemed to increase when live fish training started.



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5. Desensitisation to tags attached to dorsal fin

Various techniques were used to ensure that the tags could be fitted to the dorsal fin with minimum disruption to the dolphin. Regular

handling and rubbing of the fin allowed contact and hairgrips with suction cups were attached to the fin for short periods of time. The tags were eventually attached on the actual day of release when the team asked the dolphins to present themselves on the platform.

The over-arching goal was that the dolphins were at peak levels of health and fitness and were ready to be self-sufficient in the wild.

Additional release considerations:

Full Health Assessment

Ideally at least three full health assessments of the animals were needed to establish base-line information and health parameters. The first shortly after the animal was acquired and prior to the animal being placed in a new environment. The second test mid-way through the rehab process, and the final test two to three weeks prior to release, in order to ascertain that the animals were healthy enough for release and to determine, to the best of the project's abilities, that there was little or no chance of transmitting any known pathogen or disease to the wild dolphin population.

The *Back to the Blue* project established baseline blood parameters for the animals and monitored the animals' health a year prior to the release. One month before the animals were released a full physical examination was carried out to check for transmittable diseases. Three days prior to the release we did additional blood screening to determine there were no underlying health concerns that could jeopardise or compromise the success of the release.

Returning the animals to their home range

Ideally it was in the animals' and species' best interest to return the animals either within or as close to their home range as possible. This was important to maintain genetic continuity within the region as well as releasing the animals back into a familiar area where they potentially could reconnect with family members or familiar territory.

DNA considerations

There was some question over Tom and Misha's origins and detailed enquiries were made. Thorough investigations into where the dolphins were originally captured indicated both Tom and Misha were caught near Izmir, in western Turkey. Izmir is approximately 150 miles from where the animals were rehabilitated. Such a distance is well within the known distance a bottlenose dolphin would cover in a typical home range. Wild bottlenose and common dolphins were spotted on numerous occasions in the vicinity of the rehabilitation site.

Following an enquiry as to whether one or both of our animals might have possibly come from 'drive' captures in Japan or from the Black Sea, contact was made with the Senior Veterinarian

responsible for maintaining the health of the wild-caught animals in Japan during the time when Tom and Misha would have been captured. He confirmed that the animals exported from Japan to Turkey at that time were housed at the Turkish Dolphin Park Sea Alanya and that only three of these animals were still alive in 2012 and were still at the facility.

Given the information outlined we are satisfied we were not putting wild populations at risk and were making the right decision for Tom and Misha's immediate health, welfare and success in the long-term.

Gate Training

The animals were trained to pass through an artificial medical pen gate without issue, simulating 'gate training' for exiting the main pen into the open sea. This ensured the dolphins would have the confidence to depart the pen, through a small gate space, upon their release.

Tag Placement

Ideally tracking tags would be placed on Tom and Misha approximately two weeks prior to their release. At such a time, the animals would be asked to voluntarily hold still while a single small hole was punched in the trailing edge of the dorsal for the tag placement. It was imperative to make sure the tags rode comfortably and to make sure there was no secondary infection or irritation from the piercing of the dorsal fin.

However, due to Tom's tendency to shake off the dummy tag the team were hesitant to attach the tag early for fear of risking damage to the dorsal fin tissue. The dolphins' tags were therefore attached on the day of the release. Having been through this process, this also made them more eager to leave the pen when the gates were opened.

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Method of release

In the best interests of the animals it was determined that a soft release would be the most humane and effective way to release Tom and Misha back to the wild. A soft release gives the animals the choice to leave the area they are familiar with when they feel confident enough to explore the environment outside the pen.

Six weeks prior to release the team conditioned the

animals to exercise from inside the medical pen. By doing this the animals felt comfortable being in this confined space. Dolphins are highly intelligent and can be cautious animals. Subtle changes in their environment or management methods can set an animal back weeks at a time. It was important when conditioning the animals for reintroduction that any changes to their routine were carefully and subtly made.

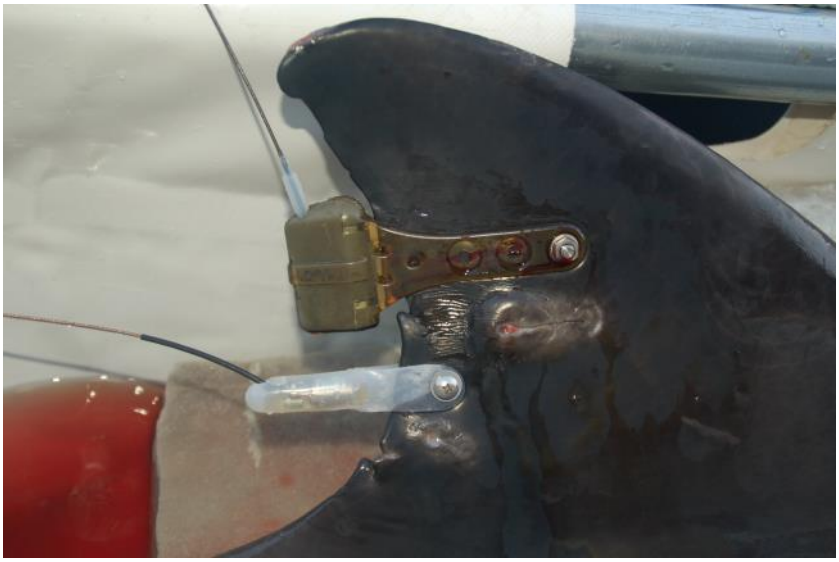
By the day of the release, Tom and Misha were conditioned to feel comfortable having a diver in the water and accustomed to excess people on and around the sea and medical pen. This would ensure that a diver could be in a position to secure the gate at the appropriate time, and also ensure the animals were familiar with people other than their daily caregivers. We had also conditioned the animals to slide out of the water for easy access to their dorsal fins for tagging.

Furthermore, Tom and Misha were given time to become comfortable around divers with cameras. Their sensitivity cannot be over stated. Both dolphins took time getting used to a piece of string that was used to measure their girth with Misha never really getting over his apprehension!

When working with large and potentially dangerous animals it was imperative to always have back-up plans. If, for example, the animals refused to slide out while being held in the medical pen, the back-up plan was to raise the floor-netting of the medical pen and 'work the animals up' in the water. All changes made to the medical pen were made weeks before the actual release day so the animals had time to adjust.

On the day of the release, the team placed all of the training staff on the platform and a diver near the entrance of the gate. They asked Tom and Misha to slide out, then the diver closed and secured the gate, effectively containing both animals in the medical pen in a confined area.

The team kept one diver in the inside corner of the medical pen in case one or both animals developed any problems or became entangled in the nets. They then placed an additional two people on two tag lines with an attached net. The team asked Misha to slide out first knowing he was the more cautious of the two. Once Misha slid out, the divers secured the tag lines and net so it was impossible for Misha to slide back into the water.



With one diver in the water and a team member focusing Tom on the backside of the medical pen, the team restrained Misha and attached the tags. The whole process took about 15 minutes. Once Misha was

tagged the net was lowered and Misha slid back into the water. A team member then entered the water with the diver to make sure Misha did not rub off the tag or become entangled in the net.

The team than undertook the same procedure with Tom. Once both animals had been tagged and returned to the medical pen, the lines that held the medical pen in place were untied and the pen was pulled over to the main pen's release gate. The release gate of the main pool was then paired with the release gate of the medical pen and both were secured together to prevent the animals getting caught between the two nets or squeezing back in to the main enclosure.

Once the medical pen was secured to the release gate, the team gave Tom and Misha time to calm down and adjust to their setting and the events of the day. Once it was felt they were not overly agitated the release gate was opened and the divers and cameraman moved into position. The medical pen gate was then unzipped and the divers cleared from the area. The gate was pulled open - allowing Tom and Misha access to the wild for the first time in many years.

Being cautious by nature, Tom and Misha refused at first to swim through the gate, even ignoring the

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live fish on the outside of the pen. Gradually though they became more confident and adjusted to the new location of the medical pen and to the open gates. After about 20 minutes the team gave Tom the hand signal to swim through the gate and Tom slowly responded, swimming through the gate to freedom. Within seconds of Tom swimming through Misha joined him and hurriedly swam through the opening. They quickly rounded the corner of the small bay and raced excitedly around the area and out to sea.

Post-release monitoring (prm)

The first few weeks post release are the most critical for the animal involved. It takes time to adjust to a new environment and to compete, both in terms of locating wild food sources and avoiding potential hazards.

Goals of PRM

The main goals of PRM can be summarised as follows:

- To track the animals and determine if their rehabilitation process has been successful
- To intervene and provide relevant treatment (if feasible) should the animals get into difficulty during the initial period of adaptation
- To gather information and, via monitoring the progress of the released animals, determine what may be learnt to further strengthen any future rehabilitation programmes
- To determine if the project is a success.

Method

The initial 7 to 21 days post-release are the most critical for the animals. It should be apparent at this point if the released animals are not adapting to their new environment.

It is also important to consider that the animals might separate from each other during the release, immediately thereafter or during post-release. Contingency plans (if feasible) should be in place for such an eventuality.

During this initial phase it is important to gather as much data as possible including visual assessments, photographs and behavioural observations.

During post-release of up to 90 days, the tracking team should be able to calculate how the animals are faring by studying the movement patterns of the animals which, in this case, were tracked via satellite telemetry. If it appeared that an animal (or animals) is spending excessive periods of time in one area or signals are received that indicate that the animals are on or near the beach, it may then be possible to intervene on their behalf, if needed.

The *Back to the Blue* team had the tracking boat in the area, on standby and ready to go on the day of the release. The boat was capable of staying out at sea for a week to 10 days and ready to respond to any emergencies that could arise.

Tracking Tom and Misha

The following process was followed during the PRM period for the *Back to the Blue* Project.

The team immediately began to follow the dolphins after release, maintaining visual contact for as long as possible during the first day. It can be very difficult to spot dolphins at sea as the slightest swell can camouflage a fin. The visual tracking was aided by the use of the VHF transmitter which helped ensure the team were able to maintain contact throughout the release day.

On day two, and subsequently while the team operated from the boat, tracking would commence early in the morning via the download of the satellite signal which would confirm a recent location. The team would then sail to that location and begin tracking via VHF. This would, on most occasions, lead to a visual observation of Tom and/or Misha.

The satellite tags used were Wildlife Computers, Spot 5 single pin attachment satellite tags. These had been custom-made for a comfortable fit, optimising the signal strength of the antenna and reducing drag on the animal. Depending on the signal strength and satellite pass-overs it takes approximately 40 minutes to receive each location fix. The use of satellite tags not only provides a record of movement (see Appendix 2) and a starting location to begin the VHF tracking, it also allows for an extended tracking period that can be carried out remotely and, therefore, in the least invasive manner possible.

The satellite tag was programmed to optimise the life of the battery. They were cycled to send signals for up to a year. Initially they were programmed to transmit daily for the first ninety days and then every other day for three months, then every three days for the next three months and so on.

Tom and Misha split up after five days. Tom continued on a journey west, rounding the Turkish coast at Bodrum and continued north towards Izmir. Misha headed back eastwards along the southern Turkish coast line.

Intervention

Tom then found good hunting grounds off the coast of Kusadesi where he began to solicit attention from people in the water and also to take fish from the nets set out by the fishermen. Due to this behaviour, which was placing him in danger from disgruntled fishermen, the decision was taken to try and capture him and relocate him to the seas off Antalya where Misha was successfully hunting.

The team were able to confirm Tom's behaviour in Kusadesi via reports from the Fishing Cooperative and via monitoring his movements from the satellite positions. After verifying his behaviour over a period of eight days, Tom was captured on September 12th 2012 and placed on a stretcher, suspended in a specially constructed tank that was partly filled with water to help ease the pressure on his internal organs during the journey. He was then transferred by road and successfully released again.

The capture and transport was managed by Jeff Foster and his team and carried out to ensure minimum discomfort for Tom. It was also envisaged that the capture, which took place immediately following Tom's intervention with fishing nets, would act as a deterrent to such behaviour.

Tom was released back into the sea on September 13th 2012. His movement on release was fluid and easy, indicating that the time spent in the stretcher had had no adverse effect.

Tom was visually monitored for the following few days and then subsequently, tracked via satellite which confirmed his continued movement along and around the coastline.

Tom and Misha were subsequently tracked via satellite until 14th October 2012 and 29th November 2012 respectively. Their movements indicating that they were adapting well to their wild environment.

Challenges

Many factors impacted the rehabilitation process, from the dolphins' health and the availability of quality fish (dead and alive), to weather conditions. Additionally, the two dolphins did not necessarily learn at the same pace and therefore it was inevitable that it took time to bring both dolphins to a certain level concurrently. Some specific issues encountered during *Back to the Blue* included:

Fish

It remained a constant struggle to ensure a regular supply of fish. It was vital to ensure a good network of suppliers and also to check each and every fish that was ultimately fed to the dolphins. Damaged fish were discarded. Ultimately, the rehabilitation process was governed by fish quality and availability.

Size of pen limited prime fitness and enrichment opportunities

The 30m diameter sea pen provided a significant space for two dolphins. However, to bring such active and muscular animals to optimum levels in such an area was challenging. Additionally, keeping such mentally active animals alert and interested in an artificially created pen was time-consuming and difficult. Funds permitting, a 'Figure 8' set-up could have worked more efficiently; giving the dolphins more room and variety and the team an opportunity to exercise the dolphins more vigorously at times.

Local community issues

The project was located in a quiet, sheltered bay, with a small community living close by. This had both positive and negative impacts on the project. Local labour was used from time to time (building walkways etc.); friendships were developed and food sourced. Negatively, however, pressure developed within the local community focused round a growing demand for the project to be moved away from 'their' bay. As this coincided with the expiry of our 12 month agreement with S.A.D., the project was ultimately relocated approximately one mile away to the Global Sailing Academy at Gokova.

Appendices

Appendix 1: Daily report form example:

BACK TO THE BLUE PROJECT DAILY REPORT FORM								
Gökova,Türkiye							**Date:**	**16/04/12**
	Air Temperature		**Sea Temperature**		**Salinity(ppt):**		**40**	
Time	**°C**	**°F**	**°C**	**°F**	**Weather :**		**Total Feeding**	
08 00	16.00	65	17.20	62.96	sun	B0	**Tom**	7.600
14 00		32		32	sun		**Misha**	7.000
17 00		32		32			**Faeces Observation**	
							Tom	
							Misha	

Resp. Rates/min		**Activity During Respiration Observation**
Tom		
Mişa		

Sesion	**Time**	**Weight(kg)**	**Species**	**TOM Comments**
1	8:30-8:45	1.200	Sardinella	Husbandry- MP working Tom while JH drew blood from ventral side. Tom a little fidgety at first but calmed down and did well. Rewarded well.
			Squid	
		0.300	P. Mackerel	
			Live Mullet	
			Other	
2	08:50		Sardinella	Dumped green buckets from pen while we were getting ready to leave. Got boys swimming and searching, and not paying attention to us as we left.
		0.300	Squid	
			P. Mackerel	
			Live Mullet	
			Other	
3	9:45-10:00	0.900	Sardinella	Husbandry- MP working Tom on slide outs with multiple people on platform. Does really well with it and doesn't seemed bothered by having people around.
			Squid	
		0.300	P. Mackerel	
			Live Mullet	
			Other	
4	10:50-11:00	0.600	Sardinella	FDD- slingshot in multiple pieces of fish at a time while boys were moving around.
			Squid	
			P. Mackerel	
			Live Mullet	
			Other	
5	12:30 -	0.600	Sardinella	Husbandry- MP scatter fish around med pen pool to get tom

	12:50		Squid	used to feeding from various spots. Afterwards scattered fish around pen to get him moving and swimming.
		0.600	P. Mackerel	
			Live Mullet	
			Other	
6	15:00-15:15	0.900	Sardinella	Husbandry- MP Worked tom from med pool while JF was slowly zipping up gate a little bit. Tom was fine with it, didn't even flinch.
			Squid	
		0.300	P. Mackerel	
			Live Mullet	
			Other	
7	15:40-16:00		Sardinella	Live fish session- 30 or so fish tossed in while JF was in water filming. Animals hunting and eating well.
			Squid	
			P. Mackerel	
		1.600	Live Mullet	
			Other	
8			Sardinella	
			Squid	
			P. Mackerel	
			Live Mullet	
			Other	
9			Sardinella	
			Squid	
			P. Mackerel	
			Live Mullet	
			Other	

Daily Target	7.600	**7.600**	**Remaining**	0.000					
Sardinella	**4.200**	**Squid**	**0.300**	**P. Mackerel**	1.500	**Live Mullet**	1.600	**Other**	0.000

MISHA

Session	Time	Weight(kg)	Species	Comments
1	8:30-8:45	1.200	Sardinella	Husbandry- AS working Misha as JF drew blood from him. Worked in med pen and drew from ventral side. Misha did really well with it, staying calm the whole time. Rewarded well and ended session.
			Squid	
		0.300	P. Mackerel	
			Live Mullet	
			Other	
2	08:50		Sardinella	Dumped green buckets from pen while we were getting ready to leave. Got boys swimming and searching, and not paying attention to us as we left.
		0.300	Squid	
			P. Mackerel	
			Live Mullet	
			Other	
3	9:45-10:00	0.700	Sardinella	Husbandry- AS working Misha on slide out with JH and JF next to him. Was able to get him to slide out and lift tail to touch target pole, with everyone around him. Immediately relaxed once everyone but AS had moved away and doing tail up with just hand cue.
			Squid	
		0.300	P. Mackerel	
			Live Mullet	
			Other	
4	10:50-11:00	0.600	Sardinella	FDD- slingshot in multiple pieces of fish at a time while boys were moving around.
			Squid	
			P. Mackerel	
			Live Mullet	

			Other	
5	12:30 - 12:50	0.400	Sardinella	Husbandry- AS working misha on slide out and was really reluctant to come out. Kept breaking during session and leaving med pen. Had a good approximation at end and ended session afterwards.
			Squid	
		0.600	P. Mackerel	
			Live Mullet	
			Other	
6	15:00- 15:15	0.700	Sardinella	Husbandry- As working Misha from inside med pen while JF was diving and closing up gate slightly. Misha did great with this, stayed in med pen and stayed calm.
			Squid	
		0.300	P. Mackerel	
			Live Mullet	
			Other	
7	15:40- 16:00		Sardinella	Live fish session- 30 or so fish tossed in while JF was in water filming. Animals hunting and eating well.
			Squid	
			P. Mackerel	
		1.600	Live Mullet	
			Other	
8			Sardinella	
			Squid	
			P. Mackerel	
			Live Mullet	
			Other	
9			Sardinella	
			Squid	
			P. Mackerel	
			Live Mullet	
			Other	

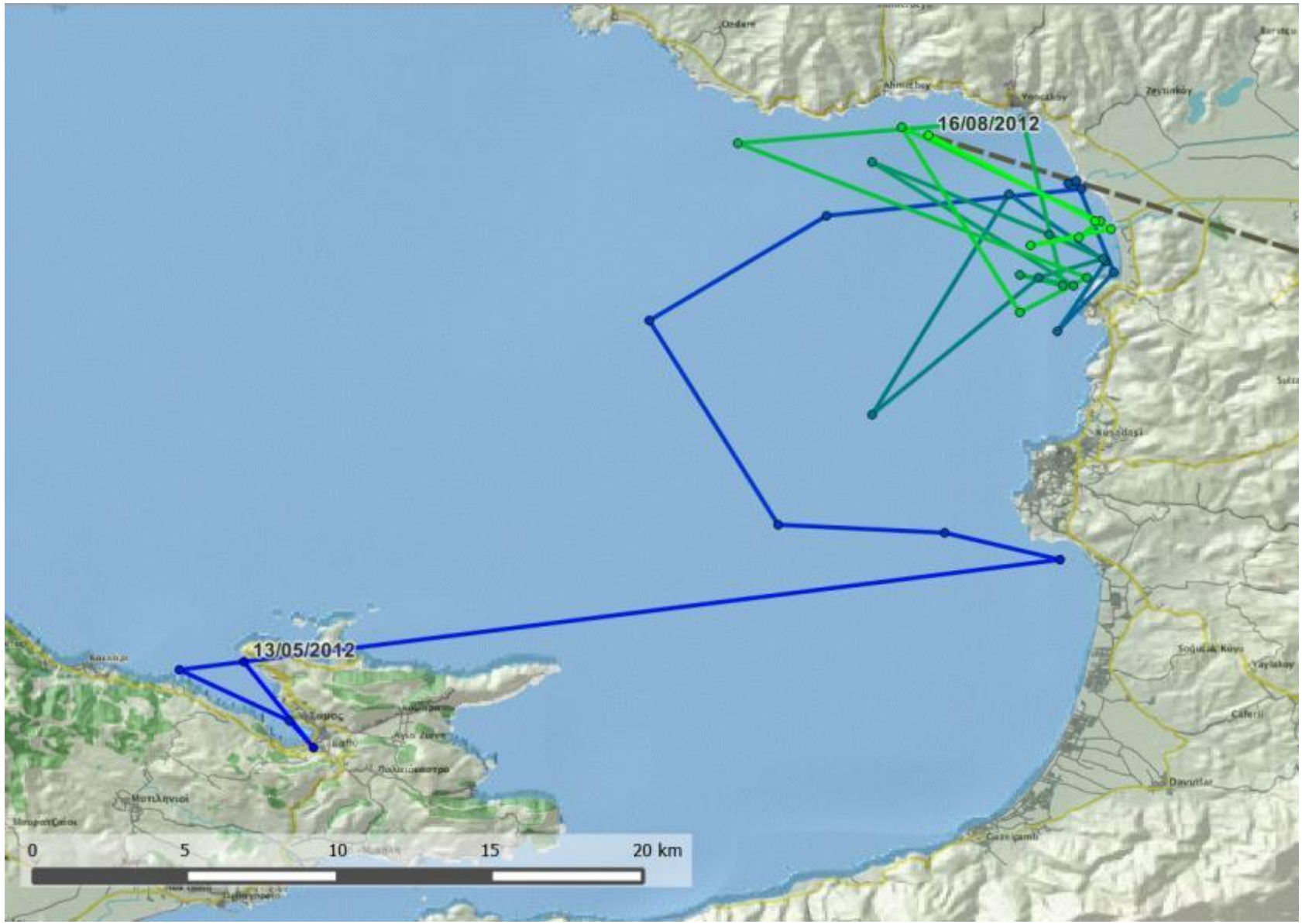
Daily Target	7.000	**7.000**	**Remaining**	0.000					
Sardinella	**3.600**	**Squid**	**0.300**	**P. Mackerel**	1.500	**Live Mullet**	1.600	**Other**	0.000

Special Concerns	
Vet/Medication:	
Both dolphin got 3 vits for each.	
Maintennance Requirements:	
Additional Comments:	
Surface Cleaning of Pen:	**X**
Diver Cleaning of Pen and Netting Check (2X divers) - initials:	**X**
Photographs (weekly):	
Staff on Duty:	Derya Jim Amy Mike Jeff
Holiday/Sickness/Accident:	
Report Form:	

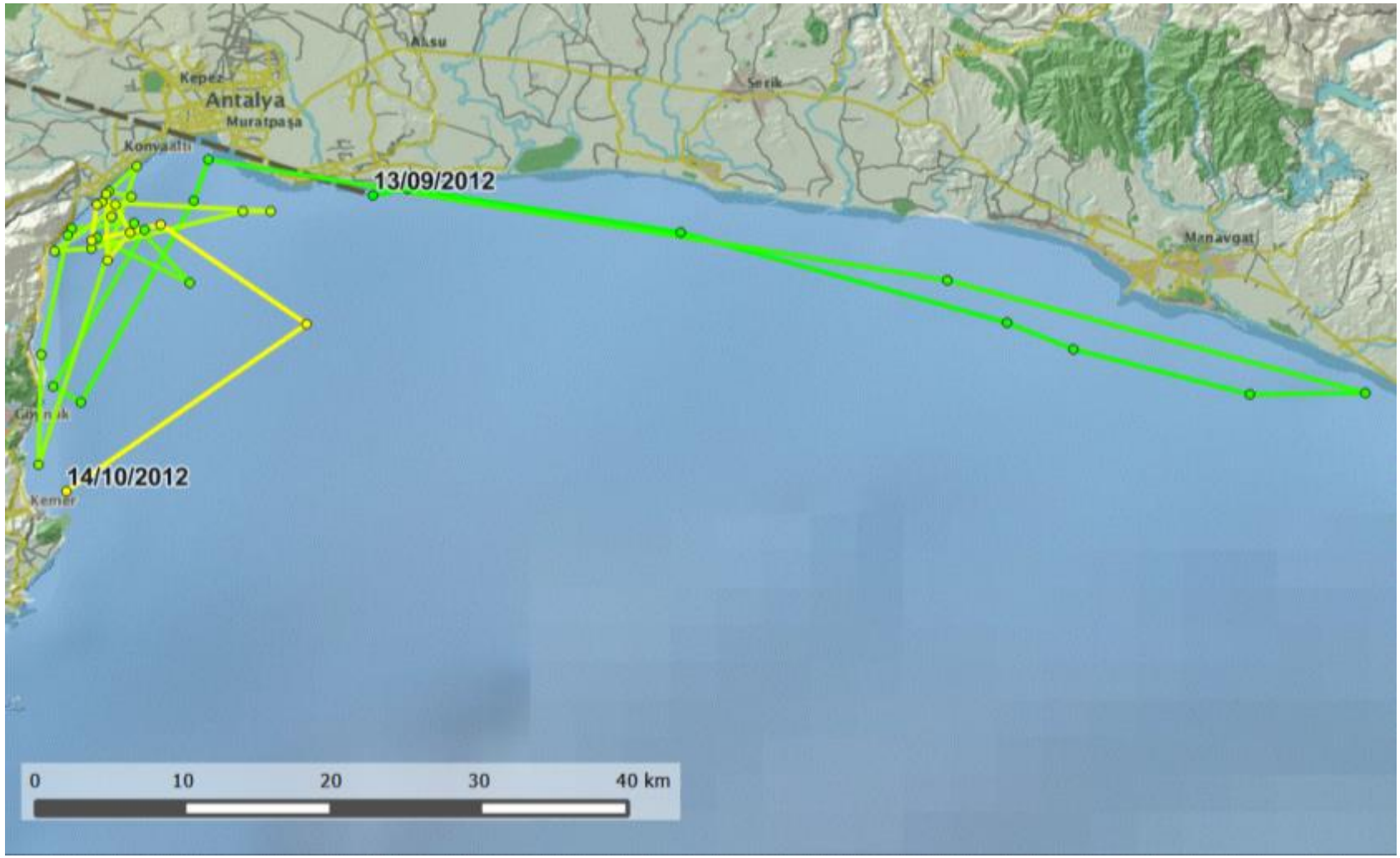
Signature			
GYK Center		**BFF**	
Z. Derya YILDIRIM			

Appendix 2: Post release monitoring maps

Map 3: Misha's movements post release, compiled by Matthew Wood on behalf of the Born Free Foundation (see p50 for © information)



Map 4: Tom's movement post release, compiled by Matthew Wood on behalf of the Born Free Foundation (see p50 for © information)



Map 5: Tom's movement after re-location to Antalya, compiled by Matthew Wood on behalf of the Born Free Foundation (see below for © information)

Topographic data provided by Marine Geoscience Data System at the Lamont-Doherty Earth Observatory of Columbia University, under the Creative Commons Attribution-Noncommercial-Share Alike 3.0 licence. Street map data provided by OpenStreetMap.org and © OpenStreetMap contributor, under the Creative Commons Attribution-ShareAlike 2.0 licence. All other data © Born Free Foundation 2014.

The satellite tags were programmed to optimise the life of the battery. Therefore, they were cycled to send signals for up to a year. Initially they were programmed to transmit daily for the first ninety days and then every other day for three months, then every three days for the next three months and so on. Information collected from 13th May 2012 to 29th November 2012 for Misha and 14th October 2012 for Tom before the tags fell off. On the 13th September 2012 Tom was relocated down the coast to a second location.

The data points are connected by straight lines and therefore appear to move over land on occasion, this is not an accurate reflection of the exact route taken by the Tom or Misha between the two points but is used to demonstrate the general movements of the dolphins post release.

Raw data available on request.