

Cross-fostering as a reproductive strategy for lesser flamingos at the San Diego Zoo Safari Park.

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Abstract

In 2020, all fertile lesser flamingo (*Phoeniconaias minor*) eggs at the San Diego Zoo Safari Park were pulled and fostered by American (*Phoenicopterus ruber*) and greater (*P. roseus*) flamingos. After many years of limited breeding success with these lesser flamingos, this fostering method resulted in the most successful year (to date) for breeding in this flock. This paper outlines the management strategy that was used and suggests could it be modified for use in other flamingo flocks under human care in order to improve reproductive success.

Resumen

En 2020, todos los huevos fértiles de flamencos enanos (*Phoeniconaias minor*) pertenecientes a San Diego Zoo Safari Park fueron extraídos y criados por flamencos Americanos (*Phoenicopterus ruber*) y comunes (*P. roseus*). Después de muchos años de éxito reproductivo limitado con los flamencos enanos, este año resultó ser el más exitoso (hasta la fecha) utilizando este método de crianza para la reproducción en esta bandada. Este documento describe la estrategia de manejo que se utilizó y sugiere que aspectos podrían modificarse para su uso en otras bandadas de flamencos bajo cuidado humano con el fin de mejorar el éxito reproductivo.

Résumé

En 2020, tous les œufs fertiles de flamants nains (*Phoeniconaias minor*) du zoo de San Diego ont été retirés à leurs parents et ont été confiés à des flamants des Caraïbes (*Phoenicopterus ruber*) et à des flamants roses (*P. roseus*). Après de nombreuses années de succès de reproduction limité avec ces flamants nains, cette méthode d'élevage a abouti à l'année la plus réussie (à ce jour) pour la reproduction de cette espèce. Cet article décrit la stratégie utilisée et suggère qu'elle pourrait être modifiée pour être utilisée pour d'autres flamants élevés en captivité afin d'améliorer le succès de la reproduction.

Introduction

The San Diego Zoo Safari Park (SDZSP) is a 730 hectare facility that opened to the public in 1972 and focuses on the breeding, conservation and display of a wide variety of animals, many of which are threatened or endangered. The SDZSP houses three species of flamingo: greater (*Phoenicopterus roseus*), Chilean (*P. chilensis*), and lesser (*Phoeniconaias minor*). The aviculture team

has had immense success breeding the greater flamingo (with 316 chicks hatched) but breeding the lesser flamingo has proven more challenging. The lesser flamingo flock lives in an approximately 0.4 hectare exhibit with a large natural pond comprising of four islands, three of which are specifically for nesting (Figure 1). Each year, the aviculture specialists prepare the islands with fresh soil for nesting and build starter mounds for the

flock. From 1999-2019, 59 lesser flamingo chicks hatched but only 36 survived past their first 6 months. In 2020, the aviculture team decided to attempt cross-fostering as a method to increase the breeding success for lesser flamingos.



Figure 1: The lesser flamingo exhibit at the San Diego Zoo Safari Park showing the islands provided for nesting (photo credit: F. Lujan.).

History of breeding

From 1999-2001, the lesser flamingo flock produced 13 chicks, with nine surviving. Between 2002 and 2009, the lesser flamingos endured a period of no breeding activity. During this time, they shared a habitat with the greater flamingo flock, and it was later determined that the greater flamingos outcompeted the lesser flamingos for nesting space. In 2010, the greater flamingos were moved to a separate habitat and lesser flamingo breeding resumed. Each year, from 2010 to 2014, at least one lesser flamingo chick either went missing or was found predated. The presumed predator was a great horned owl (*Bubo virginianus*), which nests on the SDZSP grounds. All of the predations occurred over night and the necropsy findings pointed to an avian predator. In 2015, from 5th April to 1st May, a construction project to renovate the feeding area took place in the lesser flamingo habitat. This is usually the time period when nest building begins and the extended disturbance prevented any breeding that year.

Many years of parent rearing had resulted in limited success; subsequently artificial incubation and hand-rearing was attempted in 2016. This new method proved difficult and only two chicks were fledged, far fewer than originally anticipated. The following year parent rearing was once more undertaken with increased predator deterrents installed in the form of Nite Guard Solar lights (niteguard.com). In 2017, the lesser flamingo flock was successful in fledging seven chicks with zero predation (one chick perished due to unrelated causes). In 2018, the team observed similar challenges with two of three chicks predated, so hand-rearing took place in 2019 but resulted in zero surviving chicks. Since neither parent-rearing nor hand-rearing were very successful, the SDZSP team brainstormed other potential ideas and decided to pursue a creative solution by cross-fostering. In 2020, all fertile lesser flamingo eggs were fostered under American (Caribbean) flamingos (*Phoenicopterus ruber*) at the San Diego Zoo and under greater flamingos at the SDZSP.

Evaluation

The lesser flamingo flock laid 23 eggs from May-July during the 2020 season. Three separate egg collections were completed. On 26th May, ten eggs were pulled and candled for fertility. Four eggs were fertile and two were too early to determine fertility. All six eggs were set in incubators to await fostering. Five lesser flamingo pairs were left on dummy eggs (replicas of real eggs) and the flock continued to lay. Hatch dates for the fertile eggs were matched up with non-recommended American flamingo pairs at the San Diego Zoo that were sitting on dummy eggs.

On 28th May, four fertile eggs were placed in a portable incubator, driven 49 km to the San Diego Zoo, and fostered under the matched pairs. Of the two eggs that were too early to determine fertility when pulled, one was proven fertile and fostered on 6th June. This egg, upon candling that morning, did not

appear very strong, but the team was optimistic that natural incubation would increase the egg's chance of survival.

The second egg collection was conducted on 18th June. Six eggs were pulled and candled for fertility. Two eggs were fertile and fostered under American flamingos on 22nd June. Four pairs of lesser flamingos were given dummy eggs. The lesser flamingos continued to lay while the American flamingos had already finished laying. Luckily, the greater flamingo flock was still laying at the SDZSP and had several potential foster pairs. A comparison of lesser and greater flamingo chicks is shown in Figure 2.



Figure 2: A lesser flamingo chick (left) and greater flamingo chick (right). Photo credit: A. Ray.

On 22nd July, the final egg collection took place and five eggs were pulled and candled. Two eggs were fertile, and one was too early to determine fertility. All three eggs were fostered under greater flamingo pairs at the SDZSP. On 27th July, the last egg was candled again and determined to be infertile. The lesser flamingos were given three weeks to lay any additional eggs, and then on 15th August all dummy eggs were pulled. Of the nine fertile lesser flamingo eggs fostered, all hatched and eight survived, making 2020 the most successful breeding year for this species at the SDZSP (Figure 3). The chick that did not

survive hatched from the egg that did not look strong on 6th June. This chick hatched on 22nd June and was found dead on the nest mound the following morning.



Figure 3: Lesser flamingo chick/s with greater flamingo chicks and adults (left) and with American flamingo chick and adults. Photo credit: San Diego Zoo Global.

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