2019

Beluga whales and Orcas, held captive in Zaliv Vostock, Nakhodka - Srednyaya Bay (Russian Federation).

Analyses of photo and video material.

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EXECUTIVE SUMMARY

Analysis of photographs and video of beluga (white) whales (*Delphinapterus leucas*) and orcas (*Orcinus orca*), held captive in Russia in the 'Whale Jail' for at least six months, show a range of issues which raise grave concerns for their health and well-being. All the animals appear to be young; i.e., calves, juveniles, sub-adult or recently matured.

The animals are confined in totally inadequate and small pens, where overcrowding is a significant issue. Analyses of the water in the holding pens confirmed the presence of five bacteria; *Pseudomonas*, *Staphylococcus, Escherichia, Vibrio* and *Bacillus.*

All of the animals have been exposed to a range of environmental conditions which have impacted their health, evidenced by the results of microbiological tests and the presence of extensive skin lesions and scars on most if not all of the whales. Eleven orcas were tested for bacterial and fungal organisms in their breath and on their skin. Results showed that three orcas had concerning bacterial and fungal organisms in their breath samples (*Proteus mirabilis, Staphylococcus ssp. and Candida spp*), whilst samples taken from the skin and skin lesions showed that all eleven orca had a mixture of various bacteria, including some pathogenic organisms, and seven animals harboured *Candida*. At least one orca has a tooth which has been fractured and broken off, which is likely to cause severe pain and places the animal at high risk of life-threatening complications. Some individuals were noted to exhibit abnormal behaviours (e.g., lying immobile at the surface).

Conclusions

International veterinarians and experts share and confirm the opinion of their Russian colleagues, that the medical situation of the animals, their behaviours and the unsanitary conditions of the holding facilities are a matter of serious concern with regard to their health and welfare.

However, despite these atrocious conditions, the animals remain viable candidates for assessment regarding rehabilitation and potential release back into the waters from which they were captured.

RECOMMENDATIONS

There is an urgent need to provide immediate assistance in order to address the health, well-being and welfare of the orcas and belugas. They should be given larger pens and the water quality must be improved. It is imperative that their medical complications and welfare issues are addressed.

These whales should be rehabilitated and then considered for release back into the water near their capture site(s). Due to the young ages of many of the individuals, it is vital that they are released to be with free-ranging conspecifics groups that contain adults.

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Authored by veterinarian and wildlife professionals. The primary authors were Ingrid N. Visser, PhD, Scientist & Founder, Orca Research Trust, New Zealand, Dr Heather Rally, DMV Supervising Veterinarian of Captive Animal Law Enforcement at the PETA Foundation, USA; and Peter A. J. van der Wolf, Wildlife Specialist, Russian Federation. *Contributing specialists; Dr Marie-Francoise van Bressem, DVM, PhD, Cetacean Conservation Medicine Group, Peruvian Centre for Cetacean Research, Lima; Dr Stephen Raverty, DVM, PhD, Veterinary Pathologist, Ministry of Agriculture, BC, Canada*; and *Lonneke IJsseldijk, MSc, Faculty of Veterinary Medicine, Utrecht University, The Netherlands.*

Sources (photos, video, laboratory results) & Acknowledgements.
The authors gratefully acknowledge and thank the efforts of Russian scientists and experts who have visited the facility and collected data. We are appreciative of the opportunity to view and disseminate some of their information and images through this report. We wish to thank all the volunteers who have assisted with translations, which were completed in good-faith to assist international experts in their appraisal of the situation. We recognise the assistance from members of the media who provided access to additional material and thank them for their support. NGO's (both Russian and International), have been instrumental in exposing the situation these cetaceans face and we are indebted to them for their efforts.

How to cite this report:
Visser Ingrid N, Rally, Heather, and van der Wolf, Peter A. J., (2019). Beluga whales and orcas, held captive in Zaliv Vostock, Nakhodka, Srednyaya Bay (Russian Federation): Analyses of photo and video material. Unpublished report 18 March 2019. Pp43. Available from www.orcaresearch.org

Contents

1. Introduction

Currently (14 March 2019), a number of beluga (white) whales (*Delphinapterus leucas*) and orcas (*Orcinus orca*) have been kept captive in sea pens in Zaliv Vostock Bay, near Yuzhno-Morskoy and Nakhodka, Srednyaya Bay Primorskaya Kray, Russian Federation (Figure 1).

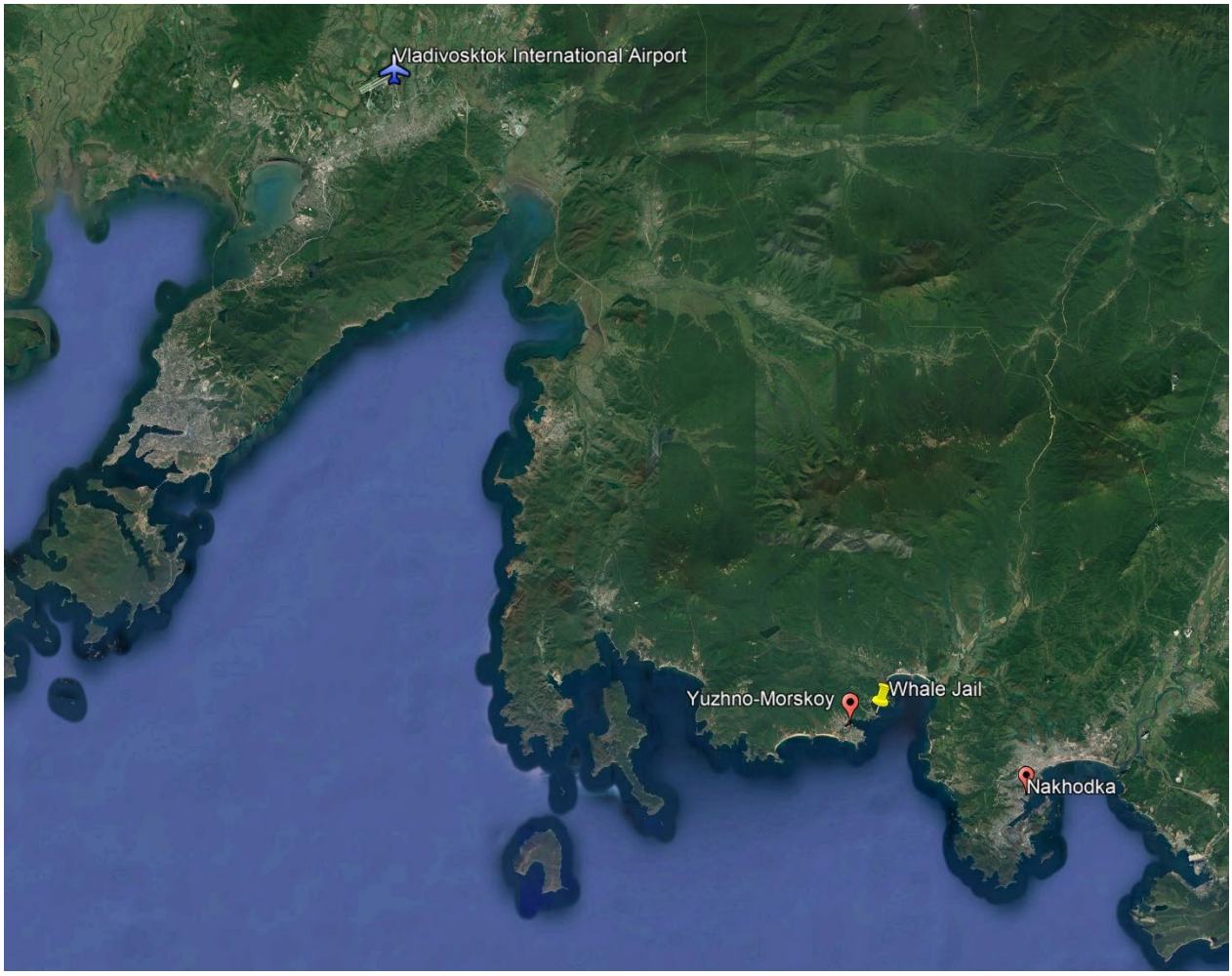


Figure 1. Location of the 'Whale Jail' (Latitude 42°52'39.79"N, Longitude 132°42'53.12"E) near Yuzhno-Morskoy, Primorsky Krai, to the north-west of Nakhodka town. The site is approximately 120km to the south east of Vladivostok international airport. (image, Google earth).

Available information leads us to believe that these whales were all captured during the northern summer (September/October) of 2018. The capture locations for both species (hereafter referred to collectively as 'whales'), were reported to have all been in the Sea of Okhotsk, over 1,500 km north of the facility where they are being held (Appendix 1).

The exact number of belugas captured has not been established, however, estimates range from 87 to approximately 100. Additionally, there have been reports of at least three belugas 'escaping'. The original number of orcas captured was stated to be 11, however, some rumours persist that there may have been 12.

At least one has now been reported as having 'escaped'. It is our belief that such escapes are highly unlikely, given the young age of the animals, the health status of the animals and the construction of the pens (Figure 2) with additional surrounding 'barrier' nets. We believe that it is more likely that these individuals died.

All of these whales were captured with the purpose of being sold to commercial facilities for public display. We have been informed that the majority, if not all, were destined for aquariums in China. However, on 7 December 2018 the Russian Yuzhno-Sakhalinsk Municipal Court (Case number 2A-6107/18) ruled that the capture license(s) were issued for the cetaceans to be allocated and exploited within Russia only and that no export permit could be authorized. Furthermore, after the Russian Authorities inspected the individuals, it was discovered that under-aged belugas and orcas had been captured and were held at the Nakhodka facilities. With these findings, the capture and keeping of the whales was denounced as "illegal". Options for the rehabilitation and reintroduction of the orca and beluga back into their home waters are now legally possible and require urgent consideration.

In anticipation of that, we prepared this report to assist with establishing the current baseline of the animals. We acknowledge that this report is restricted. It is based on assessment of video and photographic documentation (primarily from two dates; 18 January 2019 – when Russian scientists inspected the animals and 1 March 2019 when public media were given access to the whales). However, despite the limited data this report presents an overview of the animals' status as best it can be determined in this manner. We specifically note that an on-site inspection by rescue, rehabilitation and release experts, as well as those experts in marine mammal veterinary medicine, cetacean welfare and free-ranging species-specific behaviour of orca and beluga, is imperative if a better understanding of the health and well-being of these animals is to be established.

This report aims to present a clear and comprehensive picture of the current condition of the animals and notes the urgent need for direct action to ensure the safe and timely rehabilitation of the orcas and beluga whales.

We wish to acknowledge the ongoing efforts by the Russian scientists, experts media and NGO's to document this situation and facilitate an appropriate outcome.

2. Overview of the Holding Pens in Nakhodka

The Nakhodka facilities are currently comprised of ten pens for the beluga and three pens for the orca (Figure 3 and see Appendix 2 for changes in pen configurations over time). The pens are constructed from floating surrounds (large drums/pipes with wooden platforms) and nets hanging down into the water. The beluga pens have no superstructures (Figures 2-5 and Appendix 2) whilst the orca pens have light-weight structures erected over them (effectively uninsulated 'walls' and a 'roof', see Figures 2 & 6 and Appendix 2).

For much of the time that the whales have been in Zaliv Vostock (Srednyaya Bay) the water temperature has been low and unlikely to have risen above 5° C. During at least three months the water temperature was likely not above 0°, given the extent of the ice coverage in and around the whale pens (Figures 2-6 and Appendix 2).

Figure 2. A close-up of an orca next to the mesh netting of its' pen at the Nakhodka facility. This enclosure is constructed (at least in this section) with a 'double internal barrier' comprised of two nets (green and orange/brown) hung into the water. Such double netting will significantly reduce the likelihood that an orca could escape. All three orca pens are also enclosed within a 'barrier net'. (IMG_3697 via Free Russian Whales).

3. Regulatory Standards regarding pen sizes

To provide perspective as to how small these pens at Nakhodka are, their dimensions were compared to the recommendations of the marine mammal captivity industry, specifically, the standards set forth by the Alliance of Marine Mammal Parks and Aquariums (AMMPA). Details are given below and in Appendix 3.

Beluga whale pens

Pen length x width dimensions (meters); 2 pens 9 X 9, 6 pens 10 X 7.5 and 2 pens 11 X 11. Depth is estimated to be 4.5m.

Table 1. Discrepancies between AMMP requirements for beluga and approximate volume/m^3 in Nakhodka, showing that the Nakhodka beluga pens are approximately 277% - 446% below the minimum standards of a professional captive-industry organisation.

AMMP standards for 10 Beluga whales: • Enclosure volume ~1,505 m^3	**Nakhodka** holding pen for 8-10 Beluga whales: • Pen volume ~337.5 m^3 – 544.5 m^3 CONCLUSION: **Between ~ 276% - 446% sub-standard**

Orcas pens
Pen length x width dimensions (meters); 3 pens 27 X 15. Depth is estimated to be 4.5 m.

Table 2. Discrepancies between AMMP requirements for orca and approximate volume/m^3 in Nakhodka, showing that the Nakhodka beluga pens are approximately 165% below the minimum standards of a professional captive-industry organisation.

AMMP standards for 4 orcas: • Enclosure volume minimum for 4 orcas = ~2,997 m^3	**Nakhodka** holding pen for 4 orcas: • Pen volume ~1,822 m3 CONCLUSION: **Approx. 165 % sub-standard**

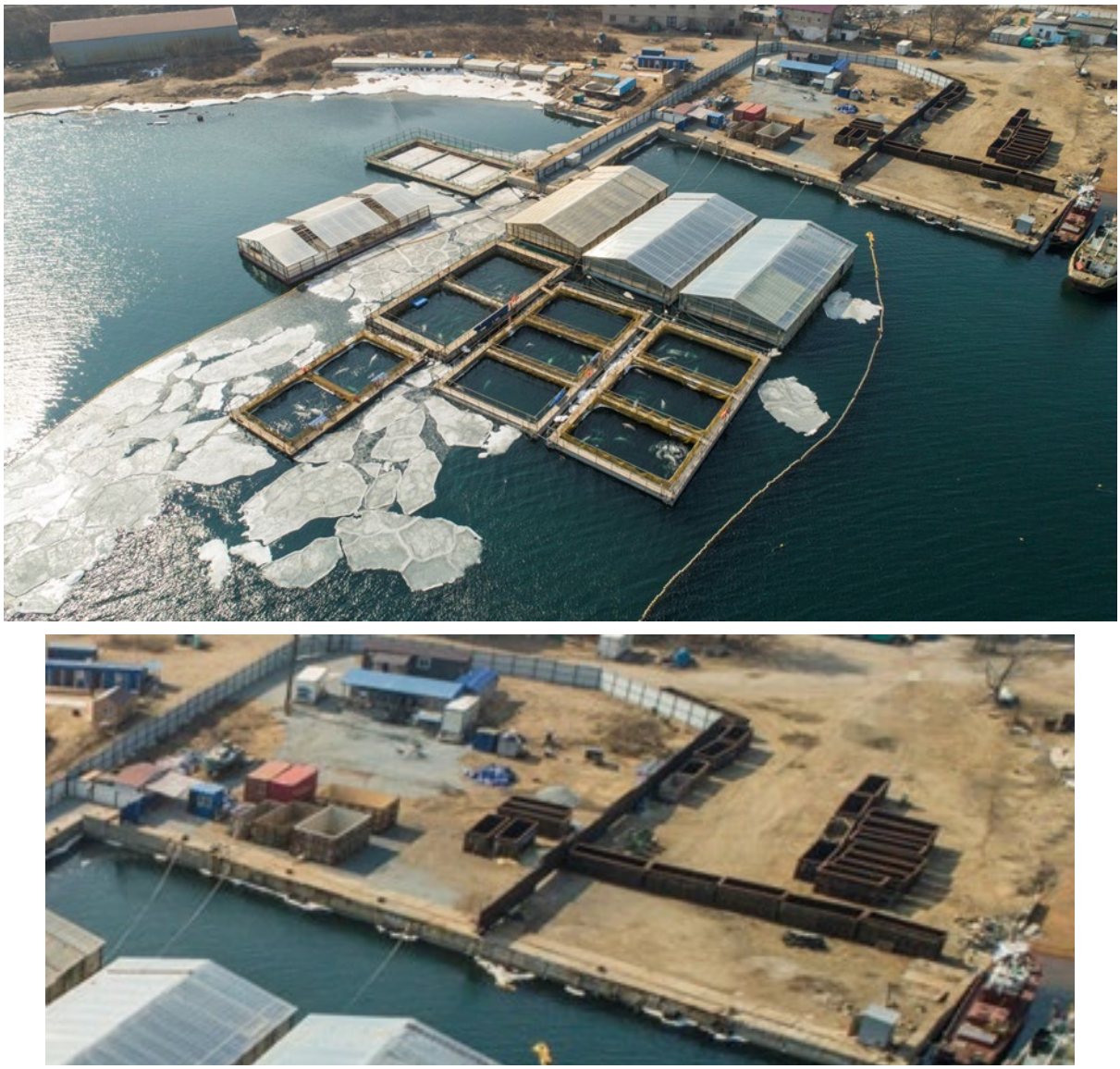


Figure 3. Upper; ten open-air pens for beluga (also known as white whales). at the facility in Zaliv Vostock. The belugas are visible in this image and in Figures 4-6. The orcas are contained in the three floating 'sheds' adjacent to each other, so are not visible from the air. Note the ice contained within the barrier net. Lower; close up of the facility compound. It appears as if at least 31 'shipping crates' for the whales are stacked in rows, in groups, as well as along the outer edge of the fence and inside the fence of the facility. (via Free Russian Orcas).

Figure 4. Aerial photograph of the beluga holding pens in Nakhodka, showing the ten pens of various sizes, with between 5–10 animals visible in each pen. (via Free Russian Orcas).

Figure 5. Two of the 10 beluga pens, with no superstructure. Ice can clearly be seen inside and outside of the structure. The continual moving of the whales is the likely reason for the central areas remaining ice free. There are at least five, possibly six belugas visible in the left pen and at least four, possibly five in the right pen. See text and Appendix 3 for details on dimensions. (via Free Russian Orcas).

Figure 6. During several visits to the Nakhodka facilities between November 2018 and January 2019, much of the surface water in the pens contained ice, including edge, brash, slush and pancake-type ice formations. Some of the edge or brash ice likely had sharp edges which could easily cause lesions on the skin of the whales. (via Free Russian Orcas).

Figure 7. One of the orca pens, showing ice inside the pen – especially near the camera and at the far end of the pen. Also visible are the light-weight, non-insulated, walls and roof and the overall construction of the pen itself. The air temperature is clearly low, indicated by the piles of ice at various locations around the walkway and forming on the drums as well as the cold-weather clothing worn by the person working at the facility. (via Free Russian Orcas).

4. Observations and Assessments of Animal Health:

Images and videos taken at the Nakhodka facility on 18 January and 1 March 2019 demonstrate a number of concerns for the whales' health. We address each species separately.

Beluga whales

The skin of beluga whales should be smooth and appear white in adult whales and grey to greyish-white in younger whales. Typically, healthy beluga skin does not show blemishes (such as dots, spots, rings etc) or uneven growths or depressions. However, a number of beluga at the Nakhodka facility have large, active and advanced skin lesions as well as large healing scars indicative of previous and on-going trauma, inflammation, and/or infection of the skin. Additionally most, if not all, of the belugas show scars on their bodies, likely indicative of aggression (i.e., rake (bite) marks from teeth). These are typically long parallel, linear marks. The intense overcrowding, as well as the barren, featureless pens (which will lead to boredom) are likely contributors to an increased level of aggression.

Figure 8. Lesions on the skin of a beluga. One of the lesions demonstrates sloughing of the upper layers of the skin. It is possible that these lesions are associated with a blood-borne bacterial infection that has reached the lower layers of the skin through the bloodstream, causing infection and sloughing of the layers above it. A viral or fungal infection is also possible, however, and additional testing is required. This is the same beluga as in depicted in Figure 9, where a larger area of skin shows signs of lesions. (image IMG_3975, via Free Russian Whales).

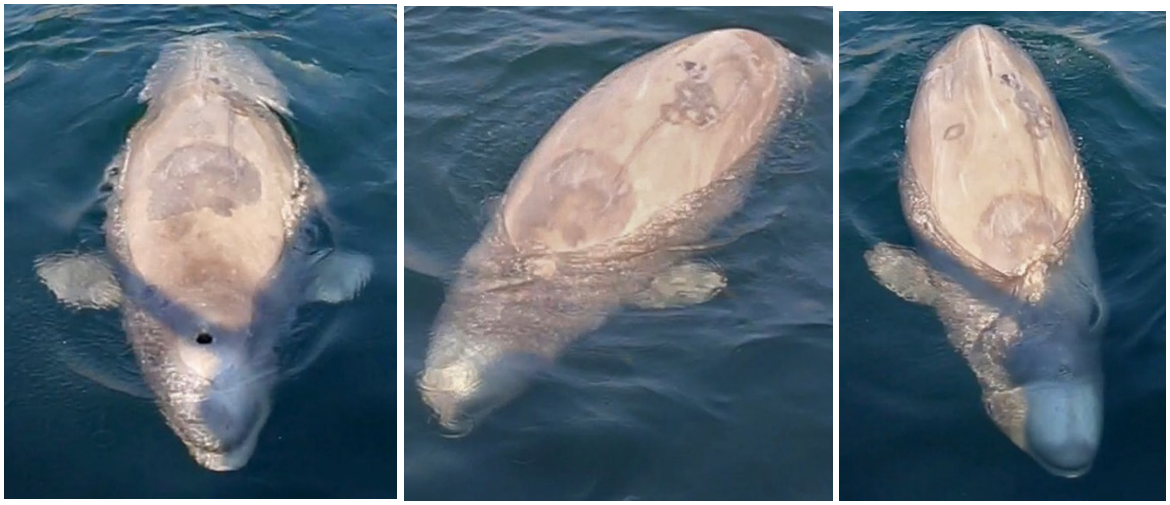


Figure 9. Three examples of the same beluga with locally extensive skin lesions on the dorsum. The lesions appear to be active and are likely associated with an infection, which may or may not be secondary to physical, phototoxic, or other trauma to the skin. This is the same beluga as Figure 8. (reference: Video screenshots from MVI_3978, via Free Russian Whales).

Figure 10. The open blowhole (middle, lower edge of frame) of a beluga provides reference to the size and position of large, circular erosions in the skin of this animal. These appear to be healing ulcers with a white ring of tissue surrounding the depression of each lesion indicating re-epithelialization and a state of healing. From a photograph, is it not possible to know the causation of such large and well-delineated areas of skin to be removed, destroyed, or to slough off, but it is suspected that trauma and/or infection are likely to have played a role(s). (image IMG_3964, via Free Russian Whales).

Figure 11. Upper; Numerous, very small, multifocal, black lesions are visible across the head (including the melon) of this beluga. They appear to be pinpoint depressions where the skin has eroded. These may be associated with a viral infection. Lower; close up of the pitting, along the rostral crease. (both images: IMG_3977, via Free Russian Whales).

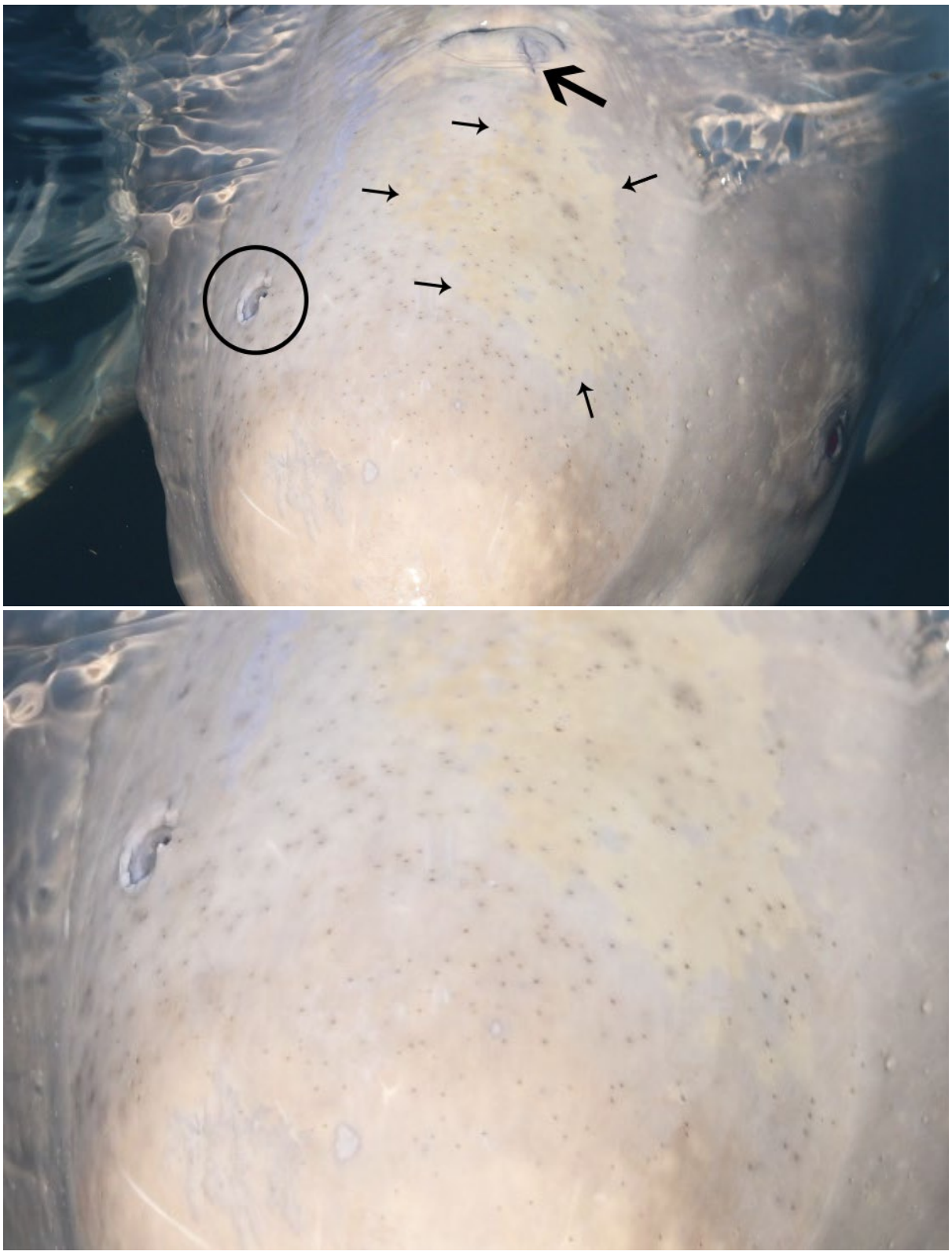


Figure 12. A beluga showing the same black pitting as the animal in Figure 11. However, this appears to be a different individual based on the scar and the large pale patch of discolouration (approximate edge deliniated by small arrows, upper image) and the wound near the leading edge of the blowhole (large arrow), which are absent on the images in Figure 11. Also, note the open lesion on the right side of the animals melon. Lower image is cropped in from the same image. (IMG_3965, via Free Russia Whales).

Figure 13. This beluga has inter-connected, rhomboid, nodular lesions on the right flank and peduncle. These are likely associated with a secondary opportunistic bacterial or fungal infection that has invaded the tissues after trauma. A linear scar can be seen connecting these lesions indicating that a rake mark or other lesion likely preceded this infection. Given the shape of the lesions it is possible that the organism involved is *Erysipelothrix rhusiopathiae*, which is a zoonotic bacteria that can also cause disease in people. If left untreated *E. rhusiopathiae* can disseminate to the rest of the body causing serious and even life-threatening disease in cetaceans. (image IMG_3904, via Free Russian Whales).

Figure 14. Long, pale, linear scars, consistent with rake (teeth) marks are visible on the right flank of this beluga. There are additional scars and/or lesions in various stages of healing along the caudal peduncle and edge of the dorsal ridge. One linear scar alongside the dorsal ridge has circular lesions (many of which are inter-connected or coalescing along the scar). These are likely associated with a secondary opportunistic bacterial or fungal infection that has invaded the tissues after trauma. (reference: Video screenshot MVI_3995 @00m:20s, via Free Russian Whales).

Figure 15. Similar linear scars with at least one (animals left side) having a raised appearance. There is also a nodular lesion on the left flank. This may be of bacterial or other infectious origin. (reference: Video screenshot MVI_3995 @00m:25s, via Free Russian Whales).

Orcas

The skin of an orca should be smooth and appear white or black (with the exception of a small area of grey behind the dorsal fin, termed the saddle patch). Typically, healthy orca skin does not exhibit large areas of sloughing, blemishes (such as dots, spots, rings etc) or uneven growths. However, each of the orca the Nakhodka facility have various issues that include at least one, if not more of the following: large, active and advanced skin lesions, scars indicative of healed or healing traumatic injuries, inflammation, and/or infection of the skin. Additionally, the orca show deep rake marks indicative of aggression. The following images help illustrate these issues.

Due to the low water and air temperatures at the facility the orca were exposed to conditions that they would not normally face. For example, the extremely small pens and the lack of

stimulation, resulted in the orca at the Nakhodka facility spending significant amounts of time at the surface 'logging' (remaining motionless at the surface). This exposed their dorsal fins to the sub-zero air temperature for unnatural periods of time. Dorsal fins in orca are counter-current heat exchange organs and they play a vital role in their body temperature regulation. In the wild, orca rarely log for periods of longer than a few minutes and instead they generally spend their lives constantly in motion. Such motion generates body warmth. The Nakhodka orca were unable to generate such body heat and with the air temperature lower than the water temperature, their internal body heat was likely compromised. At least one orca was photographed with damage to the dorsal fin which may be linked to frost-bite.

Additionally, at least one orca has multiple health issues of major concern, including a broken tooth, bruising or erythema of the skin, skin infections and/or other diseases. There are serious health and welfare concerns to be considered for this individual, but a robust inspection may also reveal similar issues for the other orca.

Figure 16. Two photographs of the same orca on 18 January 2019, showing excessive sloughing of skin and recent rake (teeth) marks that have penetrated the epidermis, increasing the risk of infection for the animal. It is believed that this animal has since died. (image via Free Russian Whales). See further examples of sloughing skin and other issues in Appendix 4.

Figure 17. Left; taken on January 18, 2019. The photo on the right side was taken of the same animal 42 days later at March 1, 2019 and shows reddish-brown discoloration indicating extensive bruising or erythema (increased blood flow due to trauma, infection or inflammation) in the chin area. See Figure 16 below for a close-up and Figures 18-22 for more details and Appendix 5 for details regarding matching the animal between dates. (images: left Tatiana Ivkovic, right via Free Russian Orcas).

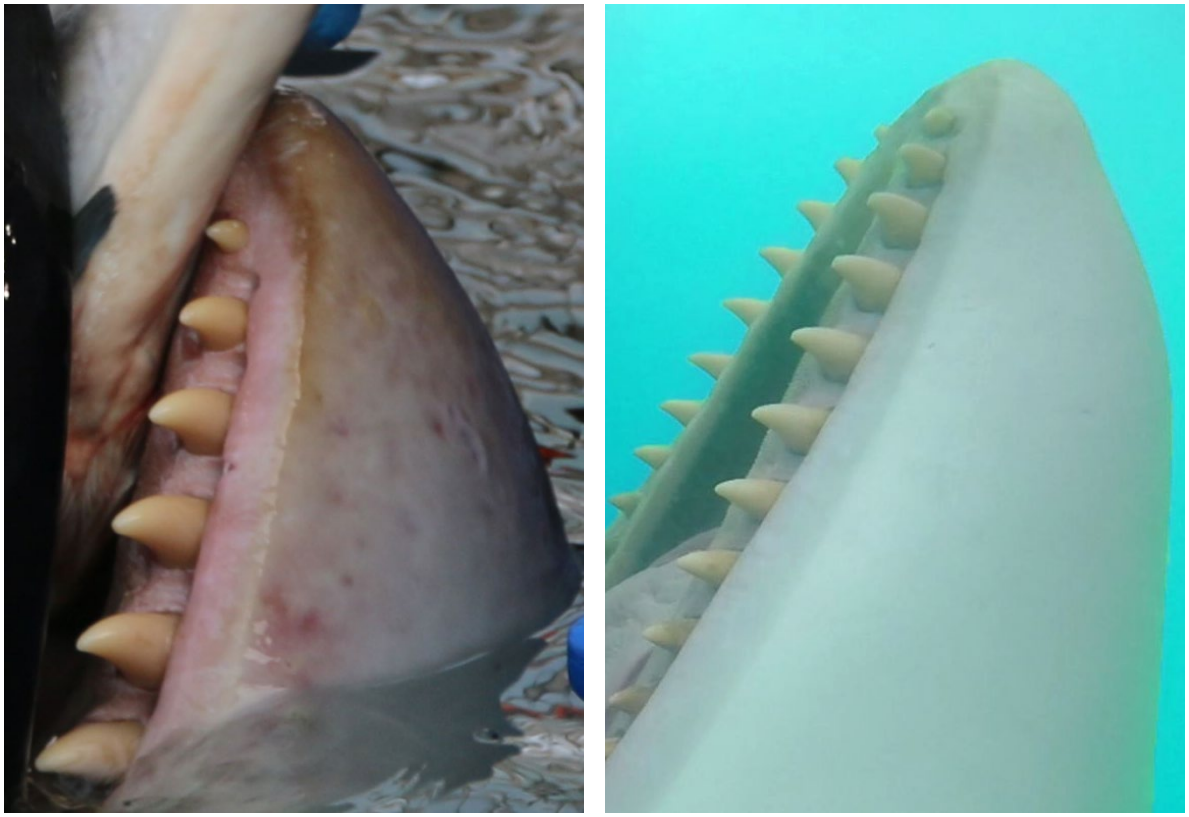


Figure 18. Left; Close-up of the same animal as Figure 17, clearly showing the bruising and/or erythema and sunken, retracted gums. Right; A healthy, free-ranging orca with unblemished white skin and pink, full gums. The abnormal gum appearance on the orca held at Nakodka (left) can be indicative of a poor state of dental health, systemic health, or hydration status. (images: left Tatiana Ivkovic, via Free Russian Whales. Right Ingrid N. Visser).

Figure 19. The same orca as depicted in Figures 17-22. The skin issues extend to the chin and left lower mandible (jaw). The circular, circumscribed, plaque-like lesions on this orca's skin may involve a bacterial or fungal infection and the skin across the mandible shows changes (including raised skin, discolouration), indicative of chronic irritation or superficial infection and health issues for this individual. (image via Free Russian Whales).

Figure 20. The same orca as shown in Figures 17-22. Raised lesions with central depression on the skin (circled on right and indicated with arrows on the left), above the right maxilla. These may be related to viral, bacterial or fungal infection and are located in the zone where the hair follicles are found, so may be infected glandular tissue.
(reference: images via Free Russian Whales).

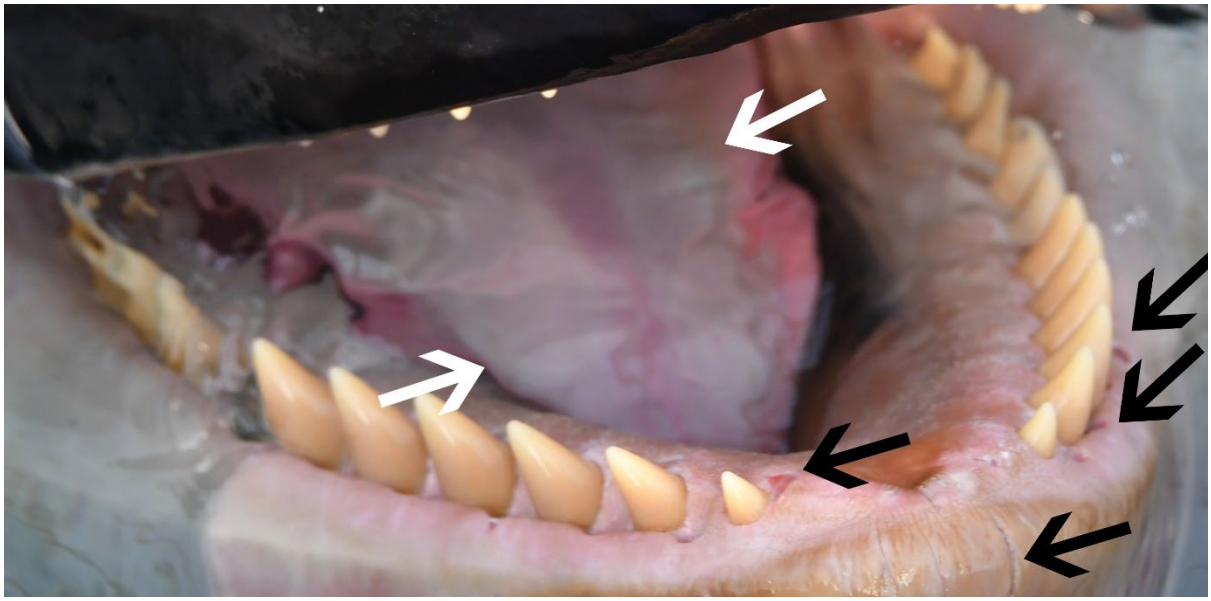


Figure 21. The same orca as shown in Figures 17-22. Damage to the skin (black arrows) can be seen near the teeth and on the symphysis (joining point of the mandibles). It is unclear what is causing such damage. Also note the extensive areas of creamy colouring on the tongue (white arrows). They extend over nearly all the upper surface of the tongue (i.e., only small patches of pink remain). This creamy colouring is likely to be an over-growth of *Candida* – an organism known to kill captive orca – and linked to poor housing conditions and stress. Samples taken from the skin and skin lesions showed that seven orcas harboured *Candida* and two tested positive for *Candida* in their breath samples (image via Free Russian Whales).

Figure 22. The same orca as depicted in Figures 17-21 has its lower-right tooth (LR7) broken (see close up, to left). The tooth is discoloured, suggestive of limited, if any dental hygine administered to the animal and/or possibly associated with devitalized tissue and infection. (image via Free Russian Whales)

As for any mammal, fractured teeth, especially those with exposed pulp cavities, can be a source of extreme pain. The pulp of a tooth contains blood vessels and nerves that extend into the mandible (lower jaw) and connect to the systemic bloodstream. Orca teeth are well embedded into the mandible as depicted in Figure 23 below.

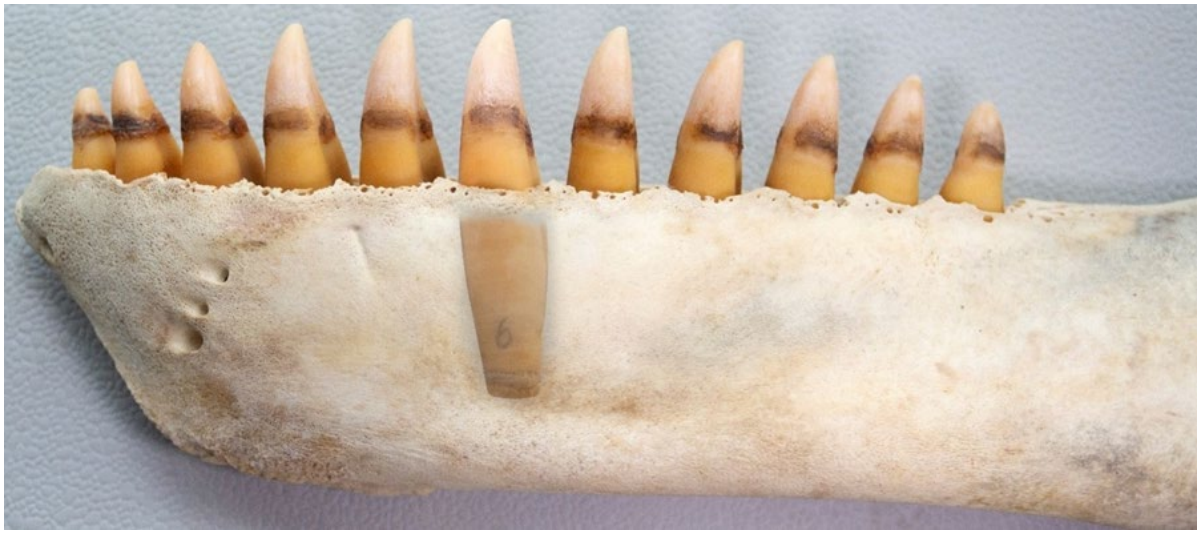


Figure 23. Tooth placement in an orca's mandible, showing the left jaw (with tooth lower-left 6 'exposed' using Photoshop). The teeth are deeply imbedded into the jaw (the dark lines on the teeth are indicative of where the gums extend up to).
(photo by Dr Ingrid N. Visser).

Exposure of the tooth pulp to an unsanitary environment following the fracture has likely resulted in pulp infection (pulpitis). If left unattended, pulp infections can extend into the surrounding bone and soft-tissue structures and promote bacterial translocation into the bloodstream causing a systemic inflammatory response and predisposing to more serious diseases.

Given the colouring of the exposed surfaces of the fractured tooth is it likely that little, if any, dental care has been administered to this orca. Additionally, such discolouration is possibly associated with devitalized tissue and infection. Pulpitis in other species, including humans, is also known to be incredibly painful. This orca requires immediate veterinary attention including cleaning and disinfection of the tooth, pain relief, and possible antimicrobial therapy or other medication. A full consultation with an experienced and qualified veterinary dentist with wildlife training is strongly recommended as this orca will most likely require dental surgery.

5. Sanitation Concerns:

Eleven orcas were tested for bacterial and fungal organisms in their breath and on their skin during inspections that took place on 18 - 19 January. Results showed that three orca had concerning bacterial and fungal organisms in their breath (including *Proteus mirabilis, Staphylococcus ssp. and Candida spp*), whilst samples taken from the skin and skin lesions showed that all eleven orca had a mixture of various bacteria, including some pathogenic

organisms, and seven orcas harboured *Candida*. *Candida* and *Staphylococcus* have both been implicated in the deaths of a number of orca held in captivity (but not in the wild)[1].

Analyses of the water in the holding pens demonstrated the presence of *Bacillus, Escherichia, Pseudomonas, Staphylococcus and Vibrio*. These are bacteria and fungi that have the potential to cause opportunistic infection of wounds or abrasions, mucous membranes, and of the gastrointestinal and urogenital tracts, especially in immune-compromised or stressed animals or those with concurrent diseases. *Bacillus* and *Pseudomonas* have also been implicated in the deaths of captive orcas[1]. Thus, the water quality at the Nakhodka facility is measurably substandard and poses an ongoing threat to animal health.

The evidently poor water quality in the holding pens is likely due to a combination of factors which are not mutually exclusive, such as the topography of the bay and benthos (including depth), water temperature, poor water circulation, high density of whales, small pens in a small area and external pollution (terrestrial, air or water borne).

With regards to the high density of whales, the small pens and the overall small area, there are again key factors to take into consideration:

1. Biological loading due to fish waste.
When feeding captive whales, not all fish are necessarily consumed (dropped fish, partially eaten fish and regurgitated fish are examples). This increase in dead fish entering the bay results in an increase in organic material to be broken down.

2. Biological loading due to metabolic waste products.
Excrement from animals can quickly accumulate in stagnant or reduced-flow waters. Whales pass urea as a liquid and faeces as semi-solid material that disperses in the water.

In both cases this results in the water surrounding the pens, as well as the benthos (sea floor), having an increased accumulation of primary organic material. This has long been recognised as an issue where bio-loading of animals exceeds that normally found (e.g., in ocean fish farming the situations are similar to those described here (Mazzola et al., 2000). Such organic matters are sources of microorganisms, which creates unsanitary conditions that can pose a danger to the animals' health.

While the pens of the Nakhodka facility are floating on the surface of the seawater and theoretically have a free-flow system that would refresh the water continuously, the tidal movements are extremely minimal, with the largest tidal range at Nakhodka being only 0.39m (1.3ft). The topography of the area indicates that the maximum depth in the bay of Zaliv Vostock (where the facility is located), is 20m (see Appendix 6 for details). Therefore, adequate water turnover inside the enclosures is not achieved, likewise in the bay area itself.

[1] GREENWOOD, A. G. & TAYLOR, D. C. 1985. Captive killer whales in Europe. Aquatic Mammals, 1, 10-12.
KIELTY, J. (2011). Marine Mammal Inventory Report (Deficiencies). St Pete Beach, Florida, USA, The Orca Project Corp (unpublished report, available from https://theorcaproject.wordpress.com/2011/03/18/noaa-nmfs-marine-mammal-inventory-report-deficiencies/): 25.
HOYT. (1984). Orca: The whale called killer. Ontario, Camden House Publishing Ltd.
RIDGWAY, S. H. 1979. Reported causes of death of captive killer whales (Orcinus orca). Journal of Wildlife Diseases, 15, 99-104.
SWEENEY, J. C., MIYAKI, G., VAINIK, P. M. & CONKLIN, R. H. 1976. Systemic mycoses in marine mammals. Journal of the American Veterinary Medical Association, 169.

With regards to how much excrement would be discharged into the bay it is logical to first assess the volume of fish that the whales consume. The scientific literature[2] indicates that orca held captive in concrete tanks, with stable water of approximately 13°C temperature, are fed between 2-3% of their body weight. The water temperature in Nakhodka is clearly much lower than 13°C (and may be sub-zero) and the animals are confined to such small pens that they cannot create body heat through exercise, so it is likely that they have to compensate by creating metabolic heat (which involves the breakdown of body fats). These factors would all increase the food-base required to maintain their body weight.

Additionally, we do not have actual body weights for these animals and as such it is not possible to accurately assess how much food they are consuming. Regardless, we can draw from the scientific literature and take into account the visit by the Russian scientists on the 18 January and 1 March 2019 and their subsequent reports. The size estimates of 3m and upwards for these orca places their weight at well over 200kg and possibly up to 800kg. Using the 2-3% criteria for calculating required food, it is possible to assume that each orca was fed between 4 to 24 kg per day. With 10 orca currently held at the facility, this would be 40-240 kg of fish per day. For the five month duration (152 days) that would be 6,080kg - 36,480kg of fish which has been turned into excrement. Additionally, there are 80+ beluga in the bay adding even more fish waste into the equation.

Thus, the amount of accumulated excreta and food particles from these animals could pose a significant animal, human, and environmental health risk. Furthermore, these fish are likely to be pre-frozen and therefore require defrosting. Defrosting of fish for marine mammal facilities is typically done in one of two ways; (a) defrost slowly in a refrigerator, or (b) force-defrost with running water. In both instances there is an excess of waste water produced and this may be disposed of directly into the bay. Furthermore, given the proximity of the facility to the shore and a range of buildings (dwellings, industrial etc), there are likely additional pollutants, such as chemical, waste water and sewage run-off into the area where the pens are located.

These unsanitary conditions are particularly concerning for the animals at Nakhodka who demonstrate indications of chronic injury to the skin and ongoing infection. An animal's skin is the first line of defence. When this natural barrier is broken, such as from raking or other traumatic insult, the skin is placed at risk of infection from secondary bacterial or fungal pathogens, such as those mentioned above. The immune system can be further comprised by exposure to chronic psychological stress, such as the stress associated with capture, restraint, transport, confinement and deprivation, to which these animals have been subjected over the past five months, or more.

[2] Numerous publications by SeaWorld veterinarians between 2004 and 2018, state that SeaWorld's orca are "*fed at a rate of approximately 2-3% of body weight per day*". E.g. see Robeck, T. R., K. J. Steinman, S. Gearhart, T. R. Reidarson, J. F. McBain and S. L. Monfort (2004). "Reproductive physiology and development of artificial insemination technology in killer whales (Orcinus orca)." Biology of Reproduction 71: 650-660.; Robeck, T. R. and S. L. Monfort (2006). "Characterization of male killer whale (Orcinus orca) sexual maturation and reproductive seasonality." Theriogenology 66: 242-250.; page 489 in Robeck, T. R. and H. H. Nollens (2013). "Hematologic and serum biochemical parameters reflect physiological changes during gestation and lactation in killer whales (Orcinus orca)." Zoo Biology 32: 497-509.; Tang, K. N., H. H. Nollens, T. R. Robeck and T. L. Schmitt (2018). "Serum cobalamin and folate concentrations as indicators of gastrointestinal disease in killer whales (Orcinus orca)." Journal of Zoo and Wildlife Medicine 49(3): 564-572; and Robeck, Todd R., Jason L. Blum, Karen J. Steinman, Jill R. Ratner, Don R. Bergfelt, and Justine K. O'Brien. "Longitudinal Profiles of Relaxin and Progestagens during pregnancy, pregnancy loss and false pregnancy in the killer whale (Orcinus orca)." General and comparative endocrinology (2018).

6. General Conclusions and Recommendations

The orca and beluga being held captive at Srednyaya Bay near Nakhodka are housed in conditions that fail to meet even the most minimum legal and professional standards for both facility size and water quality. Additionally, the facility falls dramatically short of meeting the animals' basic physical and behavioural needs. According to industry-standard practices and regulations, the Nakhodka facility can only at best be considered a 'transit' facility, i.e., a location where whales are kept for a short period of time. However, currently the whales are estimated to have been kept at Nakhodka since September 2018. Thus, it is apparent that these whales have been subjected to prolonged, excessive, and detrimental confinement at the Nakhodka facility for far longer than is professionally or ethically acceptable.

During this entire time, these animals have been prevented from engaging in biologically meaningful behaviours and movements that are essential to their survival and well-being. This includes traveling, diving, hunting and maintaining the natural social bonds and interactions that are so important to both species. Specifically, their extreme confinement has limited the whales' ability to perform basic swimming and diving behaviours that are essential to their health and wellbeing, including their ability to properly thermoregulate. The excessive over-crowding limits their ability to escape from conspecifics during aggressive encounters, which we expect to be heightened as a result of increased social tension imposed by such a constrained environment. Indeed, evidence of a high rate of rake mark lesions on the bodies of these animals is supportive of heightened aggression during their time at Nakhodka.

Furthermore, Srednyaya Bay where these pens are located has limited tidal flushing and inadequate turnover of water to sufficiently reduce and remove the large quantity of excrete that is being produced by the animals. Sampling has shown that the water quality is severely compromised. Additionally, microbiological samples taken from the skin of eleven orca confirms the presence of bacteria and fungi associated with poor sanitation and which can pose a danger to animal health. At least one orca showed a marked deterioration over just a 42-day period, including a fractured tooth with an open pulp cavity that appears necrotic and infected, and which could pose a grave risk to the orcas' health if left untreated.

Therefore, we conclude that the orca and beluga at the Nakhodka facility have been exposed to conditions that have increased their risk of injury, hypothermia, immune suppression and infectious disease. Thus, in light of this assessment, it is clear that the welfare of the animals at this facility continues to be compromised by the conditions in which they are being held.

In light of the findings of this report, we urge the Russian government to take swift action to provide access for a team of Russian and international experts to enter the facility to fully evaluate and treat the whales, and to start the process of improving the captive facility, rehabilitating the animals back to health, and preparing them physically and behaviourally for release. While the rehabilitation program is underway, transportation back to the site(s) of original captures can be planned and finalised. Transport can then be undertaken at the appropriate time to maximize the welfare of the animals and the overall success of the reintroduction program.

APPENDIX 1. Capture sites.

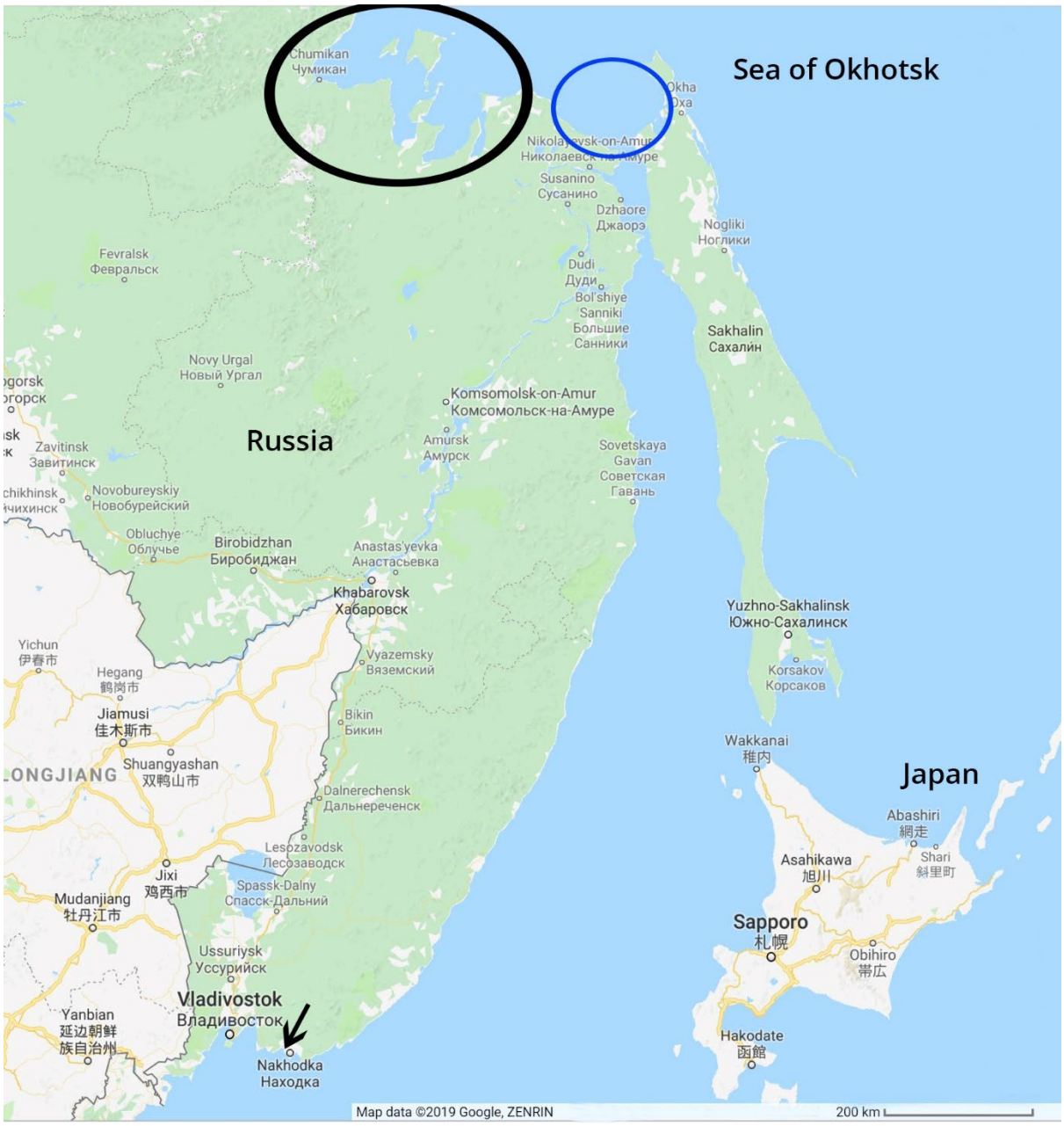


Figure 1.1. Presumed capture areas for the orcas (black circle) and the beluga (blue circle), in relation to Vladivostok and the facility at Nakhodka. Approximate distances from the holding facility to the capture sites (by sea) are 1,750 km (orca) and 1,500 (beluga).

APPENDIX 2. Pen numbers and Configurations.

The 'history' feature of Google Earth was used to ascertain the fluctuations in pen numbers and configurations. The dates (top left timeline on each image) are also in the captions.

Figure 2.1. Nakhodka shore facilities in Srednyaya Bay. Insert: Note there are no pens in the bay (compare to following images and the drone photos in the main body of this report, taken 1 March 2019). Image: Google earth on 20041002.

Figure 2.2. Nakhodka shore facilities and pens in Srednyaya Bay. Insert: Note there are nine pens in the bay. Image: Google earth on 20120920.

Figure 2.3. Nakhodka shore facilities and pens in Srednyaya Bay. Insert: Note the number of pens hasn't changed since the image three months earlier and there are still nine pens in the bay. Image: Google earth on 20121210.

Figure 2.4. Nakhodka shore facilities and pens in Srednyaya Bay. Insert: Note the number of pens is now seven open-air pens and one covered pen, in the bay. Image: Google earth on 20150610.

Figure 2.5. Nakhodka shore facilities and pens in Srednyaya Bay. Insert: Note the number of pens is now seven open-air pens and two covered pens, and a barrier net has been added to the bay. Image: Google earth on 20160826.

Figure 2.6. Nakhodka shore facilities and pens in Srednyaya Bay. Insert: Note that nothing changed in terms of the pen numbers or configurations in the months since the site was last documented by satellite. Image: Google earth on 20161012.

Figure 2.7. Nakhodka shore facilities and pens in Srednyaya Bay. Insert: Note the number of pens has remained at seven open-air pens and two covered pens, with a barrier net, i.e., in the intervening month, nothing changed in terms of the pen configurations. Image: Google earth on 20161113.

Figure 2.8. The most recent Google Earth image available at the time of compiling this report (17 March 2018), showing the Nakhodka shore facilities and pens in Srednyaya Bay. Note the number of open-air pens has dropped to seven but the number of covered pens has increased by one (it appears that two open-air pens were converted to covered pens). The barrier net has been removed. Image: Google earth on 20180322.

Figure 2.9. An aerial photo (from an Unmanned Aerial Vehicle or drone) of the facilities at Nakhodka on March 1st, 2019. Note that there are now 13 open-air pens, four covered pens and a barrier net has been reinstalled. (image, via Free Russian Whales).

APPENDIX 3. Pen Sizes.

In order to illustrate the deficiencies of size of the pens at the Nakhodka facility the pens were measured (using Google Earth measure tool – see Figures 3.1 – 3.4 for examples) and compared to the standards set forth by a USA-based professional association, the Alliance of Marine Mammal Parks and Aquariums (AMMPA). The AMMPA mandates their own minimum space standards for a facility to receive AMMPA accreditation.[3] Such accreditation is considered a 'seal of approval' and highly sought after by companies holding marine mammals.[4]

Additionally, recommendations that have been developed and published by scientists and lawyers in the United States of America with the intention of improving Captive Marine Mammal Welfare,[5] are used to show that the regulatory and industry standards have both lagged behind recent science-based recommendations.

Of note is that the number of pens at the Nakhodka facility have continued to increase over time (Appendix II). Such an increase is illustrative of the ability of the facility to expand (i.e., they could have expanded in order to give each animal more space). Furthermore, there are clearly pens on-site that hold no cetaceans, which could have been adapted to give the animals more space.

Comparison of International Standards and Regulations with Nakhodka facilities:

According to the AMMPA, the minimum volume that would be required for two orcas is 959m^3 *per orca* for the first two whales. For every additional orca above two, an additional 539.5 m^3 of water must be added[6] (Rose et al, 2017). Therefore, the minimum volume for an enclosure containing four orcas should be 2,997 m3. As we have noted in Table 2, this shows that the Nakhodka orca pens are **165% substandard to this requirement**.

For the beluga, the minimum volume for a pen containing up to two belugas is 136.8 m^3 per animal, with an additional 153.9 m^3 required for each additional animal above two[7]. Thus, the minimum total volume for an enclosure containing 10 belugas is approximately 1,505 m^3 according to AMMPA standards. There are three different beluga pen sizes at Nakhodka, with

[3] https://www.ammpa.org/membership/standards-guidelines

[4] For example, their website states, under their 'why join' page that the AMMPA is "*Dedicated to the highest standards of care, our members' priority is to provide animals with safe, healthy environments, state-of-the-art veterinary care and exceptional welfare practices*." (https://www.ammpa.org/membership/why-join-alliance) and their Standards Guidelines page (https://www.ammpa.org/membership/standards-guidelines) states "*Considered to be the most comprehensive and stringent in the world, Alliance accreditation standards are based on decades of experience and best practices of marine mammal experts throughout the world. To become accredited, facilities must meet or exceed these standards, which encompass topics ranging from animal health and wellness, applied animal behavior, training and enrichment, and water and environmental quality, to population sustainability, transportation, scientific research and conservation, and public education.*"

[5] For a more detailed discussion see Naomi A. Rose, Georgia Hancock Snusz, Danielle M. Brown & E. C. M. Parsons (2017) Improving Captive Marine Mammal Welfare in the United States: Science-Based Recommendations for Improved Regulatory Requirements for Captive Marine Mammal Care, Journal of International Wildlife Law & Policy, 20:1, 38-72. https://www.tandfonline.com/doi/pdf/10.1080/13880292.2017.1309858

[6] 959 m^3 x 2 = 1,918 m^3 for the first two animals, + 539.5 m^3 for every additional animal. Therefore, 1,918 m^3 + (539.5 m^3 x 2) = 2,997 m^3 for 4 orca.

[7] 136.8 m^3 x 2 = 273.6 m^3 for the first two animals, + 153.9 m^3 for every additional animal. Therefore, 273.6 + (153.9 x 8) = 1504.8 m^3 for 10 beluga.

volume ranges of 337.5 m^3 to 544.5 m^3. The Nakhodka pens are **between 226% – 446% substandard** to AMMPA minimum standards.

It is important to note additionally that the AMMPA has been challenged by the scientific community as inadequate to meet the biological and psychological needs of these species. According to Rose et al (2017), *"[g]iven beluga diving profiles and their Arctic habitat … this species, perhaps more than delphinids, needs deeper tanks based on average adult body length. The minimum depth requirement should be 20 m—twice the depth of a typical "surface-oriented" dive in the wild. The MHD should, at a minimum, allow a beluga whale to move in the horizontal plane in a straight line for at least 10–12 tail strokes (i.e., 50 m)."*

Furthermore, Rose et al emphasizes that "*killer whales* [orca] *routinely swim multiple kilometres in straight lines and are capable of travelling as many as 225 km a day for up to 30–40 days without rest. Home ranges can be 3,000–5,000 km north to south. They routinely dive to depths in excess of 500 m, and a "shallow" dive is in excess of 7m. In some populations, individuals dive in excess of 200m up to a dozen times a day, while in others, they dive deeper than 150 m at least once every five hours*" [internal references excluded].

Table 3.1. Extract of orca (killer whale) and beluga (white) whales from Rose et al (2017) comparing standards.

Species	Dimensions (meters (m), m^2, and m^3)	Current AWA standard	Couquiaud (2005) minimum identified[1]	United Kingdom	Italy	Brazil	Alliance of Marine Mammal Parks and Aquariums (AMMPA)	Recommendations[2]
Killer whales (*Orcinus orca*)	MHD[3]	14.64	n/a	15	n/a	n/a	n/a[9]	100
Average adult length:	Minimum depth[4]	3.66		12			5.25[9]	15
7.32 m — AWA	Min surface area	31.55[5]		2,400[8]			n/a[10]	not calculated
5.25 m — AMMPA	Minimum volume	307.89[6]		2,500			959[10]	not calculated
	Min vol each add'l animal[7]	153.95		n/a			539.5[11]	not calculated
Bottlenose dolphins (*Tursiops truncatus*)	MHD	7.32	n/a	7.0	7.0	14.0	n/a	35
Average adult length:	Minimum depth	1.83	n/a	5.6	3.5/4.5[16]	6.0	2.55	6
2.74 m — AWA	Min surface area	4.42[12]	14 *or* 91[14]	n/a	80[17]	n/a	n/a	14 *or* 91
2.55 m — AMMPA	Minimum volume	38.48[13]	46	200[15]	320[18]	800[19]	55.58[20]	63
	Min vol each add'l animal	10.79	46	200	400	400	62.7[21]	63
Beluga whales (*Delphinapterus leucas*)	MHD	8.54	n/a	n/a	n/a	14.0	n/a	50
Average adult length:	Minimum depth	2.14				7.0	3.45	20
4.27 m — AWA	Min surface area	10.74				n/a	n/a	14 *or* 91
3.45 m — AMMPA	Minimum volume	27.56				800[22]	136.8[23]	154
	Min vol each add'l animal	30.63				400	153.9[24]	154

[1] Couquiaud did not identify the cetacean species for these dimensions, but the most commonly held species in her survey was the bottlenose dolphin
[2] All dimensions are additive, except for MHD and minimum depth, which are independent of the number of animals held in an enclosure
[3] Minimum horizontal dimension (in meters)
[4] Minimum depth (in meters)
[5] Minimum surface area per animal (in m^2) — min SA required for 1 *or* 2 animals is twice the per animal min SA, or 63.09 m^2
[6] Minimum volume per animal (in m^3) — min vol required for 1 *or* 2 animals is twice the per animal min vol, or 615.79 m^3
[7] Minimum volume for each additional animal in excess of 2
[8] Minimum surface area required for up to 5 animals is 12,000 m^3
[9] Minimum depth is 2.55 m or one average adult body length of the longest species housed in an enclosure, whichever is greater
[10] Minimum volume required for 1 *or* 2 animals is 1,918 m^3
[11] Minimum volume required for 1 *or* 2 add'l animals is 1,079 m^3
[12] Minimum surface area required for 1 *or* 2 animals is 8.84 m^2
[13] Minimum volume for 1 *or* 2 animals is 76.97 m^3
[14] The minimum surface area identified by Couquiaud was 14 m^2; the median surface area was 91 m^2
[15] Minimum volume required for up to 5 animals is 1,000 m^3
[16] Minimum depth is 3.5 m but must be at least 4.5 m in half of enclosure
[17] Minimum surface area required for up to 5 animals is 400 m^2
[18] Minimum volume required for up to 5 animals is 1,600 m^3
[19] Minimum volume required for 1 *or* 2 animals is 1,600 m^3
[20] Minimum volume required for up to 4 animals is 222.3 m^3
[21] Minimum volume required for 1 *or* 2 add'l animals is 125.4 m^3
[22] Minimum volume required for 1 *or* 2 animals is 1,600 m^3
[23] Minimum volume required for 1 *to* 4 animals is 547.2 m^3
[24] Minimum volume required for 1 *or* 2 add'l animals is 307.8 m^3.

Sources for Table 3.1:

Alliance of Marine Mammal Parks and Aquariums (AMMPA) https://www.ammpa.org/membership/standards-guidelines
Brazil Regulations. Federal Public Service, Ministry of the Environment, Brazilian Institute for the Environment and Natural Renewable Resources, Regulation No. 3, 8 February 2002.
Couquiaud, L. (2005). "A survey of the environments of cetaceans in human care." Aquatic Mammals 31(3): 277-385.
Italy Regulations. Journal No. 15, Environment Ministry, Decree 469 of 6 December 2001.
Rose, et al., (2017) Improving Captive Marine Mammal Welfare in the United States: Science-Based Recommendations for Improved Regulatory Requirements for Captive Marine Mammal Care, Journal of International Wildlife Law & Policy, 20:1, 38-72.
UK Regulations. Annex G, supplement to the Secretary of State's standards of modern zoo practice, additional standards for UK cetacean keeping.

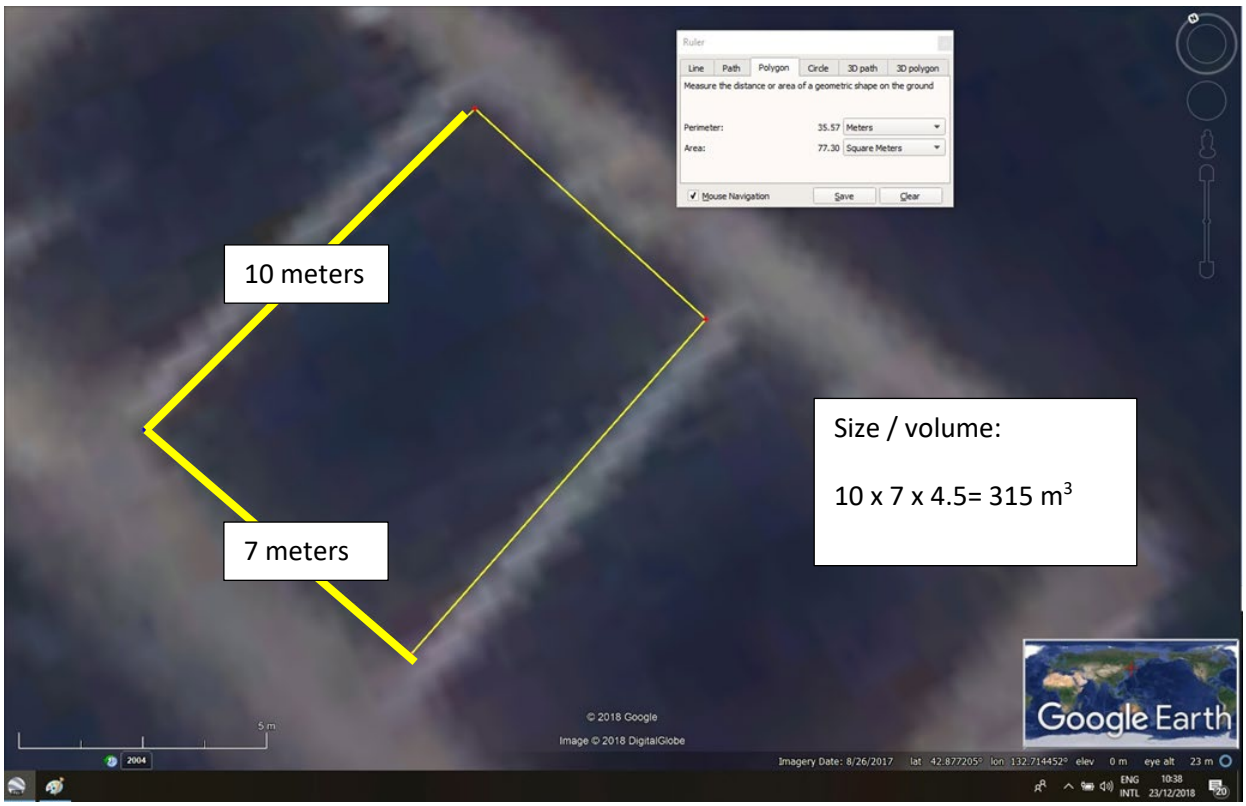


Figure 3.1. Details showing approximate measurements of one of the beluga pens at the Nakhodka facility. Image from Google Earth.

Figure 3.2. Measurements and configuration of beluga holding tanks were made on Google Earth and transposed onto this image to illustrate the different sizes. (Image from UAV-photography via Free Russian Whales).

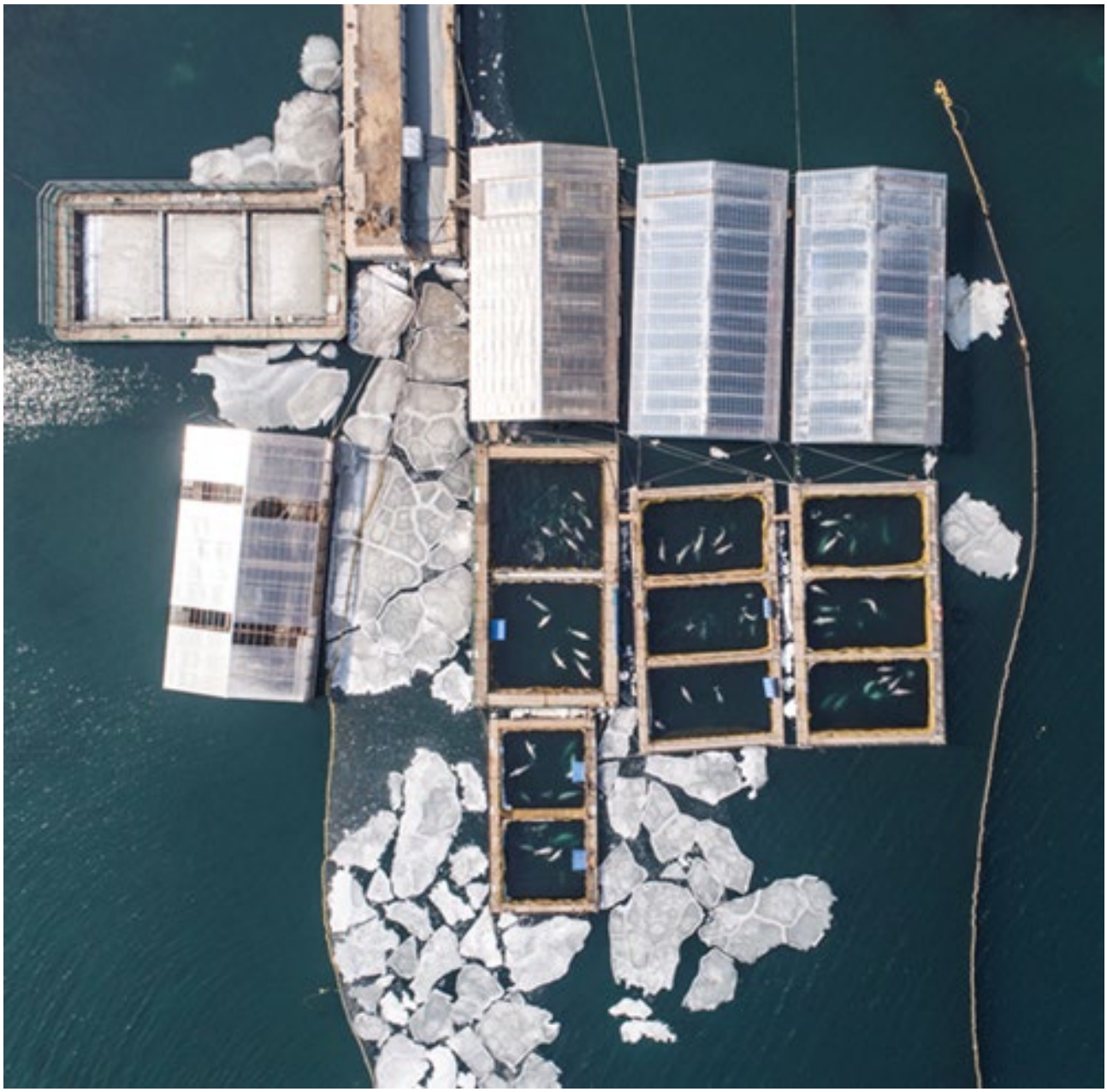


Figure 3.3 Detail of the three covered pens which currently hold the 10 orca, compared to the beluga pens. A fourth covered pen, to the right of the beluga pens, is of similar dimensions to the orca pens. It has not been established what that fourth pen holds (if anything).

Note the three open pens to the top left of frame, which are filled with ice and therefore hold no cetaceans. It may have been feasible to have adapted these three pens and the fourth covered pen to give the belugas / orca more space. (image via Free Russian Whales).

Figure 3.4. The fourth pen described above, is used as a proxy for measuring the existing orca pens. Image from Google Earth.

APPENDIX 4. Additional photographs of the belugas & orcas.

All images are via Free Russian Whales).

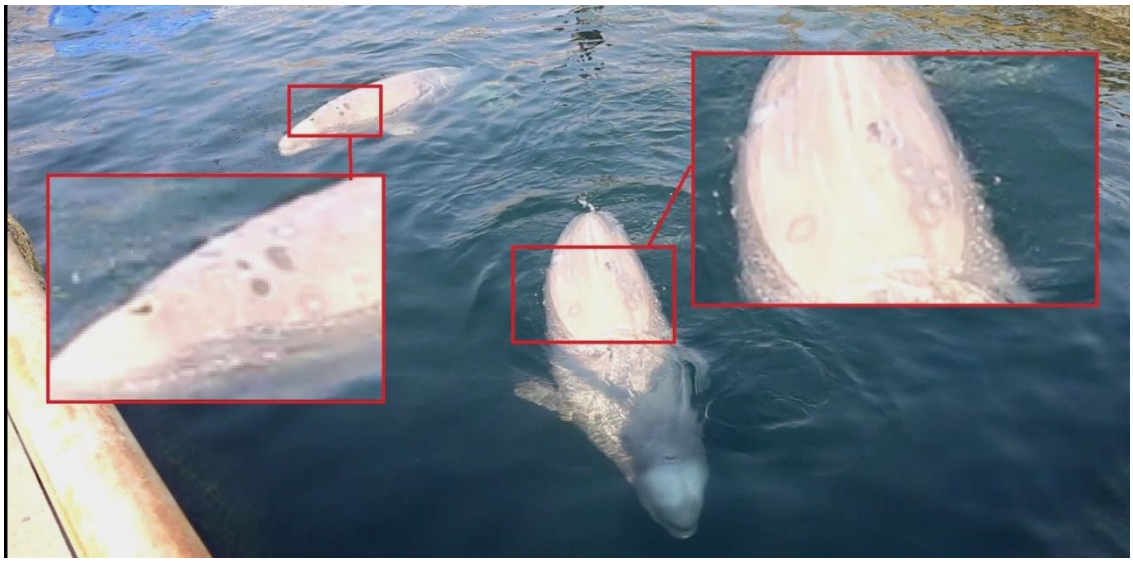


Figure 4.1. Two belugas are observed with skin lesions in this image. Right – this animal's lesions are described in MVI_3978. Left – this beluga has large, circular depressions in the skin that appear stable and possibly healing (better view in IMG_3964 below). It is impossible to ascertain the cause of these lesions, but they are indicative of prior trauma and/or infection that resulted in the removal, destruction, or sloughing of the outermost layers of the skin. (Video screenshot MVI_3978 00:13 sec, via Free Russian Whales).

Figure 4.2. A beluga whale surfaces through the floating brash/pancake ice, in one of the pens at the Nakhodka facility. (via Free Russian Whales).

Figure 4.3. The barrier net retains the surface ice as it begins to disperse in March. (via Free Russian Whales).

Figure 4.4. One of the three orca pens. Note the pen construction, where the net is clearly visible. The 'semi-permanent' nature of the pen is also evident with the guard rail, 'platform' etc. The uninsulated walls are evident. Photo taken 1 March 2019. (via Free Russian Whales).

Figure 4.4. The small scale of this pen is evident from this image taken from one corner, looking along the length of the pen to the far end. Image via Free Russian Whales.

Figure 4.5. The same orca as depicted in Figures 17-22, in the main body of the report.

The skin issues extend to the chin and left jaw and include raised skin, indicative of other health issues for this individual. Image via Free Russian Whales.

Figure 4.6. One of the orca in the Nakhodka facility showing damage to the chin (note the extensive peeling of white skin on at the water's edge on the animals left side. Note, this is not the same orca as depicted in Figures 17-22 in the main body of the text (as the eye patch pigmentation is different). (IMA_0851, via Free Russia Whales).

Figure 4.7. One of the orca with excessive amounts of skin sloughing (IMA_0851, via Free Russia Whales)

Figure 4.8. Another of the orca in the Nakhodka facility showing damage to the chin. Additional lesions are found in the creases (close up below in Figure 4.6). (IMG_1158, via Free Russian Whales).

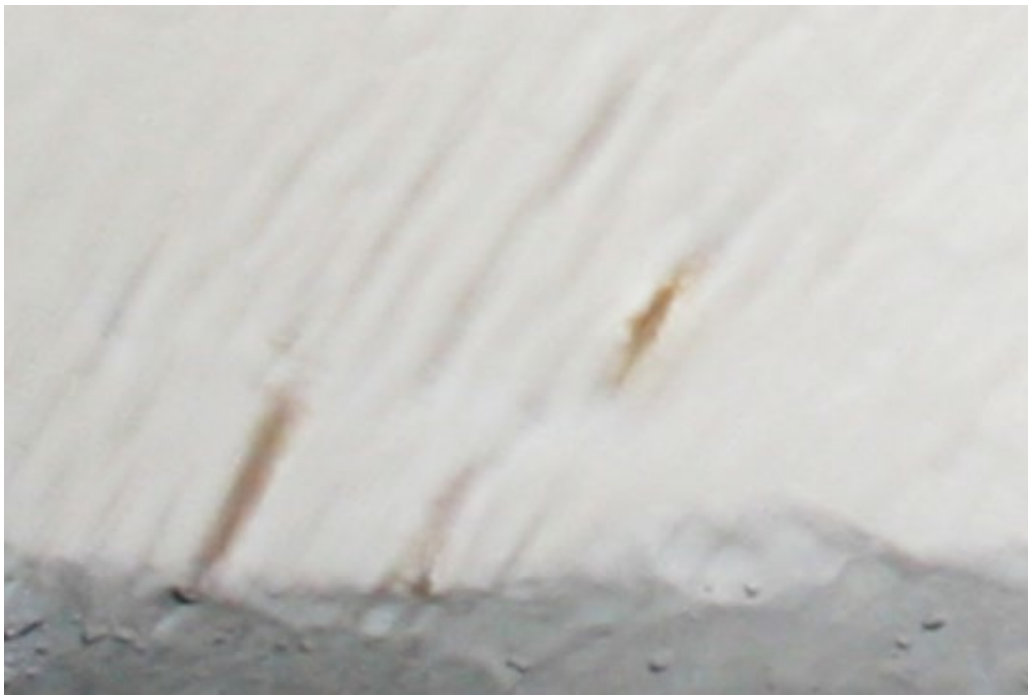


Figure 4.9. A close-up of the open lesions that lie inside the creases on the lateral side of the orca's head in Figure 4.5.

Figure 4.10. One of the orca with sub-dermal rake marks, indicative of aggression. (IMG_0768 via Free Russian Whales).

Figure 4.11. One of the orca with a healed scar from a cookie-cutter shark (*Isistius* sp.).[8] A number of the orca at the Nakhodka facility have cookie cutter shark bite marks, which are indicative that they have travelled large distances (as cookie cutter sharks are not found in Russian waters). Russian research has shown that orca with cookie cutter shark bites are more likely to be mammal-eating than fish-eating orca.[9]

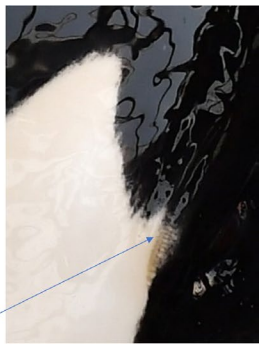
[8] Dwyer, S. L. and I. N. Visser (2011). "Cookie cutter shark (*Isistius* sp.) bites on cetaceans, with particular reference to killer whales (orca) (*Orcinus orca*)." Aquatic Mammals **37**(2): 111-138.

[9] Shpak, O. V. and T. Shulezhko (2013). Observations and photoidentification of an unusual group of mammal-eating killer whales (*Orcinus orca*) in the Western Sea of Okhotsk (Наблюдения и фотоидентификация необычной группы плотоядных косаток (*Orcinus orca*) в западной части Охотского моря).

APPENDIX 5. Matching of an orca between two dates.

All images via Free Russian Whales.

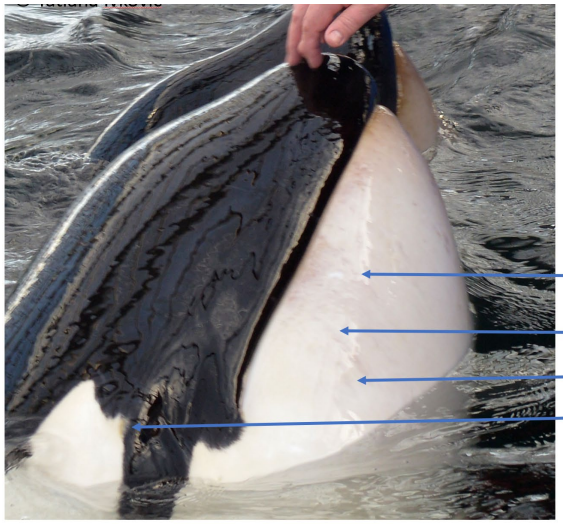
Lines such as these allow matching between photos of the same sequence



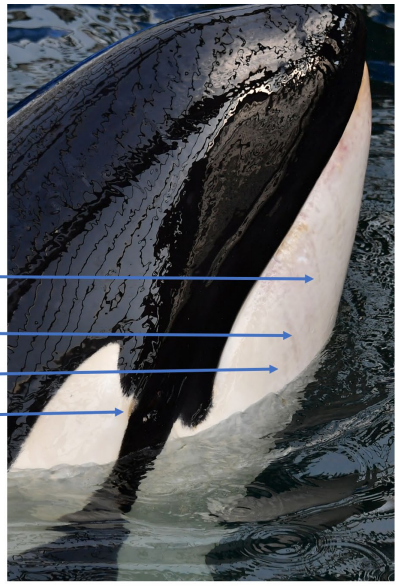
20190301

The unique leading edge of the eye patch is like a finger print – no two are the same. This one has a 'dark' zone near the lower edge, as well as a U shape to the front

20190301



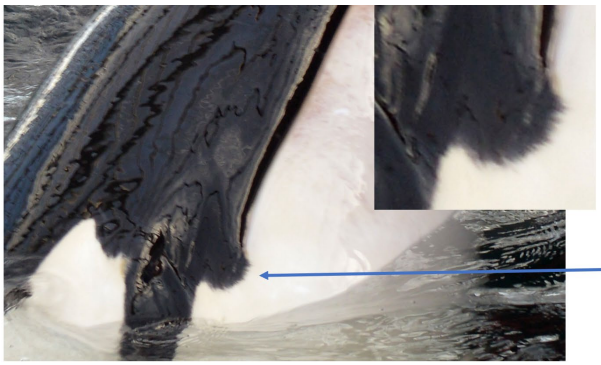
Lines of scars match between dates

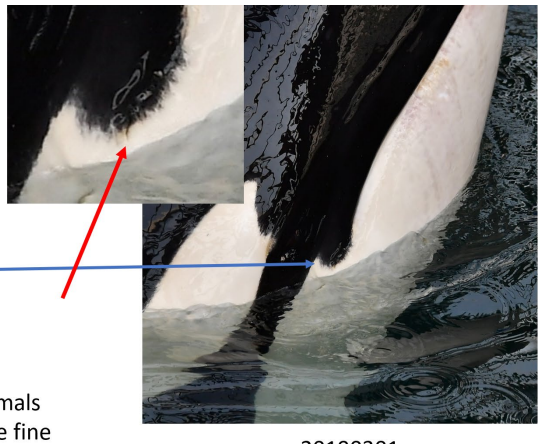


20190118

Eyepatch matches between dates (note U shape is photographed on different angle so appears slightly different, but key points can still be identified

20190301





20190118

The pigmentation at the corner of the animals mouth (called the gape) matches (note the fine 'feathering' and overall shape). The photo on the left shows new scars (red arrow)

20190301

APPENDIX 6. Depths & Tidal Range

The small bay where the 'Whale Jail' is found is labelled on Nautical Chart #96004[10] as Zaliv Vostock and is no more than 20 m deep (Figure 6.1). The actual depth below the facility is much less given the proximity to the shoreline (Figures 2.1 – 2.9). This is confirmed by Figure 2.6, where the seabed can be clearly observed through the water and adjacent to the facility. The tidal range at Nakhodka (i.e., only a few kilometres away) is less than half a meter (see Figure 5.2. All of these factors will contribute to poor water circulation.

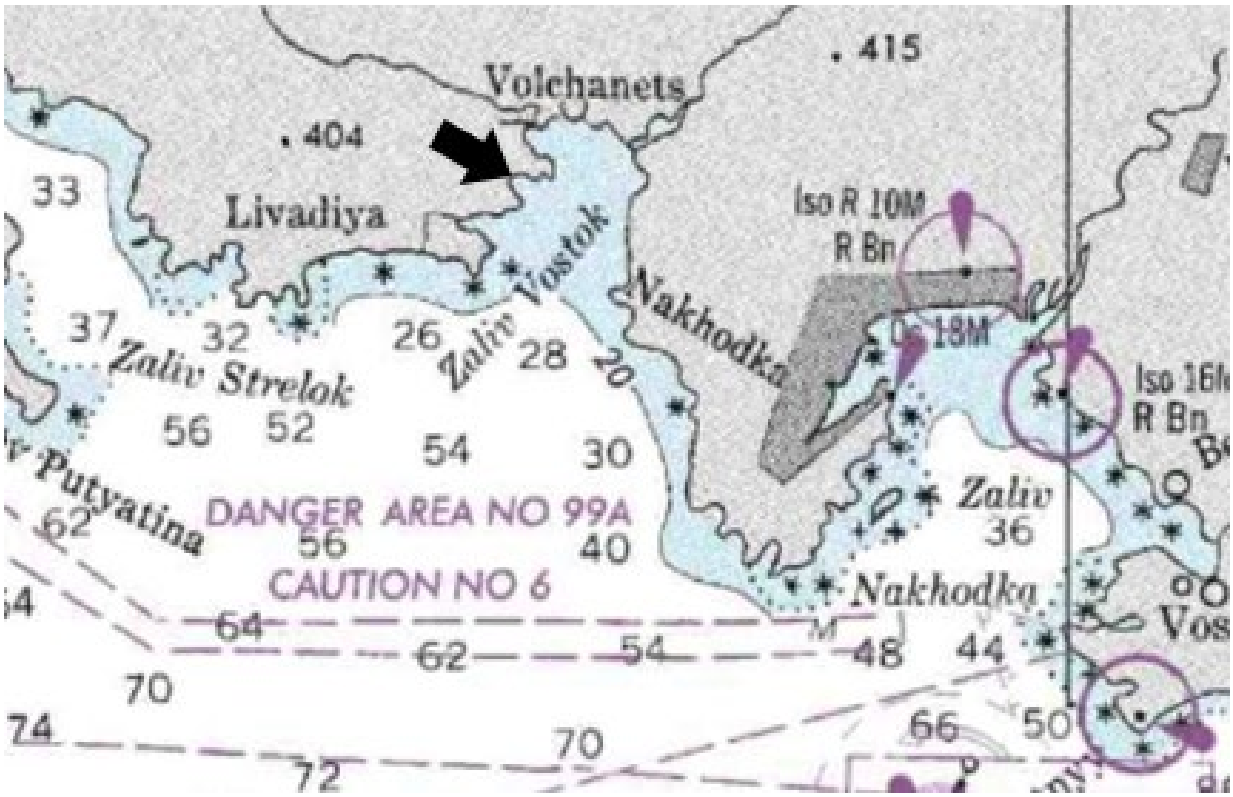


Figure 5.1. The topography of the area indicates that the maximum depth in the bay of Zaliv Vostock (where the facility is located, arrow), is less than 20m (the 20m contour line is indicated and all waters shore-side of that line are indicated in blue. Given the protruding headland of this bay and the convoluted coastline on either side, water circulation is likely to be limited. The township of Nakhodka is indicated on the chart, to the east of the facility. See Figure 1, in the main body of the text, for overview of location in relation to Vladivostok. Extracted from Nautical Chart #96004.

[10] https://www.nauticalchartsonline.com/chart/zoom?chart=96004

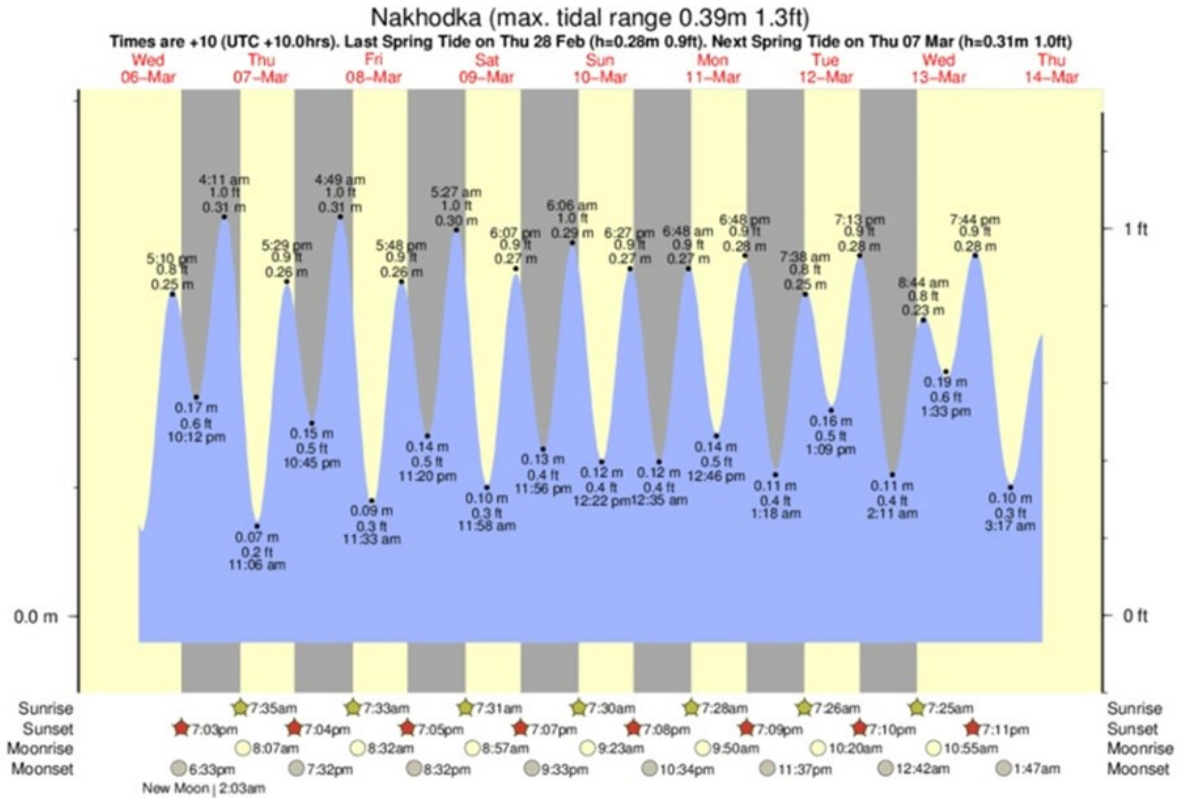


Figure 5.2. Recent tidal chart reflecting the extreme low tidal range in the Nakhodka - Srednyaya Bay area. [11]

[11] https://www.tide-forecast.com/locations/Nakhodka-1/tides/latest.