

## Enclosure alterations for improved lesser flamingo health and welfare at the Oregon Zoo

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### Abstract

Flamingos in captivity are prone to pathological changes to foot health and condition, commonly identified as pododermatitis (“bumblefoot”). Lesser flamingos at the Oregon Zoo experienced fluctuations in foot health between winter and summer, with severe changes over winter that showed limited improvement in the summer. The zoo embarked on an enclosure alteration project, changing substrates and heating the water of the flamingos’ pool. These changes have markedly improved the health and condition of the birds’ feet, as evidenced by regular monitoring and documentation of foot scores. This article outlines the changes that were undertaken to improve flamingo welfare and explains how the enclosure and the birds are managed to keep a check on their foot condition.

### Resumen

Los flamencos en cautiverio son propensos a condiciones patológicas en la salud y el estado de las patas, comúnmente identificadas como pododermatitis (dermatitis plantar). Los flamencos enanos (*Phoeniconaias minor*) en el Zoológico de Oregon, EE.UU. experimentaron fluctuaciones en la salud de las patas entre el invierno y el verano, con cambios severos durante el invierno que mostraron una mejora limitada en el verano. El zoológico se embarcó en un proyecto de modificación del recinto, cambiando sustratos y calentando el agua de la piscina de los flamencos. Estos cambios han mejorado notablemente la salud y el estado de las patas de las aves, demostrado en el seguimiento y la documentación regular de las puntuaciones de la planta del pie. Este artículo describe los cambios que se llevaron a cabo para mejorar el bienestar de los flamencos y explica cómo se maneja el recinto y las aves para controlar el estado de sus patas.

### Résumé

Les flamants en captivité sont sujets à des changements pathologiques de la santé et de l'état de leurs pattes au niveau des palmures, communément nommés pododermatites («bumblefoot»). Les flamants nains du zoo de l'Oregon ont connu des fluctuations de la santé de leurs pattes entre l'hiver et l'été, avec de graves détériorations pendant l'hiver qui ont montré une amélioration limitée en été. Le zoo s'est lancé dans un projet de modification de l'enclos, en changeant les substrats et en chauffant l'eau de la piscine des flamants. Ces changements ont nettement amélioré la santé et l'état des pattes des oiseaux, comme en témoigne le suivi régulier et la documentation de l'état des pattes. Cet article décrit les changements qui ont été entrepris pour améliorer le bien-être des flamants et explique comment la gestion de l'enclos et des oiseaux a permis de contrôler l'état de leurs pattes.

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## Introduction

At the Oregon Zoo, we care for a small flock of lesser flamingos, ranging in age from 29 to 39 years old. When I joined the team in 2018, we were monitoring their feet closely and taking regular photos for documentation and study. As with many flamingo flocks in cooler climate zoos, we struggled to maintain good foot health.

By 2019, the bird care team, together with zoo veterinarian, Dr Carlos Sanchez, had discussed several papers with extensive data on pododermatitis and different types of foot bumbles and the correlation of occurrence with various substrates and climates (Nielsen, 2010, 2012; Wyss 2014). Our flamingo area was a dirt and grass habitat with a medium-textured concrete pool (Figure 1).



*Figure 1: The lesser flamingo enclosure at the Oregon Zoo before alterations (note, these are not some of the actual flamingos...). Photo credit: B. Suhn.*

We tried retrofitting the edge of the pool with Nomad mats, and then with artificial grass (soft, not AstroTurf). We also treated the birds' feet in the winter with a combination topical cream made up of mostly A&D ointment (for good skin health) and DMSO (Dimethylsulfoxide). Each winter, however, the birds' feet would get worse, and in the summers, improvement was limited. We

decided that major steps were needed to improve the foot health of our flock.

### Changes to the enclosure for better welfare

We sampled several types of sand and ultimately selected Oregon Dune sand. We ordered enough to completely cover the concrete of the pool, as well as create a sandy beach.



*Figure 2: Sanded area in front of the flamingo's pool, covering the concrete edges (photo credit: B. Suhn).*

We also worked with our Life Support Systems team to install a heater that would pull water and heat it to 21°C (70°F) before returning it to the pool, providing a gradient of heat all year long and ensuring the pool would never freeze. This also allowed us to let the birds stay outside in colder temperatures than before, which meant less time spent indoors, where the floors were concrete.

Lastly, we modified our holding pool to have a smooth river rock aggregate floor, so even when the birds were inside, they would not be standing in a flat, rough or spongy pool (Figure 3). According to the papers we studied, the best solid flooring for our birds' feet was a smooth but uneven surface.



*Figure 3: New substrate used for the lesser flamingo's indoor pool (photo credit: B. Suhn).*

Post-planning and after finalising logistics, the project was organized, and in May 2019, installation of sand, heating and the new holding pool were completed. We kept most of the sand away from the lowest point of the pool to keep our drain system (and Life Support Systems team!) happy. The pool is deep enough at one end so that the lesser flamingos cannot touch the bottom when the pool is full, so leaving this part mostly bare of sand had no effect on the birds' feet but did encourage swimming, which is a natural behaviour for this species.

### **Monitoring and evaluation**

We continued to take regular photos to continue the close monitoring of their feet. In a year, the improvement in all types of bumble is marked. The photos on the left were taken May 2019, and the ones on the right were taken July 2020. We still take regular photographs of the birds' feet, but we have cut back from bi-monthly to semi-annually.



Figure 4: Examples of changes to foot health and condition pre-enclosure change (left) and after the enclosure changes (right). Photo credit: B. Suhn.

We continue to work on sand maintenance and have had the sand removed and replaced in August 2020. Most likely we will need to continue to replace the old sand once a year. We also continue to modify our drain setup to ensure as little sand as possible ends up in our drain and filtration system. We added some sand to our indoor rooms to cover the concrete flooring around the holding pool as well.

### Conclusion

While the project was labour intensive and takes some effort to maintain to ensure all enclosure features remain in working order and keep their benefits for the birds, the results are well worth it. In August 2019, we added five juvenile greater flamingos to the exhibit, and as of July 2020 they had not developed any signs of pododermatitis or unnatural changes to foot condition (Figure 5).



Figure 5: Photo condition of a juvenile greater flamingo, living in the altered enclosure and showing evidence that the enclosure enables maintenance of excellent foot health (photo credit: B. Suhn).

## References

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