

[REDACTED]

From: [REDACTED]
Sent: Friday, 16 July 2021 9:27 pm
To: [REDACTED]
Cc: [REDACTED]; Kirstie Knowles
Subject: RE: FW: Seeking expert advisors for an orca incident

Correct, nobody has been formally invited. I spoke to [REDACTED] on Meg's recommendation (notes in the directory document), but told him we may or may not get back to him again.

From: [REDACTED] >
Sent: Friday, 16 July 2021 4:22 pm
To: [REDACTED]
Cc: [REDACTED] Kirstie Knowles
<kknowles@doc.govt.nz>
Subject: RE: FW: Seeking expert advisors for an orca incident

I do not believe anyone has been formally invited – I think we were aiming to keep the TAG to a max of 8ish people so that it wasn't so big as to be unable to make decisions

Name that was proposed by both [REDACTED] and [REDACTED] as an orca expert was [REDACTED] – I emailed him on Monday but he was out of the office until 19th July
Key Sea World vet contact is [REDACTED] – he offered to be the key vet contact but there is a panel of 3-4 additional vets that have been providing support
[REDACTED] and [REDACTED] thought [REDACTED] from NOAA might be a good contact in the cetacean rescue practitioners space – they were going to reach out to her for us

From: [REDACTED] >
Sent: Friday, 16 July 2021 4:16 PM
To: [REDACTED]
Cc: [REDACTED] Kirstie Knowles
<kknowles@doc.govt.nz>
Subject: RE: FW: Seeking expert advisors for an orca incident
Importance: High

Hey [REDACTED]

Do you know if anyone else has been formally invited to be a part of the TAG other than [REDACTED]

Also, do you have a thought on who would be the best advisor as an "orca expert", perhaps from SeaWorld?

Just filling in this list from the draft TAG TOR that [REDACTED] started, highlighted are ones that need to be identified. Would be great to have your thoughts.

Membership:

DOC: [REDACTED]
Iwi: Ngāti Toa
Vets: [REDACTED] (Wellington Zoo), [REDACTED] (Welly zoo and Massey), [REDACTED] (HUHA)
Orca experts: Ingrid Visser (ORT), NOAA/Sea

Animal welfare: Massey Univ (via [REDACTED]
Cetacean rescue practitioners: [REDACTED], Seattle Aquarium), [REDACTED] (Animal Rescue Veterinarian, IFAW, USA)
Others to consider:

[REDACTED]

From: [REDACTED]
Sent: Friday, 16 July 2021 3:40 pm
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: FW: Seeking expert advisors for an orca incident

Hi All,

In discussions with Ian yesterday he asked for an objective source of information on Keiko's release as that is also being held up as a model for penning and ocean walks etc. following a boat. See the attached paper published with findings from that time.

For me these sections are probably the most informative

KEIKO'S BEHAVIOR AMONG WILD WHALES

During the initial efforts to release Keiko into the wild in 2000 and 2001, he and the wild killer whales seldom approached and often moved away from one another. In contrast, Keiko followed the wild killer whales shortly after first being led to them in 2002 and the wild whales seemed to tolerate his presence. The distance between Keiko and the wild whales diminished gradually, and one physical interaction was observed close to the end of period 2. The fact that Keiko was observed to follow some of the same individuals for several weeks during 2002, and that some of these same individuals were present during 2000 and 2001 (photographic data, unpublished), suggest that a mutual acclimatization may have facilitated a growing familiarity between Keiko and these particular wild killer whales. This process seemed to be ongoing at the time of the last visual observation off Vestmannaeyjar in 2002. However, keeping in mind that limited visual contact did not allow drawing definitive conclusions, the fact that Keiko was usually seen either on the periphery of the wild whale groups, or logging at various distances from them, suggests that he was not socially integrated with the wild whales at the time of the last visual observation.

EVALUATION AND CONCLUSIONS

A release program can be considered a success when the released animal is able to feed, maintain health and stress levels comparable to his wild conspecifics, show normal predator avoidance behavior, and ultimately reproduce (unless unable for other reasons, such as reproductive senescence). Under these criteria, Keiko's release to the wild was not successful, since though physically unrestricted and free to leave, he kept returning to his caretakers for food and company.

The successful reintroduction of a North Pacific northern resident killer whale A73 (called Springer) in 2002, demonstrates that killer whales can re-bond after at least a relatively short period of separation, even if their mother is no longer present (Francis and Hewlett 2007). Springer was a suitable candidate for release: she was a juvenile, had been under human care for only 1 mo, and was released into her well-researched maternal group, at the time when they feed on abundant salmon runs. Springer was captured with the aim of releasing her into her native group, after it was established that she was lost and unable to survive on her own.

[REDACTED]

From: [REDACTED]
Sent: Friday, 16 July 2021 3:03 PM
To: [REDACTED]
Cc: [REDACTED]
Subject: Re: FW: Seeking expert advisors for an orca incident

Just so everyone is clear, the orca [REDACTED] mentions below is the one we compared against in our original technical advice, which concluded the situation (and likelihood of success) was significantly different.

Cheers

On 16/07/2021 12:42 pm, [REDACTED] > wrote:

For your info. I'll add [REDACTED] contact details to my Technical document on doccm.

From: [REDACTED] seattleaquarium.org>
Sent: Friday, 16 July 2021 12:21 pm
To: Meg Rutledge <merutledge@doc.govt.nz>; [REDACTED]
Cc: Ian Angus <iangus@doc.govt.nz>; [REDACTED]
Subject: RE: Seeking expert advisors for an orca incident

Ki Ora Meg –

Happy to support in any way possible. Here's the other example of a wayward juvenile orca that was successfully reunited I mentioned <https://www.fisheries.noaa.gov/west-coast/endangered-species-conservation/orphan-killer-whale-a73-springer>

[REDACTED]
Director of Life Sciences

[Seattle Aquarium](#)

Ex situ coordinator for IUCN/SSC [Cetacean Specialist Group](#)

[REDACTED]
1483 Alaskan Way | Pier 59 | Seattle | WA 98101-2051

Inspiring Conservation of Our Marine Environment

From: Meg Rutledge <merutledge@doc.govt.nz>

Sent: Thursday, July 15, 2021 5:19 PM

To: [REDACTED] <[\[REDACTED\]@seattleaquarium.org](mailto:[REDACTED]@seattleaquarium.org)>

Cc: Ian Angus <iangus@doc.govt.nz>; [REDACTED]

Subject: RE: Seeking expert advisors for an orca incident

Kia ora [REDACTED]

Thank you for time to talk right now. I am sharing the below email with you, and urgent support would be greatly appreciated. Your extensive experience with cetaceans including transportation and critical care support would be of great value,

[REDACTED] telephone number is [REDACTED]. He is a kiwi, currently living and working in Seattle. He is available for the next couple of hours if you want to talk,

Regards,

Meg

From: [REDACTED]

Sent: Friday, 16 July 2021 11:26 am

To: Meg Rutledge <merutledge@doc.govt.nz>

Subject: Seeking expert advisors for an orca incident

Hi Meg

As discussed just now, here's some background that could be sent to your Seattle contact [REDACTED]

Thanks

[REDACTED]

We have a situation here in New Zealand of an orca calf separated from its natal pod and presently being held and cared for. Your name was mentioned (as the lead for the IWC Stranding Network Expert Panel) by [REDACTED] of NOAA.

We are seeking international advice on our response, and **I would like your advice on who might be the best person(s) internationally to be on an expert advisory panel.** The person would need the right expertise & experience with fields like orca/cetacean incident management, veterinary science, animal ethics and welfare.

A little more history.... Pod was seen Sunday morning free swimming – calf was with adult female. At midday the calf was found stranded. An attempt was made to refloat it at the stranding site but wasn't successful. Advice was given to trailer it to a better location and retry a refloat with hopes the pod was still near enough to hear. Unfortunately no joy so the decision was made to keep the calf in a semi-enclosed boatramp area (seawater).

Calf is estimated to be 2.5-3m long and believed to still be dependant on the mother. Unfortunately despite extensive searching both aerial and on the water has failed to locate the pod. The calf has been kept in the water for the past few days, and was moved last night to a temporary holding pool to avoid a storm forecast. We have been getting a wide range of veterinary advice within NZ.

We know the chances of a dependant calf being reunited with a pod are slim but have been requested to investigate options for supporting the calf to allow time for an attempt to be made.

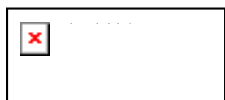
It's possible our advisory group membership will be decided before you can reply, but it's useful in any case for you to be informed of this incident.

Can you also provide **your phone contact details** in case a call is necessary.

Kā mihi

██████████ ██████████
Technical Advisor Marine | Mātanga Mātai Ahu Moana
Hokitika Office
██

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From: [REDACTED]
Sent: Friday, 16 July 2021 3:40 pm
To: [REDACTED]
Cc: [REDACTED]
Subject: RE: FW: Seeking expert advisors for an orca incident
Attachments: From Captivity to the Wild and Back_ An Attempt to Release Keiko.pdf

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[REDACTED]
Director of Life Sciences

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Ex situ coordinator for IUCN/SSC [Cetacean Specialist Group](#)

[REDACTED]
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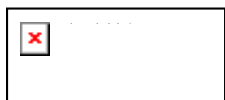
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2009

From Captivity to the Wild and Back: An Attempt to Release Keiko the Killer Whale

M. Simon

Greenland Institute of Natural Resources, P. O. Box 570, 3900 Nuuk, Greenland

M. B. Hanson

NOAA Fisheries

L. Murrey

Moeller Design and Development

J. Tougaard

National Environmental Research Institute

F. Ugarte

Greenland Institute of Natural Resources

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MARINE MAMMAL SCIENCE, **(*) : ***_*** (***) 2009)
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DOI: 10.1111/j.1748-7692.2009.00287.x

From captivity to the wild and back: An attempt to release Keiko the killer whale

M. SIMON

Greenland Institute of Natural Resources,
P. O. Box 570,
3900 Nuuk, Greenland
and
Department of Biological Sciences,
University of Aarhus,
C. F. Møllers Allé, Build. 1131,
8000 Aarhus C, Denmark
E-mail: masi@natur.gl

M. B. HANSON

NOAA Fisheries,
2725 Montlake Boulevard East,
Seattle, Washington 98112-2097, U.S.A.

L. MURREY

Moeller Design and Development,
620 S Industrial Way,
Seattle, Washington 98108, U.S.A.

J. TOUGAARD

National Environmental Research Institute,
University of Aarhus,
Frederiksborgvej 399,
P. O. Box 358, DK-4000 Roskilde, Denmark

F. UGARTE

Greenland Institute of Natural Resources,
P. O. Box 570,
3900 Nuuk, Greenland

A number of cetaceans have been released into the wild, with research or the improved welfare of the individuals in question as the main goal. In a few cases, releases have been monitored with methods such as telemetry or photo-identification (Gales and Waples 1993, Veit *et al.* 1997, Wells *et al.* 1998, Reynolds *et al.* 2000). As a rule, the animals released successfully into the wild had been captive for relatively short periods of time (*e.g.*, 2 yr, Wells *et al.* 1998), were held in sea pens rather than concrete tanks, and some were released in the company of conspecifics (Veit *et al.* 1997, Wells *et al.* 1998). We describe here the last phases of a project aimed at releasing a single killer whale that had been captured as a calf, raised in tanks and kept isolated from conspecifics during most of his life.

The released killer whale, known as Keiko, was a male born into a wild group of killer whales in Icelandic waters. He was captured in 1979 near Vestmannaeyjar, Iceland, approximately 2 yr old, determined from tooth growth layers. After 6 yrs with other killer whales in tanks in Iceland and Canada, he was sold to an amusement park in Mexico. From 1985 to 1996, Keiko lived and performed in a small pool in Mexico City, without contact with other killer whales (bottlenose dolphins were kept periodically in the same tank). In 1996, as the first step of a program to return Keiko to the wild, he was transported to a large concrete enclosure in Oregon. In 1998, he was moved to a bay pen in Klettsvik, a natural bay in the archipelago of Vestmannaeyjar, Iceland, where he received training aimed at a release to the wild (Anonymous 2000).

During the summers of 2000, 2001, and 2002, Keiko was trained to follow his caretakers' boat and take open ocean swims. Each summer, he spent several days in the proximity of wild killer whales that seasonally inhabit the waters around Vestmannaeyjar to feed on summer-spawning herring (Sigurjónsson *et al.* 1988; Jakobsson and Stefánsson 1999; Schorr 2002; Simon *et al.* 2005, 2006, 2007). Biopsies of the wild killer whales were taken during 2000–2001 (Schorr 2002). DNA analyses have shown that there are at least two genetic types of killer whales in the area and that Keiko shared a genotype with some of the wild whales (Hoelzel 2002). In the summer of 2002, as in previous years, Keiko was led to waters off Vestmannaeyjar, Iceland. He experienced minimal human contact for approximately 1 mo, while following wild killer whales. Subsequently, he spent another month swimming from southern Iceland to Norway (Fig. 1). Keiko was taken once more under human care

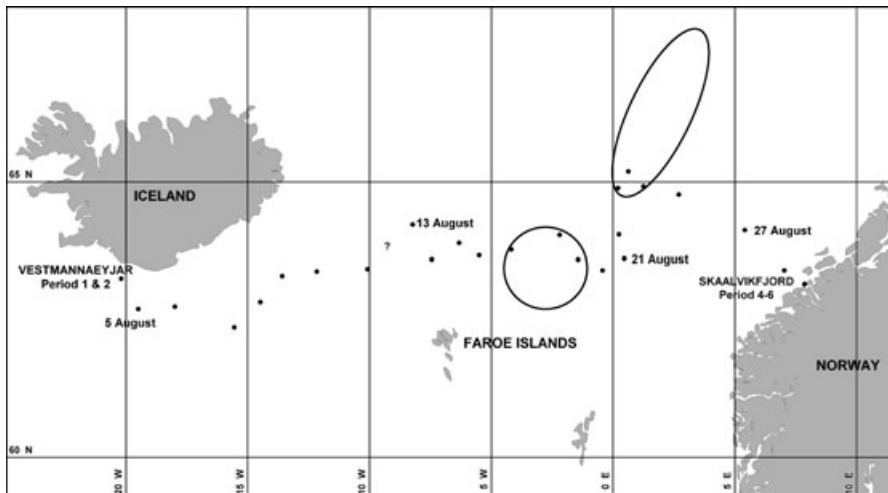


Figure 1. Study area, where the location of the whale is marked during the six periods of the release. The positions given by the satellite tag, during travel from Iceland to Norway in period 3 are marked. The approximate core areas for mackerel in the summer of 2002 are marked with open circles (Anonymous 2003).



Figure 2. Keiko after arriving in Norway with the VHF tag (on top) and SDR tag (below) mounted to his dorsal fin. (Photo by Thorbjörg Kristjansdóttir.)

in Norway and a free access enclosure was constructed in Skálvickfjorden, where he remained until his death in December 2003.

MONITORING AND INSTRUMENTATION

Immediately before the first open ocean swim of 2002, a VHF transmitter (ATS model 201) and a satellite-linked time-depth recorder, SDR (Wildlife Computers SDR-T16, Redmond, WA) were attached to the dorsal fin. The VHF tag allowed us to track Keiko in the field 24 h a day, while the SDR provided a few daily positions and a summary of the diving behavior. The positions provided were obtained within a few hours in the morning and thus did not provide data on Keiko's movements during the day. Therefore we selected the best-quality daily position (Fig. 1). The SDR-T16 tags collect dive data over 6-h time blocks and are transmitted as three different summary histograms of dive depth, dive duration, and time at depth. During a dive, the tag sampled depth every 10 s and logged information into one of 14 intervals (6–26, 26–50, 50–76, 76–100, 100–126, 126–150, 150–176, 176–200, 200–250, 250–300, 300–350, 350–400, 400–450, and >450 m). The tag electronics were over-molded in a urethane housing to fit the irregular surface of Keiko's dorsal fin. After 2 mo of attachment, the tags were inspected visually and there were no signs of tag migration or damage of the tissue surrounding the tags (Fig. 2).

TIMELINE OF RELEASE EFFORT

For purposes of analysis, the study was divided into six periods, based on Keiko's location and contact with humans and wild killer whales (Table 1). During periods 1 and 2, Keiko was off the archipelago of Vestmannaeyjar and adjacent waters, in southern Iceland and periodically observed from a small sailboat. In order

Table 1. The six periods of the study.

Period	Date (2002)	Location	Comments
1	7 July–16 July	Vestmannaeyjar	First period among wild whales
2	17 July–4 Aug.	Vestmannaeyjar	Second period among wild whales
3	5 Aug.–31 Aug.	Iceland to Norway	Eastward movement
4	1 Sept.–3 Sept.	Skálvík fjorden	Contact with people
5	4 Sept.–11 Sept.	Inner Skálvík fjorden	Reduced activity
6	12 Sept.–29 Sept.	Skálvík fjorden area	Behavioral control

to reduce the influence of human contact, visual observations were restricted to a few close approaches per day that allowed us to assess Keiko's behavior and physical condition. If Keiko approached the tracking boat, the crew went below deck or otherwise hid from view until he lost interest. The position of the tracking boat, the time, date, estimated direction and distances to Keiko and to the wild whales, as well as the behavior of the wild whales, were recorded approximately every 15 min. Period 1 and 2 are divided by Keiko swimming back to the bay pen, being fed and receiving human care before being brought back to the wild killer whales. During period 3, he swam from Vestmannaeyjar to Skálvík fjorden, Norway. In period 4, he interacted with people in the waters of Skálvík fjorden. During period 5, he remained in a relatively small area and in period 6, professional caretakers took Keiko for regular swims from inner Skálvík fjorden into nearby waters. Period 6 extended beyond 29 September 2002, the last day included in this analysis.

Period 1

Beginning on 7 July, Keiko spent seven consecutive days in the proximity of wild killer whales. The wild whales were divided into groups that joined, split, and moved in loose coordination, traveling around midnight and returning to forage in specific shallow areas during daytime (a killer whale group was defined as a cluster of animals in close proximity to each other that appeared to be independent to other killer whale groups in the area). Foraging was identified by the arching of a killer whale's body before diving, debilitated fish or fish parts at the surface and birds taking fish from the surface (Simon *et al.* 2007). Keiko switched between different groups of wild killer whales, often remaining on the periphery, at distances of 100–300 m, with his head pointing toward the closest whales. During this period, Keiko was seen either floating motionless (“logging”) or swimming slowly without arching his body. No arching or other behaviors typical for cetaceans prior to dives were observed. Keiko became separated from the wild whales after midnight on 15 July. Later that day, at 10:10, he swam back into the bay pen in Klettsvík, where he remained until the afternoon of 17 July. A stomach sample taken with a large tube was analyzed using a stereomicroscope. The sample consisted of a transparent, slimy liquid without any trace of food remains, showing that Keiko did not eat before entering the bay pen.¹

¹ Personal communication from Gísli A. Víkingsson, Marine Research Institute, P. O. Box 1390, 121 Reykjavík, Iceland, e-mail: gisli@hafro.is, 5 September 2008.

Period 2

Keiko was again led into open water on 17 July and was observed following wild whales during the period 17 July–24 July and again during 27 July–1 August (observations were interrupted on 25 and 26 July due to bad weather). As during period 1, Keiko followed wild killer whales that were split into three to five groups, which moved and interacted in loose coordination inside an area with a diameter of approximately 30 km. A second stomach sample was taken on 23 July, after Keiko was led away from a fishing boat. As with the previous sample, there was only a transparent, slimy liquid and no food remains were observed using a stereomicroscope. During period 2, the distance between Keiko and the wild whales progressively decreased. By 27 July he was regularly seen closer than 30 m from the closest wild whale. A brief physical interaction was witnessed on 30 July, when Keiko dove among foraging whales and surfaced in very close proximity to three adult males and at least two females or immature males. There was a splash from the tail of one of the wild whales, which was swimming ventral side up, with his head below Keiko, while he was at the surface. The splash was accompanied by a “startle” reaction from Keiko who swam to the tracking boat, while one of the female/juvenile whales surfaced after him. This was the only time Keiko was seen diving among killer whales and the only physical interaction observed. On 27 July, Keiko was seen arching his back before diving and then later breaking the surface of the water with his rostrum, as if ascending vertically. On 29 July, on two occasions, Keiko was seen raising his fluke up before diving, indicating a vertical descent.

Period 3

Keiko spent the majority of period 3 offshore, swimming from Iceland to Norway. There was no visual contact between 2 August and 29 August when he was tracked with the satellite transmitter. As his track soon veered off the suspected migration routes of killer whales between southern and eastern Iceland (Sigurjónsson and Leatherwood 1988), Keiko might have been alone during this period although due to the lack of visual contact we cannot be certain. On 30 August, Keiko was observed close to Kristiansund, Norway, a few meters from shore, in very shallow water. His physical appearance was healthy: the skin color and texture seemed normal, he did not look emaciated, and the tissue around the tag showed no signs of tag migration or infection. In addition, he seemed to move more actively than observed during periods 1 and 2.

Period 4

Keiko followed a small open boat with local people that were out for a pleasure fishing trip. He followed the boat into its home place in Skálvikfjorden and interacted with local people from 1 September to 3 September. During daylight hours, a crowd, from land and boats, was almost constantly soliciting his attention, trying to touch him or swim with him. In the beginning of this period, Keiko often initiated the

interactions and swam actively from one group of people to another. At about 1900 on 3 September, Keiko was seen logging and swimming slowly toward the inner parts of Skålvikfjorden. At the time of the observation, several small boats were following and surrounding him on four sides, with the passengers hitting the boat hulls, trying to attract his attention. Keiko was notably less active than earlier in this period.

Period 5

During 4 September, Keiko placed himself below and between two skiffs tied to a floating bridge. During daylight hours, until 9 September, he remained almost motionless close to this spot. On at least two occasions, people fed Keiko with small amounts of fish. On the afternoon of 6 September, the local animal welfare authorities issued a legislation prohibiting people to touch, feed, or approach Keiko closer than 50 m, whether from land or by sea. Keiko's caretakers started feeding him again on 8 September. In order to raise the activity level of the passive whale, caretakers took Keiko for short swims with a boat within the waters of inner Skålvikfjorden on 9 September.

Period 6

During period 6, Keiko's physical activity was systematically encouraged by his trainers and he was taken for longer swims into Skålvikfjorden and adjacent waters. During this period, Keiko's activity increased to levels similar to the years he spent in Klettsvik bay pen in Iceland before the release. Period 6 extended beyond 29 September 2002, the last day included in this analysis. Keiko stayed in the free access bay pen in Skålvikfjorden. Usually he had access to the open water and he swam alone outside the bay pen, returning by himself. Keiko died in December 2003 apparently from pneumonia, approximately 26 yr old.

DIVE BEHAVIOR

Two hundred and nine dive-depth histograms were received, containing summed information from a total of 1,264 h. Of 7,541 dives recorded, 93.4% were between 6 and 26 m deep. Of the dives deeper than 26 m, 98% occurred during periods 2 and 3. There were significantly fewer dives/h during period 5 compared to periods 1, 2, 3, and 4 (Tukey's Studentized range test, $P < 0.01$). There were also fewer dives/h during period 5 than during period 6 (Table 2), but this difference was not significant. The largest number of dives/h deeper than 50 m was recorded on 29 July. This coincides with the observed fluking in the surface before diving. The deepest recorded dive of 72 m occurred on 3 August, at the end of period 2 (Table 2). During all periods, Keiko spent more than 80% of the time in the upper 4 m of the water column.

Table 2. Maximum dive depth during the six periods of the study where n is the number of 6-h periods and the number of dives per hour during all six periods. A dive is defined as >6 m.

Period	Average maximum depth (SD)	Maximum depth range (n)	Average number of dives/h (SD)	Range of dives/h (n)
1	17.7 m (7.6)	12–32 m (7)	6.3 (4.4)	0–18 (36)
2	53.0 m (16.4)	32–72 m (4)	7.6 (3.0)	0.3–13.7 (37)
3	45.3 m (10.3)	36–64 m (6)	7.9 (4.2)	0–20.2 (66)
4	16.0 m ^a	16 m (1)	5.9 (6.1)	0–16.3 (9)
5	12.0 m (9.1)	4–28 m (6)	0.1 (0.2)	0–0.7 (18)
6	12.8 m (6.5)	0–24 m (10)	3.1 (3.6)	0–14.8 (45)

^aOnly one status message was received for period 4.

One hundred and ninety-one dive duration histograms were received, which summarize 1,146 h. The dive-duration intervals are: 0–1, 1–3, 3–5, and >5 min. There were on average significantly more dives with durations of 0–1 min during period 4 than in the other periods. The number of dives lasting 0–1 min during period 5 was lower than in the other periods, but this difference was not significant. The average number of dives with durations of 1–3 min was significantly lower during period 5 than in all other periods except period 6 (Tukey's Studentized range test, $P < 0.01$). There were significantly more long dives (>3 min) during periods 2 and 3 compared to the other periods (Tukey's Studentized range test, $P < 0.01$).

Two hundred and twenty-three time-at-depth histograms were received, summarizing 1,338 h. There was no significant difference in how much time Keiko spent at 6–26 m among the different periods (Nonparametric one-way ANOVA, $F = 3.36$, $df = 5$, $P > 0.05$ [Barnard *et al.* 2001]). Keiko spent significantly more time at 26–50 m during period 2 than during all other periods, with the exception of period 3 (Tukey's Studentized range test, $P < 0.01$). The diving behavior during the most active periods were compared to the dive data presented by Schorr *et al.* (2001), who deployed eight suction-cup attached time-depth recorders on wild killer whales off Vestmannaeyjar (202 h), in summer 2000. Average number of dives per hour and average duration of dives, for dives longer than 1 min, were compared with daytime data from Keiko collected in periods 2 and 3. The average duration of dives was estimated from dive duration histograms, excluding the 0–1 min bin and assuming that the average duration of dives in each bin was the center of the bin range.

Keiko made fewer dives >1 min than did the wild killer whales from Vestmannaeyjar. However, there was no significant difference between Keiko and the wild whales in the duration of these dives (Table 3). When looking at the different depth intervals of dives longer than 1 min, Keiko dove more often than the wild whales to depths of 6–26 m, but less often than the wild whales to depths >26 m (Table 3). Schorr *et al.* (2001) noted that the wild killer whales off Vestmannaeyjar spent an average of 76% of their time in the top 10 m of the water column. In comparison, Keiko spent more than 80% of the time in the upper 4 m.

Table 3. Number of dives per hour and dive duration, for dives longer than 1 min, of wild killer whales ($n = 202$ h). The data on Keiko's dive behavior include periods 2 and 3, minus time block 2100–0300. Average number of dives per hour for the four depth intervals for wild killer whales ($n = 5.5$ h, Schorr *et al.* 2001) and Keiko ($n = 468$ h from periods 2 and 3).

	Wild whales (SD)		Keiko (SD)
	Day	Night	
Average dives/h	9.2 (2.16)	9.6 (3.70)	5.41 (2.88)
Average duration (min)	2.4 (0.7)	1.8 (0.37)	2.84 (0.97)
6–26 m		1.6	7.6
26–50 m		1.8	0.8
50–76 m		3.6	0.1
76–100 m		0.36	0.0

KEIKO'S BEHAVIOR AMONG WILD WHALES

During the initial efforts to release Keiko into the wild in 2000 and 2001, he and the wild killer whales seldom approached and often moved away from one another. In contrast, Keiko followed the wild killer whales shortly after first being led to them in 2002 and the wild whales seemed to tolerate his presence. The distance between Keiko and the wild whales diminished gradually, and one physical interaction was observed close to the end of period 2. The fact that Keiko was observed to follow some of the same individuals for several weeks during 2002, and that some of these same individuals were present during 2000 and 2001 (photographic data, unpublished), suggest that a mutual acclimatization may have facilitated a growing familiarity between Keiko and these particular wild killer whales. This process seemed to be ongoing at the time of the last visual observation off Vestmannaeyjar in 2002. However, keeping in mind that limited visual contact did not allow drawing definitive conclusions, the fact that Keiko was usually seen either on the periphery of the wild whale groups, or logging at various distances from them, suggests that he was not socially integrated with the wild whales at the time of the last visual observation.

DID KEIKO FEED?

Prior to summer 2002, Keiko's diving performance was modest, with maximum recorded dive depths shallower than 35 m.² During summer 2002, the diving profile evolved from relatively short and shallow dives during period 1, to deeper and longer dives in periods 2 and 3. The increased diving activity recorded during period 2 corresponds well with observations of Keiko performing behaviors characteristic of deep dives, such as arching the body and lifting the flukes before diving. This

²Personal communication from Jeff Foster, Marine Research Consultants LLC, 2420 Nellita Road NW, Seabeck, WA 98380, U.S.A., e-mail: jefffoster13@yahoo.com, June 2001.

evolution caused Keiko's most active diving profile to resemble the profiles observed for wild Icelandic killer whales. Because he made shallower and less frequent dives than wild killer whales, and due to the failure to observe him consistently diving among feeding wild whales, it seems unlikely that Keiko actively participated in the wild whales' cooperative hunts. However, the increase in depth and duration of Keiko's dives during period 2 suggests that he nevertheless may have been able to obtain food while among the feeding wild whales. Observations of stunned herring at the surface, as well as underwater recordings, indicate that Icelandic killer whales immobilize herring by hitting the fish schools with the underside of their flukes, as Norwegian killer whales do (Simon *et al.* 2005). Underwater observations of Norwegian killer whales feeding showed that a considerable number of immobilized herring were not taken by the killer whales that debilitated them, but by other killer whales, fish, or sea birds (Similä and Ugarte 1993). A similar situation seems to take place when Icelandic killer whales hunt herring (Simon *et al.* 2005). Though Keiko was not seen feeding on live herring, it is possible that he could have fed on already stunned fish without diving as deep or as often as the wild killer whales. However, it is unlikely that he consumed any significant amount of food shortly before 15 July and 23 July, when samples of his stomach contents were obtained. During period 3, while traveling to Norway, Keiko moved on average 71.8 km/d, calculated from straight-line connections between satellite locations. The mean swimming speed of undisturbed resident killer whales in British Columbia was 5.19 km/h, SD 2.52 km/h (Kruse 1991). Assuming Keiko moved with an average speed of 5 km/h, which allows for low energy consumption (Yazdi *et al.* 1999), he would have been capable of traveling this distance of 71.8 km/d in 14.4 h, resulting in a surplus of nearly 10 h/d. This can be interpreted in two ways: either he did not swim in a straight line between satellite positions, or he spent time engaged in other activities such as resting or foraging. The relatively high diving activity during period 3 indicates that Keiko performed behaviors other than resting or horizontal traveling during this long trip, including the possibility that he was foraging. Of the potential prey species that Keiko was likely to encounter, blue whiting and squid are found at depths deeper than 200 m during daylight, outside his observed diving range. However, these potential prey items ascend to the surface at night and it is therefore possible that they were intermittently available. Mackerel seem a likely prey candidate during period 3, since Keiko spent approximately 10 d in an area with a high concentration of this species, which can be found within the upper 20 m of the water column throughout the day and night (Fig. 1, Anonymous 2003). The fact that no difference was detected in the diving behavior between the times Keiko spent inside and outside of the mackerel grounds may suggest that he did not take advantage of this prey. However, as the mackerel are available in the top of the water column during the day, Keiko might have captured this fish without significantly changing his diving behavior. It is possible that Keiko did not feed at all during the time he was independent of human care. Newly captured killer whales are able to live without food for several weeks before eating dead fish (Hoyt 1998). However, this seems unlikely given the healthy appearance and behavior of Keiko when he was first observed in Norway, as

well as the fact that a veterinarian, based on girth measurements, blood samples and photographs, concluded that the whale had fed (Cornell 2002).

HUMAN IMPACT ON KEIKO'S BEHAVIOR

Before July 2002, Keiko had no contact with the tracking boat and, as a rule, had very little contact with her crew. During periods 1 and 2, the tracking boat spent 18 d at sea tracking Keiko. Keiko approached the tracking boat on 16 occasions, with durations ranging from 2 min to <2 h. During these approaches, Keiko would either swim close to the boat or log with his head almost touching the hull. On two occasions, repeated loud vocalizations attributed to Keiko were heard below deck.

During periods 1 and 2, Keiko approached the caretakers' boat on the two occasions when this boat was out of the harbor. The first time was on 8 July, when Keiko had been on his own for one day, during which the caretakers' boat had been drifting with the engine off. When the caretakers' boat switched on the engine for the first time, Keiko, who was 2 nmi away, homed straight for it and remained in its proximity for 57 h. Keiko approached the caretakers' boat a second time, during a crew change on 22 July, and remained in its proximity until 23 July.

Despite the fact that the crew of both the tracking boat and the caretakers' boat reacted the same way to Keiko's approaches (*i.e.*, by going below deck and ignoring him), Keiko remained for much longer periods of time by the caretakers' boat, suggesting that he was more strongly attached to it (or to its crew) than to the tracking boat. When Keiko arrived in Norway in period 4, he actively sought out human company, swimming to boats and people. To begin with he was very active, though staying near the surface only diving for 0–1 min at a time. After a few days Keiko became inactive staying near a small boat (period 5), possibly to avoid the large and steadily increasing crowd of people, now seeking his attention. The frequency of dives and the number of dives lasting more than 1 min were significantly less during period 5 than during the rest of the study, and all other parameters showed the lowest levels of activity during this period. The lack of activity was also evident from visual observations, and possible explanations, not necessarily mutually exclusive, include: stress triggered by the extremely high rate of interactions with people during period 4, physical exhaustion or an infection. A moderately high white cell count from a blood sample taken during period 5 supports the suspected infection.³ Alternatively, the white cell count could have been due to dehydration caused by lack of food. At the end of period 5 and during period 6, when professional caretakers took charge of Keiko, his diving parameters began to approach levels similar to those measured at the start of the study.

EVALUATION AND CONCLUSIONS

A release program can be considered a success when the released animal is able to feed, maintain health and stress levels comparable to his wild conspecifics, show

³Personal communication from Colin Baird, Noble Caledonia Limited, 2 Chester Close, Belgravia, London SW1X 7BE, U.K., e-mail: colinbaird@hotmail.com, September 2002.

normal predator avoidance behavior, and ultimately reproduce (unless unable for other reasons, such as reproductive senescence). Under these criteria, Keiko's release to the wild was not successful, since though physically unrestricted and free to leave, he kept returning to his caretakers for food and company.

Two bottlenose dolphins were released in Florida in 1990 and resighted continuously until at least 1996 (Wells *et al.* 1998). Based on this successful release, Wells *et al.* (1998) listed several recommendations, some of which can be summarized as follows: (1) release more than one animal together in a social functional unit; (2) released animals should be young of age; (3) release short-term captive animals; (4) keep animals in acclimatizing pen before release; (5) release in native waters; (6) locate sources of live prey for readaptation; (7) study ranging and social association patterns in host community before, during, and after release; and (8) study behavior of released animals before, during, and after release. Keiko's release effort fulfilled to some extent recommendations 4–8, but failed to fulfill recommendations 1, 2, and 3; Keiko was not part of a killer whale social unit, he was not young, and he had been in captivity for the majority of his life.

Wells *et al.*'s (1998) recommendations were made for bottlenose dolphins, generally living in fission-fusion societies (Wells 1991), and additional factors may need to be taken into account when considering release of captive killer whales. The best-studied killer whale populations form strongly bonded matriarchal family groups throughout life (*e.g.*, Bigg *et al.* 1990, Baird and Dill 1996), that forage cooperatively (Similä and Ugarte 1993). Even the males keep strong bonds with their close relatives, communicating with a group-specific repertoire of calls and whistles (Ford 1991, Strager 1995, Ford and Ellis 1999, Riesch *et al.* 2006). Thus the survival of a released captive killer whale might depend on an adoption to a wild group of killer whales. The successful reintroduction of a North Pacific northern resident killer whale A73 (called Springer) in 2002, demonstrates that killer whales can re-bond after at least a relatively short period of separation, even if their mother is no longer present (Francis and Hewlett 2007). Springer was a suitable candidate for release: she was a juvenile, had been under human care for only 1 mo, and was released into her well-researched maternal group, at the time when they feed on abundant salmon runs. Springer was captured with the aim of releasing her into her native group, after it was established that she was lost and unable to survive on her own.

Keiko lived in a very small tank in an amusement park in Mexico City when he performed in the 1993 family film *Free Willy*. Thereafter, there was a strong public pressure to release Keiko to the wild, preferably to his “family” group in Iceland. Keiko was not chosen for release based on his suitability. In retrospect, Keiko was indeed a poor candidate for release, due to the early age of his capture, long history of captivity, prolonged lack of contact with conspecifics, and strong bonds with humans.

The release of Keiko demonstrated that release of long-term captive animals is especially challenging and while we as humans might find it appealing to free a long-term captive animal, the survival and well being of the animal may be severely impacted in doing so.

Through the last decades, several captive dolphins have been released to the wild. The fate of the majority of these animals is unknown, and most of those monitored

ended up being recaptured and under human care (review in Gales and Waples 1993). Because there is a high risk of not succeeding, Gales and Waples (1993) concluded that it is absolutely necessary to monitor released animals with any technology available, in order to help the animals if they are in distress. Due to the effective VHF and satellite tracking of Keiko after release, his caretakers were able to re-establish contact with him when he showed signs of distress. In agreement with Gales and Waples (1993), this report shows that a combination of VHF and satellite tracking and a contingency plan for return to human care are necessary if the goals of a release project include the long-term well-being of the animal.

ACKNOWLEDGMENTS

This paper is dedicated to Stephen Claussen, one of Keiko's trainers. The project would not have been possible without the significant early efforts by the Ocean Futures staff led by team leader Jeff Foster from 1997 to 2001 and the staff of the Free Willy/Keiko Foundation, Iceland, directed by field manager Colin Baird and supervised by Charles Vinick. Adam Lalich skippered the tracking boat *Vamos*. Gisli Vikingsson and Sverrir D. Halldorsson, Icelandic Marine Research Institute, analyzed Keiko's stomach samples. Lars and Anita Lillebø and Frank Haavik, from Halså County helped establishing the new base for Keiko in Norway. Naomi Rose and Dave Philips encouraged the writing of this work and offered valuable comments to an earlier draft, together with Toni Frohoff, Sharon Young, Paul Spong, Helena Symonds, Robin Baird, and two anonymous reviewers. Craig McCaw and The Humane Society of the United States (HSUS) provided financial support. The Wendy McCaw Foundation supported tag development. The attempt to release Keiko into the wild in 2002 was a joint effort of The HSUS, Ocean Futures, and the Free Willy/Keiko Foundation.

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Accepted: 24 November 2008

[REDACTED]

From: Kirstie Knowles
Sent: Saturday, 17 July 2021 8:09 am
To: [REDACTED]
Subject: RE: Invite to participate in the Technical Advisory Group in response to the orca calf stranded in NZ

Kia ora [REDACTED],
Thank you so much for your ongoing advice and support. We really appreciate this and thank you for confirming participation on the Advisory Panel.
I will keep you posted as I find out more today.

Ngā manaakitanga - Best wishes

Kirstie Knowles
Marine Ecosystems Manager
Te Papa Atawhai - DOC

Note: I support flexible working and may be sending this out of usual office hours. I do not expect an out of hours response.

On 17/07/2021 4:52 am, "[REDACTED]@SeaWorld.com" wrote:
Hi Lydia,

Thank you for the measurement data, glad [REDACTED] was able to respond with data, our last calf in 2014 was 190 cm at 81 days and 230 at 132 days, so agree that calf most-likely < 3 months of age.
Girth measurement behind the pectoral flippers and in front of the dorsal fin, in addition to length, will provide the best indication of weight gain with abdominal enlargement.

I'm willing to continue veterinary involvement in the medical treatment of this calf on an advisory panel and can make myself available for Zoom or Teams discussions.

With regards,
[REDACTED]

From: [REDACTED]
Sent: Thursday, July 15, 2021 10:11 PM
To: [REDACTED]@SeaWorld.com>
Cc: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: [EXTERNAL] Invite to participate in the Technical Advisory Group in response to the orca calf stranded in NZ

Hi [REDACTED]

I just wanted to start by saying thank you again for all your support already with regards to the veterinary care of this stranded orca calf here in New Zealand. We are in the process of putting together an expanded Technical Advisory Group with both local and international experts to assist the decision makers with scenario planning for this individual.

We are very keen to a veterinary voice on that advisory panel and I was wondering whether either yourself or one of the team that have been helping to provide advice so far would be willing to be on the panel? Current thinking is to have these meetings via Zoom or Teams to allow for discussion amongst the group.

I have copied in Kirstie Knowles who is getting this group set up and we would love to hear your thoughts on whether you are willing and able to be a part of this team. The plan to would for this group to meet over the weekend if at all possible or otherwise on Monday (NZ time).

Kindest Regards,



Veterinary Advisor Kākāpō - *Kaitohutohu Rata Kararahe Kākāpō*

Department of Conservation - *Te Papa Atawhai*

Postal address: Department of Conservation, PO Box 743, Invercargill 9840, New Zealand

Physical address: Department of Conservation, Level 7, 33 Don Street, Invercargill 9480, New Zealand

<http://kakaporecovery.org.nz/>



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From: Kirstie Knowles
Sent: Sunday, 18 July 2021 3:50 pm
To: [redacted]@ucdavis.edu
Cc: Ingrid [redacted]; Sarah Owen; Dave Smith; Ian Angus
Subject: FW: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group
Attachments: Orca Plimmerton TAG TOR - DOC-6722568.docx

Follow Up Flag: FollowUp
Flag Status: Flagged

Kia ora [redacted],
Please see invite below.
Apologise for not getting your emails in time – just missed you!
I hope you can participate.

Ngā manaakitanga – Best wishes,

Kirstie Knowles (she/her)

Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*
Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*
Department of Conservation – *Te Papa Atawhai*

Focal point for: IUCN-WCPA, Local Gov Coastal-SIG, Sustainable Seas Challenge, NZ Marine Sciences Society

[redacted]

Mon	Tues	Wed	Thurs	Fri
✓	🏠	✓	✓	🏠

✓ = In the office; 🏠 = Working remotely; X = Not at work



From: Kirstie Knowles
Sent: Sunday, 18 July 2021 3:35 pm
To: [redacted]@seaworld.com; [redacted]@seaworld.com; [redacted]@ifaw.org; [redacted]@massey.ac.nz
Cc: s [redacted]; Ingrid [redacted]; Ian Angus <iangus@doc.govt.nz>; Sarah Owen <sarahowen@doc.govt.nz>; Dave Smith <dwsmith@doc.govt.nz>
Subject: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

Kia Ora koutou – Hello everyone,

I would like to thank you all again for the support and advice you have provided to date re the stranded orca calf here in Plimmerton, Aotearoa-New Zealand. We would like to invite you all to participate in a Technical Advisory Group discussion tomorrow morning, **Monday 18 July at 8am NZ time**. I hope this time will work for you all. We are also inviting [redacted] and [redacted] to join the TAG. Draft Terms of Reference for this group are attached and will be confirmed at our meeting.

Subject to your confirmation, I will send out a Microsoft Teams meeting invite and am available for questions if you have any in the interim.

Ngā manaakitanga – Best wishes,

Kirstie Knowles (she/her)

Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*

Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*

Department of Conservation – *Te Papa Atawhai*


Phone: [REDACTED]

www.doc.govt.nz



~Toitū te marae o Tane, Toitū te marae o Tangaroa, Toitū te iwi - If the land endures, and the sea endures, so too will the people~



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Orca incident, Plimmerton July 2021
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To advise on the best approach for the welfare of this animal (orca).

Reporting to:

DOC CIMS structure - decision maker (Jack Mace).

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- adhering to the requirements of independence, impartiality and objectivity.

DRAFT

[REDACTED]

From: Dave Smith
Sent: Sunday, 18 July 2021 9:45 pm
To: Kirstie Knowles
Subject: FW: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

Hi Kirstie

Just FYI, I was talking to [REDACTED] and [REDACTED] tonight, and [REDACTED] said he would try to make the meeting too. I'm keen for him to attend if he does find time. Having two reps present would make it much more likely any iwi views get expressed.

D

From: [REDACTED] >
Sent: Sunday, 18 July 2021 4:55 pm
To: Kirstie Knowles <kknowles@doc.govt.nz>; [REDACTED]@seaworld.com; [REDACTED]@seaworld.com; [REDACTED]@ifaw.org; [REDACTED]@massey.ac.nz
Cc: Ingrid [REDACTED]; Ian Angus <iangus@doc.govt.nz>; Sarah Owen <sarahowen@doc.govt.nz>; Dave Smith <dwsmith@doc.govt.nz>
Subject: RE: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

Kia ora Kristie

I can confirm I am available tomorrow at 8am

Nga mihi

From: Kirstie Knowles [<mailto:kknowles@doc.govt.nz>]
Sent: 18 July 2021 3:35 PM
To: [REDACTED]@seaworld.com; [REDACTED]@seaworld.com; [REDACTED]@ifaw.org; [REDACTED]@massey.ac.nz
Cc: s [REDACTED]; Ingrid [REDACTED]; Ian Angus; Sarah Owen; Dave Smith
Subject: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

Kia Ora koutou – Hello everyone,

I would like to thank you all again for the support and advice you have provided to date re the stranded orca calf here in Plimmerton, Aotearoa-New Zealand. We would like to invite you all to participate in a Technical Advisory Group discussion tomorrow morning, **Monday 18 July at 8am NZ time**. I hope this time will work for you all. We are also inviting [REDACTED] and [REDACTED] to join the TAG. Draft Terms of Reference for this group are attached and will be confirmed at our meeting.

Subject to your confirmation, I will send out a Microsoft Teams meeting invite and am available for questions if you have any in the interim.


Ngā manaakitanga – Best wishes,

Kirstie Knowles (she/her)
Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*
Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*
Department of Conservation – *Te Papa Atawhai*
Phone: [REDACTED]



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DRAFT

[Redacted]

From: Kirstie Knowles
Sent: Sunday, 18 July 2021 5:01 pm
To: [Redacted]@wellingtonzoo.com
Subject: FW: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group
Attachments: Orca Plimmerton TAG TOR - DOC-6722568.docx

Follow Up Flag: FollowUp
Flag Status: Flagged

Hi [Redacted]
As discussed with [Redacted], we're keen that you join our Technical Advisory Group discussion tomorrow. See below. Hope you can join us as you've been at the heart of veterinarian advice to date. Any questions my number is below. I'll forward the Teams meeting invite shortly...

Kirstie Knowles (she/her)

Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*
Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*
Department of Conservation – *Te Papa Atawhai*

Focal point for: IUCN-WCPA, Local Gov Coastal-SIG, Sustainable Seas Challenge, NZ Marine Sciences Society

📞 + [Redacted]

Mon	Tues	Wed	Thurs	Fri
✓	🏠	✓	✓	🏠

✓ = In the office; 🏠 = Working remotely; ✗ = Not at work



From: Kirstie Knowles
Sent: Sunday, 18 July 2021 3:35 pm
To: [Redacted]@seaworld.com; [Redacted]@seaworld.com; [Redacted]@ifaw.org; [Redacted]@massey.ac.nz
Cc: [Redacted] Ingrid [Redacted]; Ian Angus <iangus@doc.govt.nz>; Sarah Owen <sarahowen@doc.govt.nz>; Dave Smith <dwsmith@doc.govt.nz>
Subject: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

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Kirstie Knowles (she/her)

Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*

Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*

Department of Conservation – *Te Papa Atawhai*

Phone: [REDACTED]

www.doc.govt.nz



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From: Kirstie Knowles
Sent: Sunday, 18 July 2021 3:35 pm
To: [redacted]@seaworld.com; [redacted]@seaworld.com; [redacted]@ifaw.org; [redacted]@massey.ac.nz
Cc: [redacted]@xtra.co.nz; Ingrid [redacted]; Ian Angus; Sarah Owen; Dave Smith
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Department of Conservation – *Te Papa Atawhai*
Phone: [redacted]

www.doc.govt.nz



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DRAFT

[REDACTED]

From: [REDACTED]@wellingtonzoo.com>
Sent: Sunday, 18 July 2021 3:51 pm
To: [REDACTED]
Cc: [REDACTED]
Subject: Re: [EXTERNAL] RE: Stranded orca calf in New Zealand

That's great news; thank you for the update! I'm looking forward to learning the outcome of those meetings as well!

From: [REDACTED]@wellingtonzoo.com>
Date: Sunday, 18 July 2021 at 2:23 PM
To: [REDACTED]
Cc: [REDACTED]@wellingtonzoo.com>, [REDACTED]
[REDACTED]@wellingtonzoo.com>
Subject: RE: [EXTERNAL] RE: Stranded orca calf in New Zealand

Thanks so much [REDACTED] for letting us know. Look forward to seeing the outcome of the discussion!

[REDACTED] BVSc, MVSc (Zoo Animal and Wildlife Health), MANZCVS (Avian Health)
Senior Veterinarian | Animal Care and Science | Wellington Zoo Trust
200 Daniell Street | Newtown | Wellington 6021
Ph [REDACTED]
E [REDACTED]@wellingtonzoo.com | W www.wellingtonzoo.com | 

From: [REDACTED]
Sent: 18 July 2021 14:12
To: [REDACTED]@wellingtonzoo.com>
Cc: [REDACTED]@wellingtonzoo.com>; [REDACTED]@wellingtonzoo.com>
Subject: Re: [EXTERNAL] RE: Stranded orca calf in New Zealand

Hi Welly Zoo super vets,

Just so you know DOC are putting together an international technical advisory group today with the aim to do scenario planning around options from here on in with an aim towards having a set plan by tomorrow afternoon.

I am not in this expanded group - we thought it was important to have international expertise instead so hopefully one of the [REDACTED] from SeaWorld will be able to represent us from a veterinary side.

Ingrid and iwi are aware this is the plan and will be included in the group.

Hope you are all having a good Sunday,

[REDACTED]

From: [REDACTED]@wellingtonzoo.com>
Sent: Sunday, 18 July 2021 1:02 PM
To: [REDACTED]
Cc: [REDACTED]@wellingtonzoo.com>
Subject: RE: [EXTERNAL] RE: Stranded orca calf in New Zealand

Thanks so much for cc'ing [REDACTED] and myself in this second email chain [REDACTED]. Would you be happy to cc [REDACTED] our other vet in as well next time you reply to this chain? Totally fine if you want to keep it small, we can also keep him updated ourselves if you prefer.

Thanks for considering!

[REDACTED]

[REDACTED] **BVSc, MVSc (Zoo Animal and Wildlife Health), MANZCVS (Avian Health)**
Senior Veterinarian | Animal Care and Science | Wellington Zoo Trust
200 Daniell Street | Newtown | Wellington 6021
Ph [REDACTED]
E [REDACTED]@wellingtonzoo.com | W www.wellingtonzoo.com |

From: [REDACTED]
Sent: 16 July 2021 16:03
To: [REDACTED]@SeaWorld.com>
Cc: [REDACTED]@wellingtonzoo.com>; [REDACTED]@SeaWorld.com>; [REDACTED]@wellingtonzoo.com>; [REDACTED]@seaworldabudhabi.com>; [REDACTED]@SeaWorld.com>; [REDACTED]@vanaqua.org;
Subject: RE: [EXTERNAL] RE: Stranded orca calf in New Zealand

Hi team,

We managed to get the vets on site to measure this individual for us today.

Total length 2.12m
Girth in front of dorsal fin 1.42m
Girth behind dorsal fin 1.17m

Would be very interested in how those measurements fit with other neonates (I am aware they will be from other populations but hopefully will still give some guide). As before other factors are relatively yellow eye patch, no (or few) erupted teeth and in some photos I believe I can still see foetal folds.

We are also interested in how often you would recommend repeating these measurements and which of the girth measurements is most useful for weight estimates.

Thank you so much for any thoughts.

[REDACTED]

[REDACTED]
Veterinary Advisor Kākāpō - Kaitohutohu Rata Kararahe Kākāpō

Department of Conservation - Te Papa Atawhai
Postal address: Department of Conservation, PO Box 743, Invercargill 9840, New Zealand

Physical address: Department of Conservation, Level 7, 33 Don Street, Invercargill 9480, New Zealand
<http://kakaporecovery.org.nz/>



From: [REDACTED] <[\[REDACTED\]@SeaWorld.com](mailto:[REDACTED]@SeaWorld.com)>
Sent: Thursday, 15 July 2021 8:31 AM
To: [REDACTED]
Cc: [REDACTED] <[\[REDACTED\]@wellingtonzoo.com](mailto:[REDACTED]@wellingtonzoo.com)>; [REDACTED] <[\[REDACTED\]@SeaWorld.com](mailto:[REDACTED]@SeaWorld.com)>; [REDACTED] <[\[REDACTED\]@seaworldabudhabi.com](mailto:[REDACTED]@seaworldabudhabi.com)>; [REDACTED] <[\[REDACTED\]@SeaWorld.com](mailto:[REDACTED]@SeaWorld.com)>; [REDACTED] <[\[REDACTED\]@vanaqua.org](mailto:[REDACTED]@vanaqua.org)>;
Subject: Re: [EXTERNAL] RE: Stranded orca calf in New Zealand

Hi [REDACTED]

We have not received any measurements, a length and girth measurement would help tremendously!

[REDACTED]

On Jul 14, 2021, at 1:22 PM, [REDACTED] wrote:

Good morning (afternoon?) to you all,

Thanks you very much for this information you are echoing all our concerns and the advice that we have been providing to the decision makers since day one. The biology space with regards to orca in NZ is challenging as there is one person who holds this information and therefore no way to independently verify the accuracy. The information given on day one was that the pod this calf was from is known but it is one that is occasionally seen then disappears for months on end.

I was also wondering if I could seek clarification as to an age estimate on this individual – I have requested the length measurements (or you may already have them) but in discussions with the Zoo team yesterday they indicated that the calf does not yet have erupted teeth. From the information I can find that would indicate this animal is less than 3 months old (current estimates being provided by the biologist are that it is 4-6 months old). Would appreciate any thoughts you have on verifying the age.

Just reiterating there is no facility in New Zealand that can take this animal and at this stage the possibility of sending off-shore for permanent care is not considered an option. The only long term option (which I don't feel is a real option) would be to fully hand-raise then attempt to re-wild. Would love any thoughts on have on that as well.

Thanks again for your support,

██████████

From: ██████████@SeaWorld.com>
Sent: Thursday, 15 July 2021 4:07 AM
To: ██████████@wellingtonzoo.com>; ██████████@wellingtonzoo.com>
Cc: ██████████@SeaWorld.com>; ██████████@seaworldabudhabi.com>; ██████████@SeaWorld.com>; ██████████@vanaqua.org;>
Subject: RE: Stranded orca calf in New Zealand

Good day ██████████ and all,

We appreciate all your efforts for trying to support this calf and I echo ██████████ comments about disposition of a dependent calf. If a suitable long term home is not available in NZ or Australia then you and your Team will need to make a decision on how long to continue the supportive management of the calf ... I agree, that with each day the outlook for a successful reintroduction wanes and the overall welfare of the calf will weigh heavy into the decision-making ... do the biologists have an idea of how often the pod travels by the site location?

We will continue to help, as much as possible,

Regards,

██████████

From: ██████████
Sent: Wednesday, July 14, 2021 2:32 AM
To: ██████████@SeaWorld.com>; ██████████@wellingtonzoo.com>; ██████████@wellingtonzoo.com>
Cc: ██████████@SeaWorld.com>; ██████████@seaworldabudhabi.com>; ██████████@SeaWorld.com>; ██████████@vanaqua.org;>
Subject: [EXTERNAL] RE: Stranded orca calf in New Zealand

Hi ██████████

Thank you so much and thank you again all for your support thus far! ██████████ at Wellington Zoo) has looped me in on your direct clinical advice email thread which is fabulous and much appreciated. Very keen for you to continue to liaise directly with the Wellington Zoo team with regards to direct day to day medical care though I would very much appreciate staying in the loop.

My role is to help collate and provide technical advice to the Department of Conservation team with regards to ongoing plans for this calf and to help with interpretation of the veterinary advice so that the decision makers can make decisions based on the best advice available. As such I am keen to start having conversations around medium to longer term health monitoring in an attempt to get some objective measure in place to help assess how this individual is doing.

We are also keen to have input into long term prognosis for return to the wild. As you are no doubt aware there are no facilities in New Zealand that can provide long-term care for a cetacean neonate. We are very concerned about the level of habituation to humans that is already occurring in such a young animal and are interested in any thought on realistic ability to return this individual to the pod (sssuming it can be found). We note that everything we have read indicates that a neonate of this age in any other location would be deemed non-releasable and placed in permanent human

care. I am not saying it is impossible that a return to the pod might happen but it feels more unlikely with every day that passes.

I am not sure if this is the right forum for these kinds of conversations or if you would rather focus on providing advice on the medical stabilisation and nutritional support side of things. If the latter is the case have you any suggestions as to the right people we should be talking to about longer term prognosis?

Once again thank you all so very much for your support and help from afar – it is appreciated more than you will ever know as we will not be able to properly express our thanks.

Kindest Regards,

[Redacted]

[Redacted]

Veterinary Advisor Kākāpō - *Kaitohutohu Rata Kararahe Kākāpō*

Department of Conservation - *Te Papa Atawhai*

Postal address: Department of Conservation, PO Box 743, Invercargill 9840, New Zealand

Physical address: Department of Conservation, Level 7, 33 Don Street, Invercargill 9480, New Zealand

<http://kakaporecovery.org.nz/>

<image001.png>

<image002.png>

<image003.png>

<image004.jpg>

From: [Redacted] <[\[Redacted\]@SeaWorld.com](mailto:[Redacted]@SeaWorld.com)>

Sent: Wednesday, 14 July 2021 5:38 AM

To: [Redacted]

[Redacted] <[\[Redacted\]@wellingtonzoo.com](mailto:[Redacted]@wellingtonzoo.com)>

Cc: [Redacted] <[\[Redacted\]@SeaWorld.com](mailto:[Redacted]@SeaWorld.com)>; [Redacted]

[Redacted] <[\[Redacted\]@worldabudhabi.com](mailto:[Redacted]@worldabudhabi.com)>; [Redacted] <[\[Redacted\]@SeaWorld.com](mailto:[Redacted]@SeaWorld.com)>;

[Redacted] <[\[Redacted\]@vanaqua.org](mailto:[Redacted]@vanaqua.org)>; [Redacted]

Subject: RE: Stranded orca calf in New Zealand

Hi [Redacted]

We are interested in helping from afar, but obviously understand the challenges with the situation. One thing that would help, would be to have one spokesperson from NZ, as there appears to be 2 email strings about this calf...so I'm looking to consolidate information about calf coming to us at SeaWorld and [Redacted] at Vancouver and [Redacted]

Who should be the main contact from NZ?

I will be the main contact for SeaWorld and will share information with my colleagues.

What is the short-term plan and is there a long term contingency plan?

I understand that a more scheduled feeding regimen was to begin, in the past 12 hrs, how is that going?

Do you plan to get another blood sample?

With regards,

██████████

██████████, DVM | Sr. Veterinarian
SEA Animal Health and Rescue Hospital
500 SeaWorld Drive | San Diego | CA 92109

██████████ ██████████
██████████

<image005.jpg>

From: ██████████
Sent: Tuesday, July 13, 2021 5:01 AM
To: ██████████ <██████████@seaworldabudhabi.com>; ██████████ <██████████@vanaqua.org>; ██████████ <██████████@SeaWorld.com>; ██████████ <██████████@SeaWorld.com>
Subject: [EXTERNAL] RE: Stranded orca calf in New Zealand

Hi ██████████

Thank you so very much for your message and the support of the team already. We are all so very appreciative of all the advice and help in ensuring this little calf gets the best possible chance at being stable and in a condition it could be returned if the pod were found.

Time Zones could be a little challenging but if there was a possibility to talk to some or all of you via teams tomorrow that would be very much appreciated and I would be keen to make any meeting work that would suit you all (I will be asleep for the next 8 ish hours but back on line from about 7:30 NZ time tomorrow). We cast a very wide net in the initial messages as we know you are all incredibly busy and weren't sure if people would be able to respond to us – the response has been overwhelming in the level of support which has been incredible heart-warming – that said definitely keen to streamline comms with the most appropriate people.

Let me know if you are indeed available for a talk via teams,

Thank you again so much for the support you have all provided,

Kindest Regards,

██████████

From: ██████████ <██████████@seaworldabudhabi.com>
Sent: Tuesday, 13 July 2021 6:55 PM
To: ██████████ <██████████@vanaqua.org>; ██████████ <██████████@SeaWorld.com>; ██████████ <██████████@SeaWorld.com>
Subject: RE: Stranded orca calf in New Zealand

Hello ██████████

Pleasure “e” meeting you and thanks for reaching out! I believe our ██████████ ██████████ (SeaWorld) and ██████████ (Vancouver Aquarium) have already been in contact with

██████████ there and have shared our feeding and nutrition recommendations. I think they are waiting on bloodwork results to help direct further medical recommendations. I have included them on here so they can share with you what they shared with ██████████ already and also shorten the communication chain. No need for too many cooks in the kitchen 😊 Will be happy to setup a conference or Microsoft teams call if you would like. I can be available any time that works for everybody. I watched some of this on the news, great job on the monumental effort your team has put in thus far. Hopefully we can get this little guy back on track! Please do not hesitate to reach out for anything, always happy to help.

██████████

██████████
Animal Health and Welfare Director
Zoological

<image006.png>

██████████
██████████ @seaworldabudhabi.com
W www.seaworldabudhabi.com

PO BOX 128717, ABU DHABI, UAE
Operated by Farah Experiences LLC

From: ██████████
Sent: Monday, July 12, 2021 11:16 PM
To: ██████████ <██████████@seaworldabudhabi.com>
Subject: Stranded orca calf in New Zealand

Kia ora (hello) from New Zealand,

My name is ██████████ and I am a wildlife veterinarian working for the Department of Conservation in New Zealand. I received your contact from ██████████ as a veterinarian who may be able to help provide advice with regards to an orca calf that stranded here just under 48 hours ago. I am on the technical advisory group for the response to this situation and am hoping to provide a strong veterinary voice to the recommendations.

A bit of history on the calf - Pod was seen Sunday morning free swimming – calf was with adult female. At lunch time the calf was found stranded – report is that it was swept up into a rock pool and stranded there. An attempt was made to refloat it at the stranding site but wasn't successful. Advice was given to trailer it to a better location and retry a refloat with hopes the pod was still near enough to hear. Unfortunately no joy so the decision was made to keep the calf on mattresses on a trailer overnight.

Calf is estimated to be 2.5-3m long and believed to still be dependent on the mother. Unfortunately despite extensive searching yesterday both aerial and on the water failed to locate the pod. The calf was kept in the water for the day. From videos I have seen it appears to be suffering buoyancy/stability issues and lists heavily to one side. There is a suggestion that this is due to compression of a pectoral fin from its positioning the first night. Last night the calf was kept in the water and the mobility appears to be slowly improving but is still not great.

A Zoo veterinarian attended the site yesterday afternoon to assess the calf and attempt to give it electrolytes via an orogastric tube as we recommended following advice from ██████████. I have not heard as to what the assessment was or how the procedure went at this stage.

We know the chances of a dependant calf being reunited with a pod are slim but the technical advisory group has been requested to investigate options for supporting the calf to allow time for an attempt to be made.

I was particularly reaching out to you all to seek advice on the what are the **feeding recommendations for an orca calf** if the decision was made to persist with attempts to relocate the pod. Given being located in NZ we have a lot of milk replacers for domestic animals but certainly nothing specific for cetaceans so I am not sure if there is anything in the country that would even work as a milk replacer.

Very keen to have any thoughts or advice you have on this case. [REDACTED] has been fabulous and provided wonderful initial advice it just both our knowledge is very limited in the nutrition of neonatal cetaceans hence reaching out to you all.

Thank you so much for your time and any thoughts,

Kindest Regards,

[REDACTED]

[REDACTED]

Veterinary Advisor Kākāpō - Kaitohutohu Rata Kararahe Kākāpō

Department of Conservation - *Te Papa Atawhai*

Postal address: Department of Conservation, PO Box 743, Invercargill 9840, New Zealand

Physical address: Department of Conservation, Level 7, 33 Don Street, Invercargill 9480, New Zealand

<http://kakaporecovery.org.nz/>

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<image007.jpg>

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[Redacted]

From: Kirstie Knowles
Sent: Monday, 19 July 2021 9:06 pm
To: [Redacted]@seaworld.com'; [Redacted]@seaworld.com'; [Redacted]@ifaw.org; [Redacted]
 [Redacted]; Ingrid@[Redacted]; [Redacted]@ucdavis.edu'; [Redacted]
 [Redacted]iangus@doc.govt.nz; [Redacted]
Cc: [Redacted]@massey.ac.nz
Subject: Orca TAG: decision-making framework
Attachments: Orca TAG decision-making framework July 18 2021.docx

Kia ora koutou – Hi everyone,
 Thanks again everyone for participating in this morning’s Orca Technical Advisory Group – sorry you couldn’t make it
 Please consider this list the formal TAG group. As per the terms of reference, please can I ask that communication is not forwarded on to anyone else without express approval of the group (facilitated through me as the chair). The DOC team will do a review of this tomorrow but would welcome any thoughts from you in the interim.

Ngā manaakitanga – best wishes

Kirstie Knowles (she/her)
 Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*
 Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*
 Department of Conservation – *Te Papa Atawhai*
 Focal point for: IUCN-WCPA, Local Gov Coastal-SIG, Sustainable Seas Challenge, NZ Marine Sciences Society


Mon	Tues	Wed	Thurs	Fri
✓	🏠	✓	✓	🏠

✓ = In the office; 🏠 = Working remotely; X = Not at work



From: [Redacted]@massey.ac.nz>
Sent: Monday, 19 July 2021 4:36 pm
To: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

Hi Kirstie,

[Redacted]

Best,

From: Kirstie Knowles <kknowles@doc.govt.nz>

Sent: Sunday, 18 July 2021 3:35 PM

To: <[redacted]@seaworld.com>; <[redacted]@seaworld.com>; <[redacted]@ifaw.org>; <[redacted]@massey.ac.nz>

Cc: <[redacted]z>; Ingrid <[redacted]>; Ian Angus <iangus@doc.govt.nz>; Sarah Owen <sarahowen@doc.govt.nz>; Dave Smith <dwsmith@doc.govt.nz>

Subject: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

Kia Ora koutou – Hello everyone,

I would like to thank you all again for the support and advice you have provided to date re the stranded orca calf here in Plimmerton, Aotearoa-New Zealand. We would like to invite you all to participate in a Technical Advisory Group discussion tomorrow morning, **Monday 18 July at 8am NZ time**. I hope this time will work for you all. We are also inviting <[redacted]> and <[redacted]> to join the TAG. Draft Terms of Reference for this group are attached and will be confirmed at our meeting.

Subject to your confirmation, I will send out a Microsoft Teams meeting invite and am available for questions if you have any in the interim.

Ngā manaakitanga – Best wishes,

Kirstie Knowles (she/her)


Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*
Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*
Department of Conservation – *Te Papa Atawhai*
Phone: <[redacted]>

www.doc.govt.nz



~Toitū te marae o Tane, Toitū te marae o Tangaroa, Toitū te iwi - If the land endures, and the sea endures, so too will the people~



 Please consider the environment before you print this e-mail

From: [redacted]@SeaWorld.com>
Sent: Tuesday, 20 July 2021 5:56 am
To: Kirstie Knowles
Cc: [redacted]@massey.ac.nz; [redacted]@ifaw.org; [redacted]@yahoo.com; Ingrid [redacted]; [redacted]@ucdavis.edu'; [redacted]; Ian Angus; [redacted]@wwf.org.nz
Subject: RE: Orca TAG: decision-making framework
Attachments: Measurements.pdf; Cetacean Comfort Care Assessment Form_TS.xlsx

Kirstie,

Here is more specific comfort care form that could be modified for wild stranded cetaceans, with minor modifications.
Also, attached are measurement recommendations to monitor growth, obviously it would be great to correlate with body weight (kg).

Photos of killer whale calves (Icelandic) in our collection and Loro Parque, show mandibular tooth eruption at 3-4 months of age.
I've asked [redacted] to provide information about recent calves.

[redacted] – I've seen a draft(2002) of Recommendations for health screening for marine mammals prior to translocation and release to the wild, is there a final version of document that would be appropriate to share with this group?

Regards,
[redacted]



[redacted], DVM | Sr. Veterinarian
SEA Animal Health and Rescue Hospital
500 SeaWorld Drive | San Diego | CA 92109
[redacted]



From: Kirstie Knowles <kknowles@doc.govt.nz>
Sent: Monday, July 19, 2021 2:06 AM
To: [redacted]@SeaWorld.com>; [redacted]@SeaWorld.com>; [redacted]@ifaw.org; [redacted]; Ingrid [redacted]; [redacted]@wellingtonzoo.com>; [redacted]@ucdavis.edu'; [redacted]; Ian Angus <iangus@doc.govt.nz>; [redacted]@wwf.org.nz
Cc: [redacted]@massey.ac.nz
Subject: [EXTERNAL] Orca TAG: decision-making framework

Kia ora koutou – Hi everyone,

July 19, 2021

[REDACTED] BSc, PGCert(Sci), PhD
Co-Director, Animal Welfare Science and Bioethics Centre
Associate Professor (Applied Ethology and Animal Welfare Science)
School of Veterinary Science
Massey University
[REDACTED]

Proposed framework to support decision-making about Toa and other marine mammals in trouble

Brief introduction:

What I offer is a systematic/structured approach to bringing together multiple factors for decision-making. The benefits of a structured approach are outlined below but the main benefit is to allow decision-makers to use and importantly, to present, a more comprehensive, systematic and thus **transparent approach to guide and justify decisions.**

Please note that this document outlines some suggestions for a framework. I have no vested interest in the details here and I'm really happy to help modify this framework to better suit the purposes of this group of experts. Having said that, experience tells me that the best results are achieved when experts in the specifics of the situation (in this case, marine mammal biologists, vets, trainers, first responders etc) work with someone expert in the principles of scientific assessment of animal welfare and in the application of the Five Domains model for welfare assessment. I've noted below where I don't have relevant expertise (i.e. most of the stuff outside welfare assessment 😊).

Setting aside issues such as public opinion and logistics for the moment, the key factors to consider in decision-making regarding the appropriate course of action for Toa and other marine mammals that get into trouble are:

1. Likelihood of survival (survival should be unambiguously defined by experts)
2. Animal welfare impacts of the situation itself and any interventions applied (or not applied)
3. Conservation benefits (assuming 'success', which should also be unambiguously defined)

Expertise and expert judgement (in the absence of definitive information) are required to make assessments of survival and welfare impacts that would feed into this structure (as well as considering conservation benefits of intervention assuming it was successful). Inevitably, there will be differences of opinion about the likelihood of survival and the type and degree of welfare impacts, even among experts. Discussion among experts and clear justification, using observable indicators, any available published findings and other evidence should be presented to support the assessments ultimately made. **The process and evidence used should be carefully documented in each case.**

A key point from my own experience in a range of animal contexts is that the use of cut-offs/thresholds for decision-making, especially about euthanasia, is rarely successful. People are really averse to making life and death decisions on the basis of one or a few medical parameters. They want to **consider the animal as a whole**. This is one of the benefits of the more structured and holistic approach, especially regarding assessment of the short- and longer-term impacts on welfare,

as is proposed here. In addition, and consistent with this commonly held desire, the proposed approach to assessing animal welfare **focuses on the animal's mental experiences (i.e. what is it like to be that animal, what matters to the animal)** which is what we use observable/measurable data to infer.

It is important to note that any **assessment of animal welfare impacts will be qualitative in nature**. Animals' mental experiences are not available for direct scientific scrutiny and can only ever be inferred from observable indicators of physical state and behavioural interactions with the environment, other animals and humans. In addition, the type and degree of welfare impact that is **acceptable** is an ethical judgement – there is no 'correct' answer and what is acceptable will vary from person to person. However, using a structured approach to weigh the likely welfare impacts associated with different interventions against the predicted likelihood of survival (and the conservation benefit of success) will at least make the type/degree of welfare impacts clearer and make it easier to justify and explain 'ethical' decision-making.

With these points in mind, any decision-making framework is primarily useful for:

- Guiding discussions among decision-makers
- Making clear (via systematic assessment) what the contributing factors are in those decisions (i.e. survival likelihood, welfare impacts, how estimates/inferences of both survival and welfare impacts are arrived at using the available data and expert judgement)
- Comparing the relative outcomes of different possible intervention scenarios
- Systematically assessing changes in these contributing factors and the overall outcome over time
- Ultimately, justifying decisions made and **helping people, including the public, come to terms with the decision made (really important in these emotional and very public contexts)**. Interestingly, in the zoo euthanasia context, we often find that people use these tools AFTERWARDS to either justify or evaluate their decision-making, which is useful too and may change decision-making practice the next time.

1. Systematic, science-based assessment of likelihood of survival

- Suggest likelihood of survival assessed for short term and for medium/long term.
- Need to agree definition of survival...
- Range of factors will influence prediction (species, age, weaned status, location, physiological status, nutritional status, behaviour, social support, weather.....this is where expertise is required to outline and justify how predictions are made)
- Document process and evidence used to assess likelihood of survival in each case

2. Systematic, science-based assessment of animal welfare impacts:

A framework commonly used to undertake holistic and structured assessment of welfare state is the Five Domains Model. Background on the model and general principles for its application are provided below if anyone wants to know more. The model should be applied using content experts' collation and interpretation of observable data, published evidence and expert judgement and with guidance from a person expert in its application.

General example of assessment of a possible intervention scenario: *Three days since animal found, un-weaned, tube feeding milk @ x L/day, untreated fin injury, restricted to sea-pen in summer*

Physical Domain	Physical impacts (collate evidence here)	Mental experiences (Domain 5)	Degree of impact		
			Low	Moderate	High
1 (Food and water)	e.g. evidence of lipid catabolism	<i>Hunger, weakness</i>		x	
2 (Physical environment)	e.g. water warmer/shallow	<i>Heat discomfort</i>	x		
3 (Health/physical status)	e.g. physical impacts of tube feeding, fin injury, PCV% (dehydration)	<i>Esophageal discomfort, somatic pain, thirst/weakness</i>		x	
4 (Behavioural interaction)	e.g. regular close presence of humans, restraint, inability to escape, prolonged separation from dam	<i>Fear, anxiety</i>			x
			Overall welfare impact: Moderate to High		

Example of a reference scale for assigning degree of welfare impact (Sharp and Saunders, 2011). These would be co-developed by content experts – could be done for each of the four physical domains (as shown here for Domain 1) or just for the 5th Mental domain that most directly relates to/reflects the animal’s welfare state. In either case, I suggest using only three categories (low, moderate, high welfare impact) as there is unlikely to be sufficient information to support a finer resolution (and probably not necessary anyway).

DOMAIN 1: WATER DEPRIVATION, FOOD DEPRIVATION, MALNUTRITION		
Impact category	Description of impact	Examples
NO IMPACT	No effect on food/water intake	
MILD IMPACT	Short-term water or food restrictions that are within usual tolerance levels for the species.	An animal has a few hours without water; in shade conditions. Short-term deprivation of food.
MODERATE IMPACT	Water or food restrictions which cause serious short-term or moderate long-term effects on physiological state or body condition, but such effects remain within the capacity of the body to respond to nutritional variations and allow spontaneous recovery after restoration of a good quality diet.	An animal has a few hours without water; in hot, sunny conditions. Deprivation of food long enough to bring about mobilisation of body fat stores.
SEVERE IMPACT	Severe restrictions on food/water intake that lead to significant levels of debility.	An animal has many hours without water. Deprivation of food for many days resulting in severe loss of body weight.
EXTREME IMPACT	Extreme restrictions on food/water intake that would likely result in the animal dying from dehydration or starvation.	An animal has many days without water and /or food and dies from severe dehydration and/or starvation.

3. Combining assessments of likelihood of survival and welfare impacts for a proposed or current intervention or to allow detection of changes in status over time:

SHORT TERM:

		Likelihood of Survival		
		Low	Moderate	High
Welfare impacts	Low	2	1	1
	Moderate	4/5	3/4	3
	High	5	5	4

MEDIUM/LONG TERM:

		Likelihood of Survival		
		Low	Moderate	High
Welfare impacts	Low	B	A	A
	Moderate	D/E	C/D	C
	High	E	E	D

OVERALL SCORE: 1A (do it) to 5E (no way)

Background on the Five Domains Model

The Model was originally formulated in 1994 to identify and grade negative impacts of research, teaching, and testing procedures involving a range of sentient animals. It has since been used to assess the welfare of a range of species in a range of situations, including working dogs (Littlewood & Mellor, 2016), farm animals (Mellor et al., 2009), sport animals (Mellor & Burns, 2020), zoo animals (Sherwen et al., 2018) and wildlife and pest animals (Beausoleil et al. 2012; Beausoleil & Mellor, 2015, Beausoleil et al. 2016; Harvey et al. 2020). It has also been used to assess suffering and animal cruelty that have led to court prosecutions (Ledger & Mellor, 2018).

The Model was designed to facilitate the assessment and grading of animal welfare impacts in a systematic, comprehensive, transparent and justifiable manner, focussing not only on factors which can compromise welfare, but additionally those which can ultimately improve levels of welfare. Throughout its 25-year history, the Model has been regularly reviewed and updated to include the latest developments in animal welfare science thinking. The most recent update to the Model includes detailed guidance on how to evaluate the negative and/or positive impacts of an animal's experiences arising from its interactions with its environment, humans (e.g. stockpeople) and other non-human animals (Mellor et al. 2020).

The model is predicated on the understanding of animal welfare as a state within the animal itself that arises due to the integration of its various mental experiences, both negative and positive, at a point in time. Mental experiences that have valence (i.e. are negative or positive) matter to the animal and are also referred to as 'affective experiences' or 'affects'. In other words, an animal's welfare reflects how it is experiencing its world and life, and its overall welfare will vary over time on a continuum from very poor to very good as those experiences vary.

This understanding aligns most closely to the 'affective state' orientation to welfare, according to which good welfare can be achieved when animals have few, minor and/or transient negative mental experiences *and* have frequent and meaningful positive experiences. Other approaches to welfare relate predominantly to the animal's 'biological functioning' (e.g. productivity) or the 'naturalness' of the way the animal is kept (Fraser et al. 1997; Dwyer, 2009; Hemsworth et al. 2015). Emphasis is placed on the 'affective state' orientation for several reasons: first, affective experiences most directly link the animal's welfare state with its own integrated perceptions and interpretations of various features of its

world (Fraser, 2008); second, affective experiences and biological functioning are dynamically related.

In accordance with this, the structure of the Five Domains model reflects the understanding that mental experiences arise due to processing, by the animal's central nervous system, of sensory information gathered about its physical state (internal bodily processes/biological functioning) and its external environment (Mellor et al. 2020). As shown in Figure 1 below, the link between the animal's physical state/behavioural interactions and its affective state is a fundamental feature of the model and one of its key strengths for transparently justifying conclusions drawn about overall welfare state.

According to the model, evidence of impacts on, or opportunities for, the animal is organized into four physical/functional domains which relate to its (1) Nutrition and hydration, (2) Physical environment, (3) Health or functional status, (4) Behavioural interactions. This evidence is provided by a range of qualitative or quantitative physical, physiological, pathophysiological, biochemical, immunological, neurological and behavioural indicators. This information is then used to cautiously *infer* the animal's likely mental experiences, which are most relevant to its welfare state, in Domain 5: Mental State. Negative experiences such as thirst, hunger, breathlessness or pain arise in Domain 5 from factors that disturb or disrupt the internal stability of the body (evidence in Domains 1-3) or when the animal is stopped from achieving strongly motivated behavioural goals to interact with the environment and other animals, e.g. fear or frustration (evidence in Domain 4). Positive experiences such as pleasures of eating or thermal comfort may arise when the animal has opportunities to maintain or restore its internal physical stability (Domains 1-3) or when it can achieve its goals, e.g. pleasure and safety of companionship (Domain 4).

Indicators for scientific assessment of welfare state

Mental or affective experiences are, by definition, internal and subjective and thus unavailable for direct assessment. Thus, various measurable or observable indicators must be used to cautiously *infer* the likely associated mental experience. In humans, those indicators can be directly validated by asking the person what they are experiencing when they express the indicator. In non-human animals, validation of indicators relies on a variety of information including: a) scientific understanding of the cause and effect of disease, dysfunction or disruption to the animal's internal physical state, b) consistency among a

variety of different indicators, such as expression/presence of behavioural and physiological measures, in the same situation, c) understanding of the nervous system pathways leading from sensory inputs to the generation of specific mental experiences such as pain, fear or breathlessness and d) the effects of actions known to cure the disease, resolve the internal dysfunction or disruption or remove the external stimulus (Beausoleil and Mellor, 2017).

Animal-based indicators represent the *outcome* of the animal's perception and interpretation of its world and thus provide the strongest justification for inferring mental experiences and overall welfare state. Examples of animal-based outcomes indicators include behavioural and physiological responses to environmental features. In contrast, resource- and management-based indicators such as the space provided or animal handling represent *risks* to the animal's welfare (inputs or alerting indicators) but don't provide direct evidence that the resources and management activities are, in fact, affecting the animal's mental state (Harvey et al. 2020). Thus, animal-based indicators are preferred for Five Domains assessments of welfare state whenever feasible.

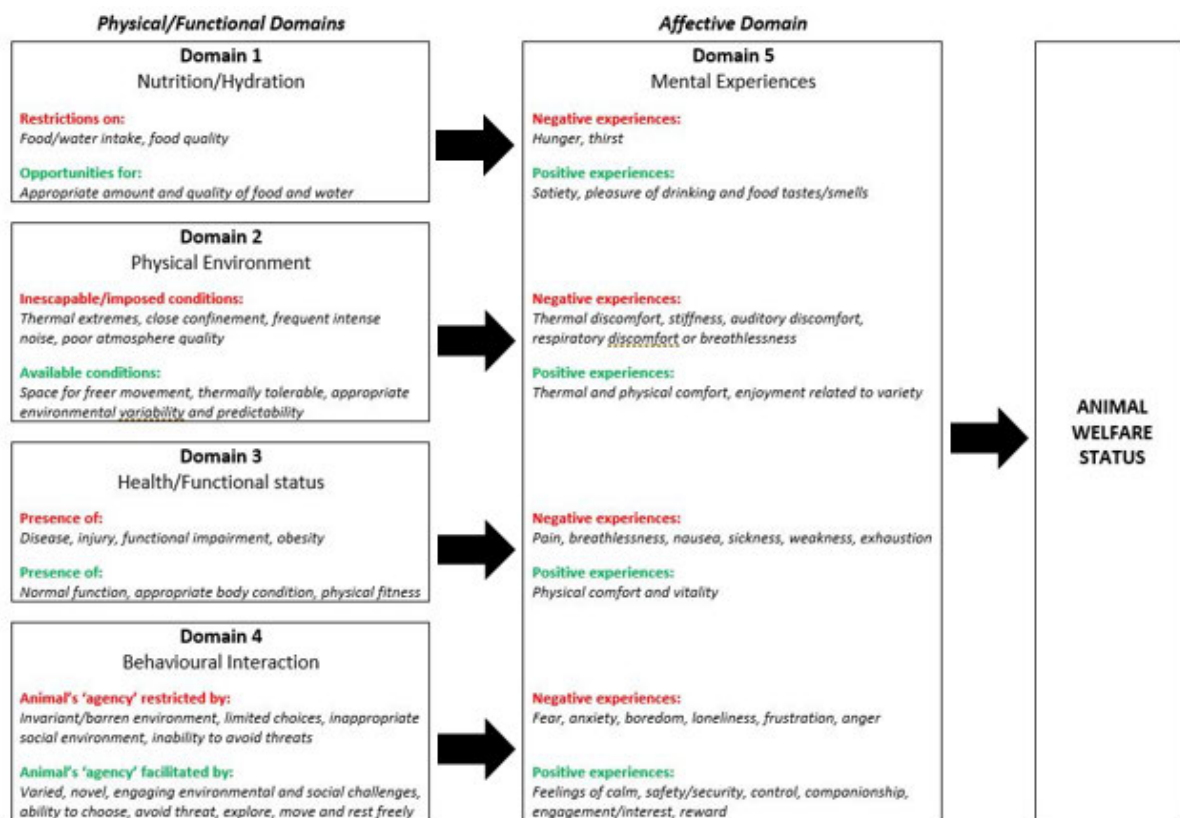


Figure 1. The generic schema of the Five Domains model for assessment of animal welfare with examples of relevant features of the animal's physical/functional state or environment (Domains 1-4) and the associated negative or positive mental/affective experiences inferred in Domain 5. Taken together, these mental experiences represent the overall welfare state of

the animal. In Domain 4, 'agency' refers to the animal's engagement in voluntary, goal-directed behaviours. Adapted from Mellor and Beausoleil, 2015.

Selected references

Beausoleil, N.J., Mellor, D.J. 2017. Validating indicators of sheep welfare. Pp327-343. *In: Greyling, J. (Ed). Achieving Sustainable Production of Sheep*. Burleigh Dodds Publishing, Cambridge, UK. ISBN: 978-17-8676-0845-017.

Beausoleil, N.J., Fisher, P.M., Littin, L.E., Warburton, B., Mellor, D.J., Dalefield, R.R., Cowan, P. 2016. A systematic approach to evaluating and ranking the relative animal welfare impacts of wildlife control methods: Poisons used for lethal control of brushtail possums (*Trichosurus vulpecula*) in New Zealand. *Wildlife Research* 43, 553-565.

Dwyer, C.M. 2009. Welfare of sheep: Providing for welfare in an extensive environment. *Small Ruminant Research* 86, 14-21.

Fraser, D., Weary, D. M., Pajor, E. A., & Milligan, B. N. 1997. A scientific conception of animal welfare that reflects ethical concerns. *Animal Welfare* 6, 187-205.

Fraser, D. 2008. Understanding animal welfare. *Acta Veterinaria Scandinavica* 50, S1. <https://doi.org/10.1186/1751-0147-50-S1-S1>

Harvey, A., Beausoleil, N.J., Ramp, D., Mellor, D.J. 2020. A ten-stage protocol for assessing the welfare of individual non-captive wild animals: Free-roaming horses (*Equus ferus caballus*) as an example. *Animals* 10(1), 148. doi:10.3390/ani10010148

Hemsworth, P.H., Mellor, D.J., Cronin, G.M., Tilbrook, A.J. 2015. Scientific assessment of animal welfare. *New Zealand Veterinary Journal*, 63:1, 24-30. doi:10.1080/00480169.2014.966167

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Ngā manaakitanga – best wishes

Kirstie Knowles (she/her)

Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*

Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*

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✓	🏠	✓	✓	🏠

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 Sent: Monday, 19 July 2021 4:36 pm
 To: Kirstie Knowles <kknowles@doc.govt.nz>
 Subject: RE: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

Hi Kirstie,

Sorry for the delay in sending this. As noted this morning, I have mocked up a little bit of information and a few ideas for a structured framework for decision-making. This may be more applicable for the longer-term exercise but could be worked up by the TAG to assist in the current situation too, if so desired.

This is simply a starting point and can/should be modified by the content experts for application. In the current situation, for example, the level of detail and documentation could be tailored to fit the time available. We could then spend more time on refining the details after this situation has stabilized or concluded.

Please could you circulate this to the rest of the group.

Best,



From: Kirstie Knowles <kknowles@doc.govt.nz>
 Sent: Sunday, 18 July 2021 3:35 PM
 To: [redacted] <[redacted]@seaworld.com>; [redacted] <[redacted]@seaworld.com>; [redacted] <[redacted]@ifaw.org>; [redacted] <[redacted]@massey.ac.nz>
 Cc: [redacted] <[redacted]@massey.ac.nz>; Ingrid [redacted]; Ian Angus <iangus@doc.govt.nz>; Sarah Owen

<sarahowen@doc.govt.nz>; Dave Smith <dwsmith@doc.govt.nz>

Subject: INVITE: Orca calf Aotearoa-NZ: Technical Advisory Group

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We are also inviting [REDACTED] and [REDACTED] to join the TAG.

Draft Terms of Reference for this group are attached and will be confirmed at our meeting.

Subject to your confirmation, I will send out a Microsoft Teams meeting invite and am available for questions if you have any in the interim.

Ngā manaakitanga – Best wishes,

Kirstie Knowles (she/her)

Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*

Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*

Department of Conservation – *Te Papa Atawhai*

Phone: [REDACTED]

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~Toitū te marae o Tane, Toitū te marae o Tangaroa, Toitū te iwi - If the land endures, and the sea endures, so too will the people~



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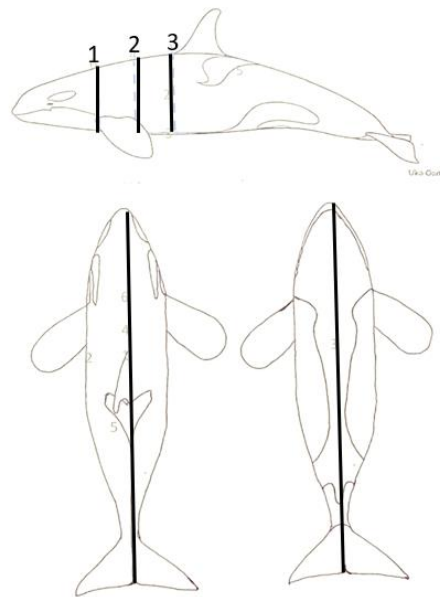
Recommended length and girth measurements to monitor growth:

Length - Tip rostrum to fluke notch

Girth – 1- front of pectoral flippers

2 - Behind pectoral flippers

3 – front of dorsal fin



Cetacean Comfort Care Assessment

Date: _____ Trainer: _____
 Animal: _____ Accession #: _____
 Current Meds: _____ Weight: _____
 _____ Fecal Score: _____
 _____ BCS: _____
 Diet Offered: _____ Diet Consumed: _____

Behavior	AM	PM
Alert	4	4
Less mobile, quiet, still with group, eating and doing behaviors	3	3
Not swimming with group, quiet, resting at surface or bottom more than awake/alert, eating but less cooperation with behaviors	2	2
Isolating self, logging or bottom resting, low appetite	1	1
Isolating self, logging or bottom resting >75%, listing, low appetite	0	0
Mobility/Social		
Full mobility; high energy behaviors performed when asked, playing with enrichment devices, interacting with conspecifics	4	4
Full mobility but slower; tentative to do high energy behaviors, playing and interacting but less than clinically normal for individual	3	3
Slight impairment; refusing high energy behaviors, minimal interaction with enrichment devices and conspecifics	2	2
Impaired; refusing high energy behaviors, no interactions with enrichment devices and conspecifics	1	1
Not moving, logging at surface, listing or bottom resting	0	0
Appetite		
Eating normal amount	5	5
Eating normal amount, but slowly	4	4
Eating 75% normal amount, slowly	3	3
Eating 50%, slowly, have to bribe, refusing	2	2
Eating 25%, have to bribe, refusing, swimming away	1	1
Not eating	0	0
Training		
Interacting normally with trainers, performing behaviors for primary and secondary reinforcement, motivated to participate in training sessions	3	3
Reluctant to participate, loose control, leaving sessions, not accepting secondary reinforcement	2	2
Refusing to participate in training sessions, no control, unwilling to do any behaviors for any reinforcement	1	1

AM Comfort Care Score: _____

PM Comfort Care Score: _____

[REDACTED]

From: [REDACTED]
Sent: Thursday, 22 July 2021 1:08 pm
To: [REDACTED] Kirstie Knowles
Subject: RE: Recording of TAG meeting
Attachments: orca meeting notes.docx

Hi both

This will likely need some editing from you. I have tried to capture the conversation under the relevant headings – however, there was a lot of chat that wasn't relevant. I have stopped taking notes at 2:13:00 when the conversation went to more day-to-day care. I don't think this is the classic way to capture notes but hope its useful.

[REDACTED]

From: [REDACTED]
Sent: Thursday, 22 July 2021 9:11 AM
To: [REDACTED] Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: Recording of TAG meeting

Hi [REDACTED],
This seems fine to me, given we just want a record. I've tracked some changes to the first bit around names, etc. Thanks for this.

Cheers,
[REDACTED]

[REDACTED]

From: [REDACTED]
Sent: Wednesday, 21 July 2021 6:55 pm
To: Kirstie Knowles <kknowles@doc.govt.nz> [REDACTED]
Subject: RE: Recording of TAG meeting

Hi
This is taking a while. Before I finish the second half I want to make sure that I am capturing what you want.

[REDACTED]

From: Kirstie Knowles <kknowles@doc.govt.nz>
Sent: Wednesday, 21 July 2021 3:20 PM
To: [REDACTED]
Subject: RE: Recording of TAG meeting

That was [REDACTED] (Orca Research Trust / WWF). I asked for notes via text Tuesday middle of the night (ha!). Not seen anything.

Kirstie Knowles (she/her)
Manager Marine Ecosystems – Kaimātanga Mātai Ahu Moana
Aquatic Unit, Biodiversity Group – Kāhui Kanorau Koiora



Mon	Tues	Wed	Thurs	Fri
✓	🏠	✓	✓	🏠

✓ = In the office; 🏠 = Working remotely; X = Not at work



From: [Redacted]
Sent: Wednesday, 21 July 2021 5:12 pm
To: [Redacted] >
Cc: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: Recording of TAG meeting

Probably. It was implied that it was for everyone, but we haven't received anything so most likely it just went to someone else.



From: [Redacted]
Sent: Wednesday, 21 July 2021 5:09 pm
To: [Redacted]
Cc: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: Recording of TAG meeting

No worries

Someone at the beginning of the video said they are taking notes – is that for a different organisation?



From: [Redacted]
Sent: Wednesday, 21 July 2021 3:07 PM
To: [Redacted]
Cc: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: Recording of TAG meeting

There's no required format, nor am I aware of a template. We're just trying to create a written record. Perhaps talk to [Redacted] to see if they have a format used for CSP meetings?

Cheers,



[Redacted]

From: [Redacted]
Sent: Wednesday, 21 July 2021 2:16 pm
To: [Redacted]
Cc: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: Recording of TAG meeting

Got it now.

Some more silly questions – is there a format these need to be written in, or a template? (I haven't written up minutes before...)

[Redacted]

From: [Redacted]
Sent: Wednesday, 21 July 2021 11:59 AM
To: [Redacted]
Cc: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: Recording of TAG meeting

[Redacted] I think I've shared this with you. It's my first go at doing so in Teams, so let me know if you didn't get an email with a link and/or if the link doesn't work.


Cheers,



[Redacted]


[Redacted]

From: Kirstie Knowles <kknowles@doc.govt.nz>
Sent: Wednesday, 21 July 2021 12:55 pm
To: [Redacted]
Cc: [Redacted]
Subject: FW: Recording of TAG meeting

Can you give [Redacted] access please [Redacted].
[Redacted] everyone is MST is on this or other critical work. Your help appreciated.

Kirstie Knowles (she/her)
Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*
Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*
Department of Conservation – *Te Papa Atawhai*
Focal point for: IUCN-WCPA, Local Gov Coastal-SIG, Sustainable Seas Challenge, NZ Marine Sciences Society
 +64 27 566 3618

Mon	Tues	Wed	Thurs	Fri
✓		✓	✓	

✓ = In the office;  = Working remotely; X = Not at work

Papatūānuku Thrives

Te ora o Papatūānuku
Te ora o te Hapori
Te hunga Atawhai



Healthy nature
Thriving communities
People who care

From: [REDACTED]
Sent: Wednesday, 21 July 2021 9:25 am
To: Kirstie Knowles <kknowles@doc.govt.nz>
Subject: RE: Recording of TAG meeting

Hi Kirstie

I don't have access to the recording.

Sorry to be a pain, but is there someone in MST that can do this? When you asked I thought you meant a MET related meeting (didn't click it was the orca stuff – bit slow at the moment).

If not, I can still do it, just need access to the recording.

From: Kirstie Knowles <kknowles@doc.govt.nz>
Sent: Tuesday, 20 July 2021 2:48 PM
To: [REDACTED]
Cc: [REDACTED] Ian Angus <iangus@doc.govt.nz>
Subject: FW: Recording of TAG meeting
Importance: High

Hey [REDACTED]

IN CONFIDENCE

Thanks for offering to write up the Orca Response TAG minutes. Recording link below in [REDACTED]'s email. Summary is fine.

Obviously not for sharing please – even amongst colleagues. Need to carefully control this response.

DUE: ASAP please.

Agenda was:

Proposed agenda:

- 1) Welcome and introductions (5 mins)
- 2) Confirm Chair and draft Terms of Reference (10 mins)
- 3) Calf update (5 mins)
- 4) Calf statistics (10 mins)
- 5) Scenarios (1 hour)
- 6) Draft Recommendation (30 mins)

Scenarios table here:

We didn't really get commitment on timeframes or likely success liked I'd hoped for (as you'll hear).

Scenario	Timing	Due date	Risks/Dependencies
Reunite calf into pod	Originally considered we have around a week at current site. TAG discussion was that this was an operations/animal health/welfare consideration	?	Locating pod, identifying pod, distance from Wellington Female likely to stop lactating after 30 days – based on mammals, however could be shorter. Some spontaneous has been recorded in 2 different Beluga whales. But this is a completely different species and chance for success unknown Photo id occurring and mother could be one of 2 females which. WI orca not resilient enough?
Reunite calf into a pod with lactating female	As above	?	As above plus question whether pod will accept calf. TAG agreed this was less desirable option WI pod does not accept calf?
Relocate calf to sea pen until such time can reunite into pod or a pod a) To Plimmerton sea pen b) To alternative sea pen	Original assessment that this might be necessary in two weeks. TAG discussion was time dependent on when weaned and fit an healthy enough	a) 1 week b) until weaned (~9 months?)	There are no care facilities appropriate in New Zealand. a) Current sea pen at Plimmerton is very small. 3.5m x 3.5m and only 1.5m depth at low tide. Current site could be viable for one more week. b) Alternative sea pen. Suggestion of using Aquaculture but risks re iwi rohe, viability etc. Questions asked about suitable option longer term for variety of reasons (operations, animal health/welfare, costs) Open water training could be needed (gradually remove from sea pen as weaned with aim to reunite into a pod). This could take more than 9 months Ethics, logistics, media and public backlash, precedent. Legal risks
Transporting to another country	N/A	N/A	TAG considered this was not an option for cultural/ethical/welfare reasons.
Release to sea without pod	N/A	N/A	TAG considered this was not an option for cultural/ethical/welfare reasons.
Deteriorating orca leading to decision to euthanise	This is something that sits across all options. Health protocols in place.	?	TAG discussed DOC SOP only covers ballistics. TAG advised there are alternatives but that a sub-group should be convened to discuss further. Public and media backlash
Stable orca but euthanasia on ethical grounds	TAG discussion was that this was an operations/animal health/welfare consideration	?	As above.

Kirstie Knowles (she/her)

Manager Marine Ecosystems – *Kaimātanga Mātai Ahu Moana*

Aquatic Unit, Biodiversity Group – *Kāhui Kanorau Koiora*

Department of Conservation – *Te Papa Atawhai*

Focal point for: IUCN-WCPA, Local Gov Coastal-SIG, Sustainable Seas Challenge, NZ Marine Sciences Society



Mon	Tues	Wed	Thurs	Fri
✓	🏠	✓	✓	🏠

✓ = In the office; 🏠 = Working remotely; ✗ = Not at work



From: [Redacted]

Sent: Monday, 19 July 2021 2:33 pm

To: Kirstie Knowles <kknowles@doc.govt.nz>; Ian Angus <iangus@doc.govt.nz>

Subject: Recording of TAG meeting

Hi both,

I'm not sure whether everyone can see this in Teams or not, so here's the link to the recording of this morning's TAG meeting: [Redacted]. I will add this to the technical advice log as well.

Cheers,



Technical Advisor, Marine Species

Kaimātanga Takutaimoana

Department of Conservation – *Te Papa Atawhai*



Proposed agenda:

1) Welcome and introductions (5 mins)

Attendees:

Kirstie Knowles – marine ecosystems manager

██████████ – iwi (Ngati Toa)

██████████ – WWF marine species manager/notetaker (not a formal part of TAG)

██████████ – local iwi rep

Ian Angus – Marine species team manager

██████████ – veterinarian on site

Ingrid Visser – orca researcher

██████████ – marine technical advisor DOC

██████████ – direct international Fund for Animal welfare's marine mammal rescue

██████████ – veterinarian sea world

██████████ – sanctuary project

██████████ – associate professor/co-director animal ethics centre Massey University

██████████ – senior vet at wellington zoo.

Apologies:

██████████ – University of California-Davis veterinarian

██████████ – Sea World veterinarian

2) Confirm Chair and draft Terms of Reference (10 mins)

Kirstie confirmed as chair.

Any objections or changes to the terms of reference? - None

The objective of the TAG is to provide the best care for the stranded animal.

Kirstie confirmed that everyone needs to be heard throughout the meeting.

3) Calf update (5 mins)

The feeding formula has been changed to ensure that he is getting 1.5L per feeding. Preference swimming to the left and is being encouraged to swim to the right. Overall doing well.

Blood test run on two occasions, looking to do another one tomorrow. Nothing unusual. Have a fecal sample now which will be analysed later in the week.

Has a bit of a squinty eye. Increasing the formula and electrolytes. Some lacerations on tail, probably from being on rocks but aren't getting worse.

Any questions:

- [REDACTED]: Would it be possible to get the blood chemistry results sent to group?
 - o [REDACTED]: yes
- [REDACTED]: Is he in a pool?
 - o [REDACTED]: yes was moved into a pool because of the weather
 - o Not moving him would have been dangerous
- [REDACTED]: What is the current total formula
 - o 7-8L, increasing today to 9L

4) Calf statistics (10 mins)

Kirstie: Male has been estimated at 4-6 months. May be younger based on vet input ([REDACTED])

[REDACTED]: 2.1 m means he's 2.5-3 months

Ingrid: NZ has an ecotype, tend to be quite a bit smaller. Indicators suggest that he's older based on mustard yellow, he's creamy all over. Will use a chromatic to confirm. Can see fetal flog lines, has a saddle patch on both sides – indicates he's 4-6 months. All of his teeth have erupted and his bottom are partially. What months do they come out in [REDACTED] animals?

[REDACTED] 4-6 months. We can age him with new techniques with skin.

Ingrid: What do we store the skin in?

[REDACTED] RNA later? The zoo may have some.

Ingrid: Where do the samples have to go and how long is the sample stable for?

[REDACTED] Freeze skin at -80 and store in RNA. Can you export?

Ingrid: Yep we can go facility to facility.

[REDACTED] What is the specificity of the aging technique?

[REDACTED] Its probably beyond the limits of the technique.

Kirstie: Does the age need to be changed?

Ingrid: How about an email chain with just that – using photos.

[REDACTED] Use the range 2-6 months and refine later.

[REDACTED]: When you weigh the animal you can tweak your formula and get good weight on him.

Ingrid: Girth measurement is subjective. I'm doing the measurements every time for consistency. Give both anterior and posterior measurements.

[REDACTED] behind pectoral is good because there is more fat there.

5) Scenarios (1 hour)

Kirstie: Start by looking at the draft table and adding any missing scenarios then want to get likelihood of success and timeframes around each of the proposed scenarios.

Female: The scenarios will come from these ones

Female 2: Is this an academic exercise to inform future scenarios or just to inform the current situation.

Kirstie: The former.

Female 3: My understanding is that we are currently focussing on Toa and will consider all scenarios later.

Female 2: Letting the animal go into the environment without being disturbed

Female 3: That would be considered in an all scenario situation

Kirstie: Want to take advantage of everyone being in the room

Female 2: It's a valid approach but we would not consider it because it's a welfare issue

Tag conversation:

Ingrid: Ensure that he's being tracked to make sure we have the data coming into making informed decisions.

Female 2: A tag is a good idea but we might need to make some really urgent decisions and might not have time to get a tag on them.

Ingrid: Get a tag from Female 2 as we need it for his welfare.

Female 2: looking into a tag.

Female 2: NZ only has 14 hours useable satellite tag time. Suggest a TDR wont give the information we need. A tag is arriving on Wed.

Female 2: Details of tags.

Ian: Need to look at the scenarios.

Female 2: Assess body condition with drones.

Kirstie: want to tease out how long we can keep the calf in its current state?

Kirstie: Asked for Ngati Toa and mātauranga perspective

Ngati Toa: Cant contribute until the issue is discussed with the whole iwi. But really important to be involved in the whole process.

Someone? [1:37:28]: If the pod does show up today is there a clear decision that he will be released with no tag?

Ian: Would the animal survive a translocation scenario? Assess the contingencies and what happens if something goes wrong. The tagging question will need a working group, but could be made in the moment if the opportunity for release presents itself.

6) Draft Recommendation (30 mins)

Ingrid: Natal pod first, non-natal pod second with moving into sea pen sitting alongside these scenarios.

Ian: Have a workable site (no ideal) given we have monitoring protocols. Need to make a decision soon on moving back into sea pen based on:

- Weather conditions
- Animal welfare

Need to make a decision about translocation to a more appropriate site. Focussed on relocating with the pod.

Kirstie: Use [redacted] animal welfare framework

Ingrid: We don't need the framework because we know what we need to monitor. We have records of everything that has happened so far. Cultural considerations for moving him. There are better locations nearby.

ACTIONS:

- Offline conversation about what measurements to take and how often
- Offline conversation about whether or not to tag the orca
- [redacted] to send out document
- [redacted] set public expectations low
- Further discussion on euthanasia
- Further discussion on age and weaning
- [redacted] forward assessment protocols
- Tell Wellington Zoo what they need if euthanasia is on the table

Scenarios table here:

We didn't really get commitment on timeframes or likely success liked I'd hoped for (as you'll hear).

Scenario	Timing	Due date	Risks/Dependencies	Likelihood of success	Comments
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<p>Reunite calf into pod</p>	<p>Originally considered we have around a week at current site. TAG discussion was that this was an operations/ animal health/welfare consideration</p> <p>30 days was a number that was considered by the group.</p>	<p>?</p>	<p>Locating pod, identifying pod, distance from Wellington</p> <p>Female likely to stop lactating after 30 days – based on other mammals, however could be shorter. Some spontaneous lactation has been recorded in 2 different Beluga whales. But this is a completely different species and chance for success unknown</p> <p>Photo id occurring and mother could be one of 2 females – not sure which.</p> <p>WI orca not resilient enough?</p>	<p>Ingrid: What's the timeframe for lactation?</p> <p>█ The female will dry up after about 30 days when the calf stops suckling. But some females spontaneously lactate.</p> <p>Ingrid: If we put him back with the group we could monitor his size. If its past the 30 days we may be able to put him back and she may start lactating. We could supplement his feeding.</p> <p>█ Another female could start lactating, but its speculation as it hasn't happened with orca, but it has happened with Beluga.</p> <p>Ingrid: If there is a lactating female of another group can she sustain feeding of two calves?</p> <p>█ Can answer because we don't know. The % fat they provide is way higher than what we can provide. Can ween onto fish at 120 days of age. Once they have teeth they can consume food.</p> <p>Ingrid: Orca of 1 year of age capturing their own food.</p> <p>█: We have to assume that this is acute evolution. The 30 days we have seen in other animals could be shortened as 30 days is for terrestrial in mammals.</p> <p>Ingrid: We could also assume its longer?</p> <p>█: No, when its an acute end, they will return to a non-lactating state sooner.</p> <p>Ingrid: █ – can you get in touch with █ – they took Ula away from Morgan because of reduction in milk. Can we find out how long she was lactating for.</p> <p>█ I can find out from █.</p> <p>█ How often do you see spontaneous lactating?</p> <p>█ Seen in two beluga's but not in orca. Ask █.</p> <p>█: there are too many unknowns. Depends on the dynamics of the group. Can't put a timeline on it.</p> <p>█: Does the pod have to turn up near the calf to get it into the pod? Or will we have to move the calf?</p>
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				Ingrid: Can use a military helicopter, the boat is a really good option with a good range.
Reunite calf into a pod with lactating female	As above	?	As above plus question whether pod will accept calf. TAG agreed this was less desirable option WI pod does not accept calf?	W Zoo vet: Do you have to take into consideration weather? Ian: The one thing that sits above the orca's wellbeing is human. Can the group give us their assessment of the risks to the calf under each scenario? Ingrid: Also want the benefits. █ Need contingency options for both of these scenarios – maybe recapture after a certain amount of time. Ingrid: started a protocol of recall if he needs to be recaptured █ consider the habituation with too much training Ingrid: transition to underwater recall from hand signals █ Orca are hardy animals. No problems transporting. Hard to track in winter. Recommend a satellite tracker. █: animals at the zoo are trained for medical perspectives. May not respond to training if sick or in unusual environment. █: because of the concerns about weather this option is less likely to succeed than the first option. But is better than keeping it indefinitely. Massey: be careful to balance the survival and welfare of the animal. Can offer a structured approach to making these decisions between short and longterm welfare. Send offline to look at.
Relocate calf to sea pen until such time can reunite into pod or a pod a) To Plimmerton sea pen	Original assessment that this might be necessary in two weeks. TAG discussion was time dependent on when weaned	a) 1 week b) until weaned (~9 months?)	There are no care facilities appropriate in New Zealand. a) Current sea pen at Plimmerton is very small. 3.5m at high tide and only 1.5m depth at low tide.	Kirstie: He has been in Plimmerton a week. █ Was that a logistical concern? Ingrid: Made temporary fencing which could be extended for another week. Its not big and its tidal. Ian: We made a decision to put him there from logistical perspective and that we could only feed him for a week. Ingrid: working with Weta to create a better feeding device and feeding him while moving around to simulate him mother. Maintaining pool temp at 11-13.

<p>b) To alternative sea pen</p>	<p>and fit an healthy enough</p>		<p>Current site considered viable for one more week.</p> <p>b) Alternative sea pen. Suggestion of using Aquaculture farm but risks re iwi rohe, viability etc. Questions asked re if this is suitable option longer term for variety of reasons (operations, animal health/welfare, costs)</p> <p>Open water training could be needed (gradually remove calf from pen as weaned with aim to reunite into a pod). This could take up to or more than 9 months Ethics, logistics, media and public backlash, precedent.</p> <p>Legal risks</p>	<p>Is it unclear that we don't know which pod he's from.</p> <p>Ingrid: We know the pod from 20 years of photo's. Don't know which one is the mum.</p> <p>: The animals were seen the day of the stranding.</p> <p>Ingrid: Was foraging with his mum and got swept into a rocky reef. His mum stayed and left after a bit.</p> <p>In NZ groups come together and separate regularly in NZ. One orca has been photographed with 48 other orca. Large social groups.</p> <p>: Are we able to maintain the orca at site indefinitely?</p> <p>Ian: We've made the best of the site. A boat slipway has been penned off. This is a problem because its exposed. Concern is that we have an animal bouncing between seapen and pool. Haven't looked at other sites yet and don't know logistics.</p> <p>Ingrid: Depth of seapen is 3-3.5 m at high tide, low is 1.5, sandy bottom and safe from snorkelers perspective.</p> <p>What is the distance between the pool and pen. Can you weigh him with a scale?</p> <p>Ingrid: 200m. Put him on a flat bed (stretcher) and towed him at walking speed. Trying to get digital scales. Solid wooden pier on either side that can be used to weigh him. How often should he be weighed?</p> <p>Every 2-3 days.</p> <p>[1:46:20] W Zoo vet: Questions around the length of time he can be kept until he misses his learning opportunity and he wouldn't survive in the wild.</p> <p>Ingrid: They are a social networking species and cultural transmission of behaviours can be seen. In the wild in NZ animals who have been badly injured are provisioned by the rest of the pod.</p> <p>: a common dolphin came in and was rehabbed for 5 months and successfully back to its pod.</p> <p>A beluga was considered non-releasable because of the environmental conditions and the pod was too small. Risks were too great and he was deemed not to be able to survive. Considerations:</p> <ul style="list-style-type: none"> - Murky water
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					<ul style="list-style-type: none"> - Obstacles - Finding food - Water temperature - No way to track the animal <p>██████: Need considerations for if the animal is not assimilated back into its pod and its health deteriorates.</p> <p>[1:56:00] ██████: need to discuss moving him into a sea pen for medium term management which would be made by DOC managers.</p>
Transporting to another country	N/A	N/A	TAG considered this was not an option for cultural/ethical/animal welfare reasons.	N/A	
Release to sea without pod	N/A	N/A	TAG considered this was not an option for cultural/ethical/animal welfare reasons.	N/A	
Deteriorating orca leading to decision to euthanise	This is something that sits across all options. Health protocols in place.	?	TAG discussed DOC SOP only covers ballistics. TAG advice is there are alternatives but that a sub-group should be convened to discuss further. Public and media backlash	N/A	[1:55:00] Kirstie: email from IWC that the best course of action based on the current scenario is euthanasia, but understand current situation and want to reunite with pod.
Stable orca but euthanasia on ethical grounds	TAG discussion was that this was an operations/animal	?	As above.	N/A	██████ need to have conversation around euthanasia. The DOC SOP says that we have to use ballistics. But there may be other options. Need to have that conversation. ██████: Just published a paper reviewing IUCN and DOC euthanasia methods.

health/welfare
consideration

█: There are better ways to euthanise – very sensitive to opioids and benzodiazepine's such that a drug overdose is doable and humanely.