

## **Behavioural observations to evaluate natural instinct in hand-raised rescued lesser flamingos in South Africa**

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### **Abstract**

When an artificial dam in South Africa suddenly dried up in the middle of the lesser flamingos breeding season, a wide rescue operation was put together. It ended up with the rescue of about 1800 chicks and eggs for hand-rearing before eventual release. It brought up countless challenges, both for the people and animals involved. Such a traumatic experience could have had disastrous consequences on the birds and jeopardise their survival and their future. However, numerous observations made during the project highlight resilience within the species. These observations are documented in this article and provide important information regarding the natural behavioural development and instinct of lesser flamingos.

### **Resumen**

Cuando una represa artificial en Sudáfrica se secó repentinamente en medio de la temporada de reproducción de flamenco enano (*Phoeniconaias minor*), se organizó una amplia operación de rescate. Terminó con el rescate de alrededor de 1800 polluelos y huevos para criarlos a mano antes de su eventual liberación. Planteó innumerables desafíos, tanto para las personas como para los animales involucrados. Una experiencia tan traumática podría haber tenido consecuencias desastrosas para las aves y poner en peligro su supervivencia y su futuro. Sin embargo, numerosas observaciones realizadas durante el proyecto destacan la resiliencia de la especie. Estas observaciones están documentadas en este artículo y brindan información importante sobre el desarrollo natural del comportamiento y el instinto en el flamenco enano.

### **Résumé**

Suite à l'assèchement brutal d'un plan d'eau artificiel en Afrique du Sud en pleine période de reproduction des flamants nains, une opération de sauvetage a conduit à la récupération de 1800 œufs et poussins dans le but de les élever à la main avant de pouvoir les relâcher. L'envergure de l'opération a apporté de nombreux défis à relever, aussi bien d'un point de vue humain qu'animal. L'impact d'un tel traumatisme aurait pu fortement nuire aux oiseaux, et compromettre leur survie ainsi que leur avenir. Cependant, de nombreuses observations détaillées ici montrent une extraordinaire résilience de l'espèce, et apportent d'importantes informations quant au développement comportemental naturel et à l'instinct naturel des flamants nains.

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### **Introduction**

Kimberley, Northern Cape, South Africa - January 2019: One of the major breeding sites in Southern Africa for lesser flamingo (*Phoeniconaias minor*), Kamfers Dam

(Anderson & Anderson 2010; del Hoyo et al., 2020), endured an unprecedented challenge. The inflow of water coming into the artificial dam from the town of Kimberley drastically decreased, leading water levels to drop.

Consequently, the area surrounding the flamingo nesting island dried up, forcing the adult birds to move further into the dam to sustain themselves. In Southern Africa, the lesser flamingo breeding season usually occurs in summer, between December and April (del Hoyo et al., 2020). This sudden, artificially induced drought of Kamfers Dam then had a major effect on the survival of hundreds of newly hatched chicks and soon-to-hatch eggs. Around 5500 youngsters, old enough to follow the flock were able to head to deeper waters and available algae. Around 1800 chicks and eggs were left behind under the burning sun.

A country-wide and international operation was then quickly set up to rescue those chicks and eggs, with the goal of hand-raising them and releasing them back into the wild. The rescued birds were sent to several facilities across South Africa, including the National Zoological Gardens (NZG) in Pretoria, where the following observations took place over three months. The NZG initially received 200 compromised chicks from the rescue project, which were only a few days old at the time. The challenge in the first two weeks after the rescue was mainly to keep them alive and safe, as they arrived physically traumatised, very weak and dehydrated.

I arrived in South Africa and was assigned to the NZG right after those two weeks, and the following observations described in this article occurred after this sensitive part of the rescue.

## Methods

These observations were all made on a daily basis during the rescue project. Approximately 130 lesser flamingo chicks were under the care of NZG when I arrived on 12<sup>th</sup> February 2019. No adult flamingos were rescued, and the chicks were still on, or near, their respective nests when rescued. This means that they only got to see their parents' behaviour for a few days, as lesser flamingo chicks generally stay on or near the nest until

they are 5 to 12 days old (Anderson & Anderson 2010; Brown et al., 2011; Shannon 2007). There were also no adult flamingos nearby in the NZG.

The rescued birds were received at NZG two weeks before I arrived. We can thus consider that they were between two and three-and-a-half weeks old at the beginning of these observations. The birds were first kept in groups of 10 to 15 individuals, then moved to larger groups. The daily routine started with the weighing of each individual chick. Then they were crop fed several times a day until weaning (from ten feeds a day, down to only one). They were all microchipped so they would all be identifiable. Growth (weight, size) and health of each individual were monitored to ensure that body conditions suitable for release could be eventually achieved. After their time at NZG, the birds were brought back to Kimberley for release. These NZG chick re-joined the rest of the rescued lesser flamingos raised in other facilities across South Africa. They were between four and four-and-a-half months old when the first group was released back into the wild.

## Results

### Brooding and begging behaviour

Early in the first weeks, the birds showed some instinctive behaviours that are usually directed toward the parents. They would be congregating together or clinging to a stuffed toy made available in the pen when sleeping, as to be brooded under a parent wing on the nest (Brown et al., 2011; Shannon 2007). Some of them also started real soon to show a begging behaviour toward other individuals: standing in front of another bird, turning their back to them, making a characteristic begging call and trying to reach some fictional crop milk while pacing in motion with the other chick.

At that time, the other chick would respond and show the expected response from the parent (Brown 1971; Brown et al., 2011). I had previously observed this behaviour between

chicks from other species of flamingo raised by their respective parents. If we assume that all six species of flamingo display similar breeding behaviours (Brown 1971; Brown et al., 2011; Conrad & Kasielke 2020; Winkler et al., 2020), then it is probably safe to say that the observation made here was not of a rescue-induced behaviour. Healthy parent-raised chicks display the same kind of behaviour, so it could mean that the rescue did not alter their natural instincts.

#### Strength of the bonds between individuals

Wild and captive flocks can present strong bonds between individuals (Rose & Croft 2015; Rose & Croft 2020; Shannon 2000). This has been observed during this project. During the first weeks, the chicks were kept in small groups, for easy feeding, monitoring and management. After a few weeks, they were strong enough to handle being outside for the most part of the day. It was then noticed that some of them (about a 12 birds) would desperately try to climb the wires between the enclosures or would be pacing non-stop along the fence.

At first, we assumed that those 'climbers' were being bullied in the group they were in, as this often happened. Consequently, they were switched to another group to provide them with a calmer environment, but it did not systematically make this behaviour disappear. A few individuals would instantly start adopting the same behaviour on the next fence, toward the next enclosure. It became clear that they were trying to reach another individual on the other side. Consequently, we decided to keep them all in one large group, in a creche-setting closer to a wild one.

It was then observed that very strong bonds existed between some of the birds. As they were not tagged with identification rings and we could only recognise a few birds, we could not be sure that they were all the exact same birds. Despite this, we noticed that within identified bonded pairs, one of the two birds would constantly follow the other one

everywhere, stay very close, sometimes try to hide between its legs. It appeared more like reaching for protection or reassurance than actual interaction. This behaviour was diluted with the birds growing up but was still observed when they were three-and-a-half months old.

#### Bullying behaviour

In parallel of the bonding behaviour, we observed some aggressive bullying. When the chicks were kept in small groups during the first weeks of the project, they were divided according to their size to prevent such behaviour as much as possible. However, we observed that some individuals systematically displayed aggressive behaviour, even when they were smaller than the ones they were bullying. Indeed, we could notice one or two small chicks being as aggressive towards larger chicks as they were with small ones.

As a result, switching them between groups was often necessary. It would temporarily create a calmer situation, both in the group they were coming from and in the one they arrived in. The aggressive bullying behaviour started to be noticeable when the younger birds were only about three weeks old. We observed that, as the chicks grew up, this behaviour occurred more often. We attributed that to the enclosures becoming too small for the growing birds. Thanks to a non-stop collaboration with the NZG personnel, we could regularly expand the size of the enclosures. Yet, it was only when the birds were kept in the larger creche and the biggest enclosure (i.e. provided with the largest amount of space) that the bullying behaviour decreased significantly.

#### One-leg resting

At approximately three weeks old, the stronger chicks started to sleep less (and less directly on the ground too). Chicks were already able to stand on one leg for short periods of time. Eventually, after a few weeks we observed that they all spent most of their resting time on one leg, probably because

they had gained enough strength and balance to do so. At the same time, we noticed that they were sleeping less soundly, being more aware of their surroundings while resting, both indoors and outdoors. Such observations were reassuring concerning their physical development, which further appeared to be normal when considering their weight and size growth rates. These observations suggest that the rescue operation did not impact the natural growth of the birds.

#### Additional observations regarding bird growth

Several additional observations mainly agree with the assumption that natural flamingo growth and development was not impacted upon by the rescue operation.

a) A few days after we opened the big enclosure and regrouped the entire creche together, a helicopter flew over the zoo and the flamingos. They immediately grouped close together, each one staying as close as possible to the others, and the entire flock moving as one bird. They then displayed the head-flagging behaviour better known in flamingos as a courtship display (O'Connell-Rodwell et al., 2004; Stevens 1991) and maybe this stressor, followed by the sudden close proximity of all birds together, stimulated the first stirrings of potential courtship activity.

b) Lesser flamingos feed exclusively on blue-green algae in deep water, but they also can find food close to the shore (Childress et al., 2008; del Hoyo et al., 2020). They mainly feed near the water surface (Brown et al., 2011) but do share the 'stamp-feeding' behaviour found in the other flamingo species. The birds raised during the rescue project started to display this behaviour as instinctive between five and eight weeks old. It was combined with the use of their bill for filtering the water they were stirring.

c) Almost immediately after the birds were put outside during daytime, they instinctively went towards pools of water available in the pens and cleaned themselves. They already

knew how to submerge themselves, dry their down and preen themselves afterwards.

d) At the same time as the previous observation, the birds started jumping around in the enclosure, flapping their wings. This could be assigned to a natural attempt to experiment with and use their wings, test their balance and their ability to play with air. We further observed that individuals showing feather growth over their down would take off for an instant, as to try to "understand" the wind direction and speed. The growing birds got more and more agile with their wings, as they developed condition thanks to increased exercise. As a result, after a few weeks they would completely take off for a few seconds. They were then assessed to be ready for returning to Kimberley before release.

The pictures of the first release event showed the birds flying, facing wind. In the wild, they would have been encouraged to undergo the same learning process by the adults in the colony (Brown 1971).

#### Feeding behaviour

At their arrival, crop-feeding by humans was performed to feed the chicks. At about six weeks old, the birds were offered the choice between crop-feeding by humans and bowls in their enclosures with food *ad lib*. The bowls were first filled with the crop-feeding mix used since their arrival, and adult food was then gradually introduced in the mix. Supplementary crop-feeding was still given twice a day then once a day to those who did not completely sustain themselves with the food they found.

We also chose to follow their preferences when transitioning between the 'baby diet' and young adult food. As a result, they transitioned themselves over less than a week, and finished weaning themselves from crop-feeding over two and a half days. As the birds started feeding themselves, we observed that they filled their crops more than we would have done with artificial crop-feeding. This is directly linked to the fact that

their crop capacity quickly increases during the weaning process (Conrad & Kasielke 2020). The chick growth rates remained satisfactory and kept the same pace during the entire weaning process. The feeding strategy that we used helped to minimise the handling time of the birds and, as a consequence, lowered the risk of them being imprinted.

## Discussion

It is known that artificial rearing of flamingos can disrupt their intraspecific socialisation and induce some kind of imprinting, voluntarily or not (Conrad & Kasielke 2020). We did our best to keep the handling of the birds to the bare minimum to ensure them the best chances upon their return to the wild. These rescued lesser flamingos have shown the early development of behaviours (brooding, bond between individuals, bullying, one-leg resting) typically documented in flamingo species (Brown et al., 2011; Rose & Croft 2015). Also, the wide range of behaviours observed and explained in the results section show some strong natural instincts within the birds. Their physical and cognitional development, evaluated as normal, thereby seemed to not have been affected by their rescue and captivity, although appearing as traumatic. It all seems to give evidence of a strong resilience of the birds in the growth and survival characteristics of their species. Maybe of all flamingos as the six species do share some behavioural features. Plus, most of the wild behaviours witnessed here had already been seen in captivity.

Could it mean that captivity does not affect many of a flamingo's natural instincts? Over the years, in the course of my professional work as a bird keeper, I have noticed many behavioural patterns in flamingos that had been captive for generations, shared by three species, both adults and chicks. These species were the greater (*Phoenicopterus roseus*), Caribbean (*P. ruber*) and Chilean flamingo (*P. chilensis*). Not having compared these behaviours with wild individuals, I wished to

understand if some of the behaviours were captive-induced, or an integral part of the birds regardless of if they were wild or captive. I also wanted to know if they were instinctive, taught by the parents, or shared within the flock, and if they were all shared with these three other flamingo species that I have cared for in the past. This rescue operation answered some of these questions, as those birds were wild, not raised by their parents, and of another species. Finally, as the chicks observed at NZG were always kept in groups, first small then larger, it raises another question. Is the learning potential of living within a flock higher than what comes from the parents? Is growing in a flock promoting another sort of resilience and allowing wild behaviours to develop in captive settings?

## Conclusion

Over three months, the birds displayed some amazing instinctive behaviours. Many of my observations raised fascinating questions, and call for more research into: The social bonds (positive and negative) between growing flamingo chicks; a potential link between these early bonds and the strong pair-bond that makes flamingos apparently monogamous (Conrad & Kasielke 2020; Shannon 2000; Winkler et al., 2020); and as lesser flamingos are the most gregarious if not the most social (Brown 1971; Rose & Croft 2020) of flamingo, assessment of social differences between the six flamingo species.

Aside of their behaviour, the speed of the weaning was quite surprising. It would be interesting to know more about the weaning process when the birds are raised by their parents. It may be of use in the event of another large rescue elsewhere in the world and provide an additional monitoring tool for the development of flamingo chicks. The goal of releasing these flamingos back in the wild means it is essential to make sure their development is viable.

Finally, and more generally, it is clear from these observations that rescue projects such

as this provide an enormous learning potential to advance our knowledge of a species, as important pieces of information can be gathered from the observation of rescued animals. It should be strongly encouraged to study the animals' development if such an unfortunate event were to happen again. The comparison of these gathered data to the existing information on captive and wild flamingos also could both give more credit to studies on captive birds, by advancing husbandry through a better knowledge of their needs, as sometimes flamingos can be difficult to study in the wild (King 2000).

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