

LOCATION

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DESCRIPTION

Keeping marine mammals has a long tradition at Nuremberg Zoo. The old dophinarium that had opened in 1971 was no longer adequate for keeping and presenting dolphins after 40 years of operation with only minor improvements. The reconstruction of the first open-air exhibit for dolphins in Germany intended to create optimal conditions for keeping and breeding dolphins on a long-term basis. The visitors now can better experience the dolphins through large underwater windows.

As Nuremberg zoo is planned as a landscape zoo: all enclosures are integrated in the zoo's quarries of characteristic red sandstone and the oak forest. The complex of basins and the visitor area including the stands are structured by rocks from local quarries and retaining walls of matching artificial rockwork. The islands for the trainers are made of artificial rock. They are planted and decorated with natural stones. A large mound hides the technical building. Underwater, the visible parts of the basin walls were covered with artificial rockwork.

SIZE

The total area of 23,000 m² includes the manatee house. Dolphin Lagoon:
 Basin 1: 274.8m²; 1.078m³;
 depth 4m



Dolphins. ©Tiergarten Nürnberg, 2012



Air dome: During winter, an air dome covers basin 1 and basin 6. ©Jonas Homburg, 2016

ANIMALS

Family	Species	Common Name	Capacity
Delphinidae	<i>Tursiops truncatus</i>	Bottlenose dolphin	10 + offspring
Otariidae	<i>Zalophus californianus</i>	Californian sea lion	10 + offspring



View overlooking the Lagoon: Basin 2/3 spreads out along the stand, basin 4 in the background. ©Monika Fiby, 2015



Underwater view. ©Jonas Homburg, 2016



Site Plan: Down basin 2/3, on the right basin 1, up left basin 4, centrally basin 5 and up right basin 6. ©Tiergarten Nürnberg, 2016

Basin 2/3: 668.5m²; 3,316.6m³; depth 5-7m
 Basin 4: 313.5m²; 363.7m³; depth 0.5-1.5m
 Basin 5: 86.3m²; 214.8m³; depth 2.5m
 Basin 6: 200.7m²; 486.8m³; depth 2.5m

The overall water surface is 1445.2m² for the dolphins. Additionally, there is approximately 600m²

of land around the basins and on the trainers' islands that, with the exception of the planted areas, are accessible to the sea lions.

The "Blue Saloon" is about 500m².
 The landscaped stands cover an area of about 2400m².

Old Dolphinarium:
 Presentation basin: 176.2m²; 718.0m³; depth 3.95-4.4m
 Round basin: 113.0m²; 469.0m³; depth 4.25m
 The visitor area in the dolphinarium is about 600m².

COSTS: € 31,000,000. The costs include the Dolphin Lagoon, as well as the neighbouring manatee house, as they were built at the same time and have technical equipment in common.

Space allocation in square meters:

use	indoors		outdoors		total exhibit
	accessible	total	accessible	total	
animals	289		1,445	2,100	2,400
visitors		1,100		2,900	4,000
others					2,600
total					9,000

OPENING DATE : 31 July 2011

DESIGN

- Beginning: Autumn 2005
- Concept and Zoodesign: wild-design Martin Schuchert
- Landscape architecture: Adler & Olesch Landschaftsarchitekten GmbH, Nuremberg
- Building engineering: AUSHOCH GmbH, Lorenz Ocklenburg Schaffner Wilhelm, Nuremberg
- Statics: Trafektum GbR, Ludwig Viezens & Martin Pudelko, Nuremberg
- Heating, ventilation, sanitary: INH - Ingenieurbüro für neuzeitliche Haustechnik, Führt
- Water technology: Ingenieurbüro Sixt, Heiß & Partner GbR, Markt Schwaben
- Electrical engineering: PFK Ansbach GmbH, Ansbach
- Thermic building physics, acoustic protection, room acoustics: Ingenieurbüro Sorge, Nuremberg
- Energy efficiency: KEM - Kommunales Energie-Management der Stadt Nürnberg, Nuremberg

CONSTRUCTION

- Beginning: September 2008
- Acrylic glass: Nippura Co. Ltd., Sanuki/Japan
- Concrete work: Wolff & Müller Regionalbau GmbH & Co.KG, Nuremberg
- Membrane roof: Vector Foiltec GmbH, Bremen
- Regulation and switching technology: Kieback & Peter GmbH & Co.KG, Nuremberg



Information panels in the 'Blue Saloon': Here the work of Yaqu Pacha is presented. ©Jonas Homburg, 2016

- High voltage current and electrical building: WTB Elektro GmbH, Stadt Mansfeld
- Horticulture and landscaping: Biedenbacher GmbH, Schwabach

PLANTS

Halophilic plants like sea buckthorn and tamarisk grow in the areas exposed to direct-spray water. These plants were chosen for having small leaves in order to avoid risks in case of being swallowed by dolphins or sea lions. Basin 1 and 6 are surrounded by beach grass on the sandy ground. Fast-growing birch and poplar were planted in the areas of the embankment behind the stands to shade them. The plant material at the technical building mimics the native plants found at the Monkey Mountain which is located opposite the exhibit. The remaining plants were selected to create visual interest such as the ironwood tree that provides autumn colours at the entrance to the Lagoon.

FEATURES DEDICATED TO ANIMALS

Altogether, five basins comprising 5,450 cubic meters of water with depths varying between 0.5 and 7



Basin 1 and basin 6: In the front the mother-and-calf basin, behind it the shifting basin. ©Monika Fiby, 2015



Round basin: The round basin of the old dolphinarium has a lift floor. ©Jonas Homburg, 2016



Sea lion basin with birth pens: Two shallow bays can be separated by mobile fences from the basin in the front, if necessary. ©Jonas Homburg, 2016



Turnable column "Sea habitats". ©Jonas Homburg, 2016

meters are available for the dolphins and sea lions. The arrangement of the basins allows the animals to swim different routes.

Basin 1 which is used by dolphin mothers and their calves is hourglass-shaped with smooth walls and no sharp or overhanging edges. In the case of two simultaneous births, the basin can be centrally divided. Basin 6 is located adjacent to basin 1 and is also connected to the round basin of the old dolphinarium. To ease shifting of the animals between the dolphinarium and the Lagoon basins, basin 6 is rectangular with a level floor and a depth of only 2.5 meters. If necessary, movable partitions can be installed in this basin. A floor lift was added to the round basin so that dolphins, and particularly the young animals, can be examined and treated without stress to the animals and with minimal danger to the keepers. For this reason, the basin



View into the air dome. ©Jonas Homburg, 2016

also serves as a birthing basin. Basin 5 is specifically for the sea lions and includes separate pens for births. Under normal conditions, the dolphins can also use this basin. If it is used as a sea lion retreat, the animals still have access to the other basins of the Lagoon by crossing the islands. Here on the islands, the sea lions find rest stations made of natural sandstone. Basin 4 has three areas with varying depths of 0.5m, 1m and 1.5m to provide shallow water access to both animal species. Basin 2/3 which is the largest basin has eyelets in the floor so that it may be subdivided by nets as needed.

Thanks to this partition of the Lagoon, a subdominant dolphin male does not need to be separated from the group during a female's rutting season because the bull independently temporarily goes to a different basin during the day and returns when rutting is over.

During winter, basin 1 and 6 are heated and covered by an air dome so the animals can use these two new basins in addition to the old dolphinarium.

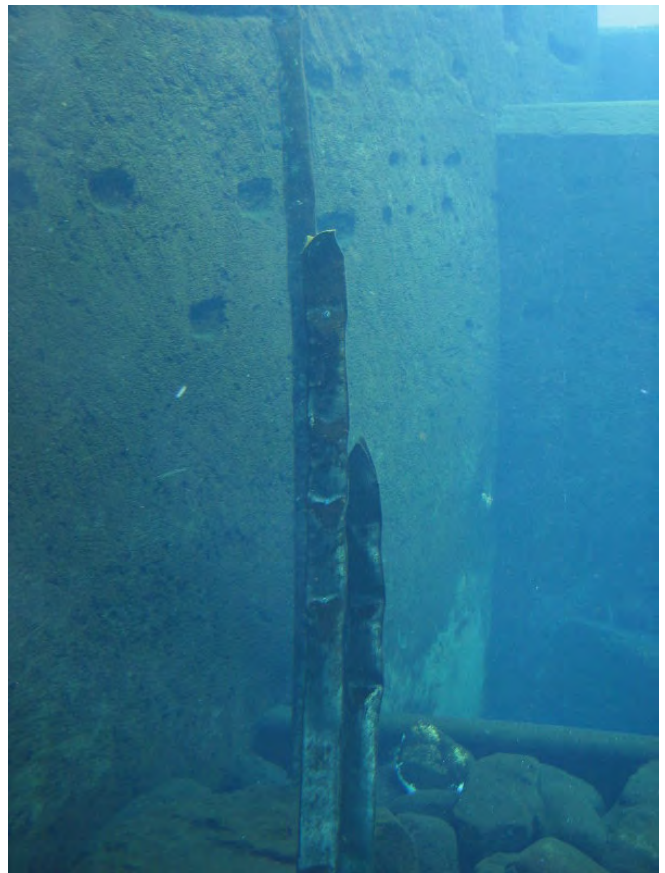


Dolphin presentation: Presentations take place in the Lagoon up to four times a day. ©Tiergarten Nürnberg, 2011

Water from 400 jets can be blown through a band of natural rocks generating a curtain of bubbles as well as a stronger current. This enrichment technique is used once a day. Fire hoses are installed on the floor of basin 2/3 that are kept afloat with cork float balls. Particularly the sea lions like to play with these hoses.

FEATURES DEDICATED TO KEEPERS

The keepers move around the basins on the rock islands and on wooden bridges. All separation panels are put in manually. The largest, 4m wide slide is operated by a hoist.



Fire hoses: The hoses are kept up in the water by cork float balls. ©Monika Fiby, 2015



Dolphin and visitor. ©Tiergarten Nürnberg, 2011

A scale for weight control of the animals is located at the main basin.

The fish kitchen, the freezer, the defrost room, the drying room, the changing rooms, the restrooms and the staffroom are located next to the basin with



Scale. ©Jonas Homburg, 2016

visual access to the animals. A small laboratory is available where keepers can manually verify the digitally recorded water parameters. Short circulatory paths for staff were an important design consideration.



View into basin 2/3: At the front there are rocks that can be rinsed through by water for cleaning. ©Jonas Homburg, 2016

FEATURES DEDICATED TO VISITORS

At first, the visitors can look at the animals from above basin 4 by approaching a 1.2m fence with stainless steel mesh. The railings in front of the basin are 1.2m high so that stroller and wheelchair users can look in from below the top rail. The "Blue Salon" offers underwater viewing into the main basin through a 12.8 x 3,5m glass panel, where dolphins and sea lions can be observed swimming. The "Blue Salon" is also used for evening events with up to 300 persons.

The large landscape stands adjacent to basin 1 and 2/3 provide seating for 660 visitors and about 600 standing places. From the top of the stands, the visitor can see the entire Lagoon. At the lower level, visitors can approach the basins and have a barrier-free view at several locations where the only separation from the animals appears to be a "driftwood pile" made from locust stems.



'Blue Salon': The 'Blue Salon' has underwater viewing for the dolphins as well as the manatees. ©Monika Fiby, 2015

The lagoon as well as the old dolphinarium are used for dolphin therapy. The interaction between the dolphins and the children can take place in different areas, depending on the situation. The indoor basin has about 700 seats.

INTERPRETATION

Depending on the season and the number of visitors, educational programs about the dolphins and sea lions take place up to four times a day. Among the topics presented in five rotating programs are the dolphins' anatomical adaptations, their aquatic way of life and the practice of keeping dolphins in captivity. Large panels and several turntable columns outdoors as well as in the Blue Saloon inform the visitors about the dolphins' biology, the threats to the world's oceans, and Nuremberg Zoo's engagement to protect wild marine mammals. One station of the zoo's bionics educational trail is located in the Blue Saloon and presents the function of the dolphin's sonar system.



Stands. ©Monika Fiby, 2015

MANAGEMENT

All basins can be separated by net panels as well as water-tight thermo-slides. The basin system allows to separately house and shift various groups of dolphins and sea lions, if needed. During winter, the dolphins have access to the outdoor basins when temperatures are above -5°C.

RESEARCH

The dolphins are involved in mirror experiments, studies on their electric perception and research on bioacoustics and ethology. Nutritional and hormone physiological research and veterinary analyses are also carried out.

CONSERVATION

Nuremberg Zoo supports the Society for Protection of South American Marine Mammals Yaqu Pacha.

Signs and presentations are meant to sensitize visitors to the threats to the oceans. Visitors can find practical advice about how to contribute to the protection of the seas.

The new water processing system achieves a recovery rate of 90% by an ultra-filtration technique that saves power when pumping freshwater. Water used for backflushing the filters is collected in rinsing water tanks, sent through the ultra-filtration system where it is disinfected, and then fed back into the pools. The ultra-filter must also be backflushed. First, this water is collected in a sewage tank which allows the sludge to settle out. Then the surface water is ultra-filtered again and the sludge press dried in a membrane press. The material from the press is disposed of properly. This technique has lowered salt use for the entire Lagoon when compared with the old dolphinarium. Electrical use for the pumps was also minimized because water is gravity fed through half of the water circulation.

Heat production is the result of a three-step process with solar water heaters, a block-type thermal power station and two gas holders. The basin heating is especially efficient through heat exchangers.



Trainers' islands: The keepers move between the basins on the rock islands and on wooden bridges. ©Monika Fiby, 2015

Announcement

Educational Excellence Awards to Higher Education Institutions in India 2016

PEARL Foundation is organizing National Conference on "SMART SUMMIT – 2016" during December, 2016 at Madurai, Tamil Nadu. In the eve of this conference, PEARL Foundation presenting the Educational Excellence Awards in the field of Science, agriculture, etc., in recognition of their contributions in education and excellence which is intended to produce a significant positive impact in the society and in turn contribute to the well-being of our fellow citizens. For more information please check <http://pearlfoundation.in/>