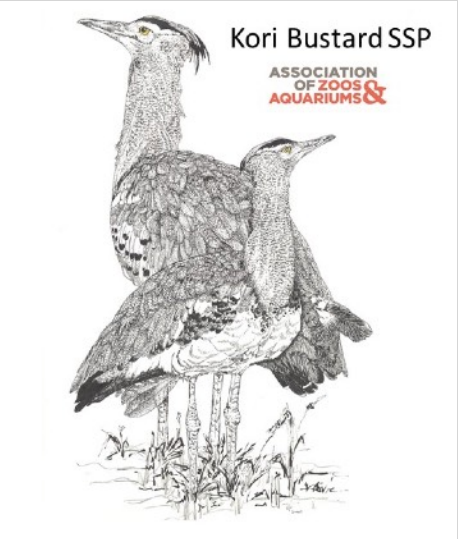
# THE GOMPOU




## Annual Bustard Newsletter
## Volume 19

**In this issue:**



Photo by Robert Johnson/Macaulay Library at the Cornell Lab of Ornithology/ML70694031

**The Gompou is an annual newsletter by the Kori Bustard SSP encompassing all things bustard**

**This issue was edited by Kori Bustard SSP Representative Kyle Waites**

**We are already looking for content for the next edition of The Gompou! If you have anything you would like to contribute feel free to contact any of the following:**


**Kyle Waites:**
**kwaites@phoenixzoo.org**
**Sara Hallager:**
**hallagers@si.edu**

# Kori Bustard in the Spotlight

**Photo of Kori Bustard by Aaron Baggenstos included in one of the top 100 photos of the 2021 Audubon Photography Awards**

Standing erect in a field of tall brown grass, a male Kori Bustard sticks out the large white feathers under his tail. The striped white-and-black feathers around his neck make it look like he's wearing a featherboa below his black head.

Spectacular, artistic and playful, these photos feature avian life at its most vivid, vulnerable and formidable. Along with the winners of its Photography Awards competition, the National Audubon Society selects 100 additional shots to share every year. The Top 100 images depicting bird life were chosen from more than 9,000 entries to its 12th annual Audubon Photography Awards. "There are intimate portraits that reveal exquisite details, action shots that capture powerful raptors on the hunt and arresting images that celebrate a wide array of bird behavior," Audubon explains.

**Photographer Note:**

Kori Bustards have impressive and elaborate courtship displays, as I saw while leading a photographic safari to Kenya in October. The male holds his head back with cheeks bulging, his crest held erect and bill open. He inflates his gular pouch, forming a white throat "balloon." He enhances his performance with an exaggerated bouncing and emits a low-pitched booming noise when his neck is at maximum inflation, snapping his bill open and shut. Seeing this display was an extraordinary experience, one that I will remember for a lifetime.

# Weight Monitoring in Kori Bustards at the Smithsonian Institution

**Sara Hallager, Curator of Birds, Smithsonian's National Zoo & Conservation Biology Institute**

Several areas of research aimed at understanding the general biology of kori bustards have been ongoing for a number of years at the Smithsonian's National Zoo. One area of concentration is regular weighing of each bird in the flock. From 1999-2015, monthly weighing allowed documentation of seasonal weight gains in multiple males and regular monitoring of females. We documented that male weight gains (increases of 23-30% in body mass) are directly correlated with reproductive activity. Seasonal weight changes as they relate to reproductive activity in male kori bustards had not been documented prior to this research.

Unfortunately, we have not had a reliable working scale for the past 5 years and as such, regular weights were unattainable. Kori bustards are relatively easy to self-weigh and regular weights (as frequent as weekly) are quite possible. This provides an important insight into their overall health, body condition and reproductive status.

Thanks to the generous funding from the kori bustard SSP (now a Candidate Program), the National Zoo was able to purchase a new scale in 2021! In the picture at right, 25 year old "Tanzy" is seen standing on the scale. A simple scattering of superworms and/or waxworms is all it takes to get her and the other females to step onto the 4 x 4 scale. If birds are reluctant to step on the metal, a layer of carpet and/or straw can help them feel more secure.

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# Kori Bustard SSP Grant Opportunity

The **Association of Zoos and Aquariums (AZA) Kori Bustard Species Survival Plan** is committed to promoting kori bustards in AZA zoos, funding field work in range countries and providing support to those AZA facilities committed to this species.

## Guidelines and Conditions

The AZA Kori Bustard SSP offers small grants to support zoo and aquarium staff and aviculturists engaged in projects related to *in situ* and *ex situ* conservation and management, husbandry, conservation education, and zoological research of kori bustards.

1. Staff employed at AZA zoos and aquariums are eligible.

2. Non-AZA staff may apply, but they must have a sponsor from at least one AZA institution.

3. Individual funding requests cannot exceed $1500 USD during any grant cycle.

4. Only one application per candidate per year will be accepted.

5. Grant recipients are required to submit a report on their project within 12 months of receiving the grant funds. If an extension is required, a request must be submitted via writing or e-mail to the SSP. All invoices and/or receipts detailing use of SSP grant funds shall be included with this report.

6. Funds provided by the Kori Bustard SSP which are not spent within one year of their being awarded must be returned within 30 days. Project applicants who wish to continue to use the funds beyond that time frame must obtain written approval from the SSP Steering Committee, with the request submitted a minimum of one month (30 days) before the one-year expiration date. name of the AZA Kori Bustard SSP must be included in any publications (printed or otherwise), productions, and presentations supported by this grant.

7. The full name of the AZA Kori Bustard SSP must be included in any publications (printed or otherwise), productions, and presentations supported by this grant.

8. Applicants are required to submit this completed application via e-mail to the SSP where it will be reviewed by the Kori Bustard SSP Steering Committee. See 'Application Submission'.

9. Grant recipients agree to provide a written summary of the project for use by the Kori Bustard SSP in promotional materials.

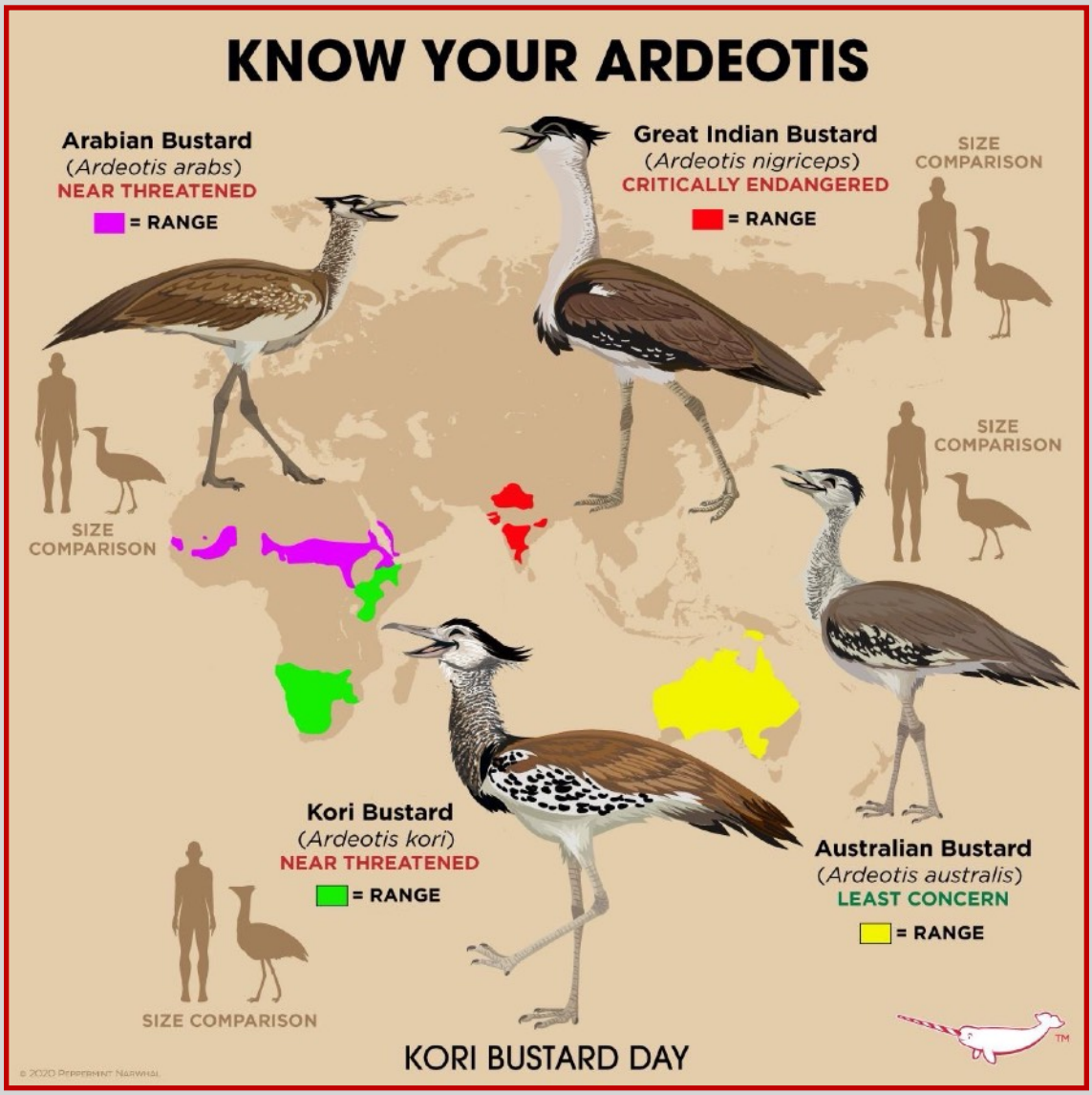
10. Applications which do not clearly demonstrate benefit to kori bustards will not be considered.

Failure to satisfy these requirements will disqualify the applicant, organization, and/or co-investigators from being considered for any future funding requests of the SSP.

**Applications will be accepted from Jan 1st 2022 – March 1st 2022 and award recipients will be notified in writing by March 31, 2022.**

**Applications received after March 1st 2022 will not be considered.**

## Click here to apply!



# Learning With the National Zoo

**Nicole Hellmuth - Zookeeper, Hooves and Horns, Franklin Park Zoo**

When I started as a hoof stock keeper at Franklin Park Zoo (FPZ), I was fresh off the heels of a seasonal bird training position at another facility. At first, I was kind of happy to be moving on to other types of animals because though my ability to understand bird behavior was improving, I still wasn't a favorite of the parrots who did not like "new people!" Birds, and especially parrots, can be a challenge to get to know! But as time went on at FPZ, I started missing my old flock and wanted to foster a greater appreciation for birds in those around me, especially guests. I began to focus my energy on learning about the few bird species my team and I care for, including Siberian cranes, southern ground hornbill, ostriches, and...kori bustards!

Kori bustards really stood out to me. I had never seen a bird like them before, and they were so beautiful and inquisitive. I was thrilled to be added to their training program. The more time I spent with M'guu (an 18 year old female) and Kibibi (a 4 year old female), the more I appreciated them and saw their unique species characteristics. I also noticed that, unless startled or in breeding mode, these two ladies are very deliberate and slow with their movements, and vigilant to their surroundings. I learned that hard-boiled egg especially, could really get them moving during training session! I began to pick up on seasonal changes in their behavior as well.

Author, Nicole Hellmuth posing with M'guu and Kibibi

I love these girls' quirks, but I wasn't sure if all their behaviors were unique to the species, or to the individual. My experience with kori bustards is limited. I wanted to know if all kori bustards were as thoughtful as ours or if maybe our girls could benefit from some additional confidence building training and enrichment. I was also interested in how our kori bustard management differed from other places. When I expressed my interests to Chris Bartos, the Hooves and Horns assistant curator, she offered to connect me with Sara Hallager, the kori

bustard SSP coordinator. Sara was willing to host me at National Zoo for a day so I could learn more about the species from her and her staff.

Sara and her team were so welcoming! I shadowed Gwen, a very seasoned keeper who chatted with me about her experiences with the species as we worked through her daily care routine. Sara was kind enough to order pizza for lunch, and as we all ate, staff told stories and laid out how they care for their koris in more detail. Some of the stories had me laughing, some had me taking notes, and some led to more questions and discussions. After we had our fill of pizza, Gwen gave me a more thorough tour of their kori barn and exhibit. Those birds have it made! The tour and our conversations definitely gave me some ideas and direction FPZ can take with our birds. Comparing M'guu and Kibibi to National's birds also reduced my concerns about their confidence level. Their behavior seems to be on par with with species minus a few personality traits. I was supported in my training efforts so far and advised in what my next steps could be. Heather is the training guru at National!

Author, Nicole Hellmuth during a training session with M'guu and Kibibi

National Zoo staff were so giving with their time and I really appreciate Sara, Gwen, Debi, Heather, and Eric for taking the time to trade information with me. There may not be many in AZA facilities, but if you are considering adding kori bustards to your collection, you couldn't find a more supportive and dedicated SSP program to join! Also, kori bustards are awesome!

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ZOO NEW ENGLAND
Franklin Park Zoo ♦ Stone Zoo

# Brood X Emergence at the National Zoo

**Sara Hallager, Curator of Birds, Smithsonian's National Zoo & Conservation Biology Institute**

In the spring of 2021, the Washington DC area experienced an event that occurs every 17 years: the arrival of billions of cicadas who emerged after spending the past 17 years underground: https://www.cnn.com/2021/05/23/world/cicadas-2021-emergence-scn/index.html.

The event is truly a remarkable phenomenon and the number of cicadas that emerge from the ground is mind boggling. These insects strike fear in many, but they are quite harmless and very fascinating. I last observed kori bustards at the National Zoo enjoying the cicada emergence in 2004 and remember well the birds gorging on the bugs. I also recall being surprised that the koris didn't gain weight despite all the cicadas they were eating! This past year, the kori bustards at National Zoo once again gorged on cicadas. They ate so many that they nearly stopped eating their normal diet! We also collected some as a treat for a kori bustard who was hospitalized and he really loved them! I don't think I will be at the Zoo in 2038, but I hope kori bustards will be at the Zoo and I hope that those working in 2038 enjoy watching the koris enjoying this special treat as much as I did in 2021.

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# New Koris at Living Desert

**Bekki Lorton - Animal Care Supervisor, The Living Desert**

Here at The Living Desert, we have three Kori bustards on habitat - one male and two females. Our male is named Pipe and he is 14 years old, one female is named Malki and she is 17 years old, and our other female is named Skwerl and she is 13 years old. We received Pipe and Skwerl from Phoenix zoo this last June where they were introduced to Malki, who we have had for 16 years. They have all adjusted wonderfully and are continuing to bond with one another.

Malki, Skwerl, and Pipe enjoying their habitat together

Every morning, they strut out of holdings with their feathers fluffed and ready for the day. You can find them foraging for bugs such as crickets and mealworms throughout the day, training with their animal care keepers, or nestled down amongst the bushes. They are incredible birds and we have thoroughly enjoyed seeing Pipe, Malki, and Skwerl get to know each other!

THE LIVING DESERT
ZOO | GARDENS

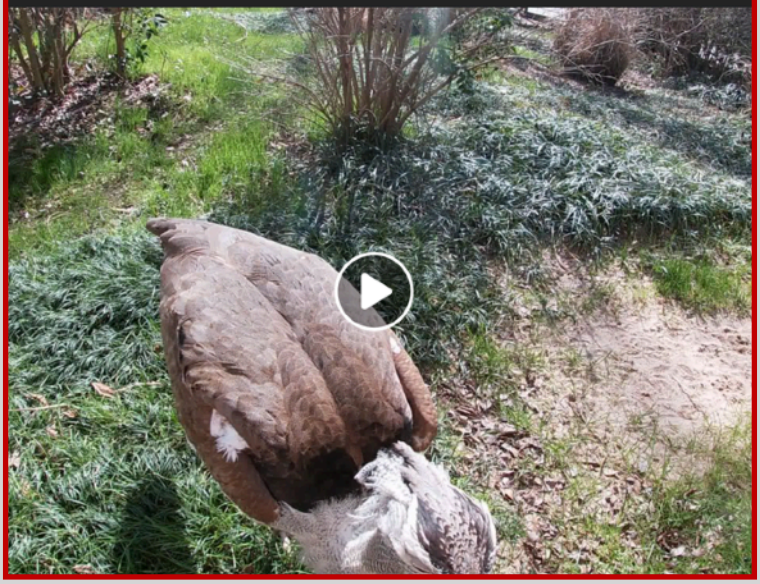
# Celebrating Kori Bustard Day 2021!

**Zoo Atlanta**
March 27, 2021 ·

Hi! My name is Zola. I am one of the two kori bustards who live at Zoo Atlanta. I'm taking over the Zoo's social media in celebration of #KoriBustardDay – today!

I recently moved to Zoo Atlanta at the end of 2020. I am now living in the kori bustard habitat at the African Savanna. I live with my new friend Tuza. We are two peas in a pod! I am 1 and a half years old, so I look up to Tuza like she's an older sister. I like to follow her around, which she doesn't always like.

Kori Bustard Day is a day that takes place once every year in several zoos across the country. Together, the participating zoos help educate the public about kori bustards like and spread awareness of current conservation efforts taking place to help protect my species in the wild, as well as birds in your own backyard. #OnlyZooATL



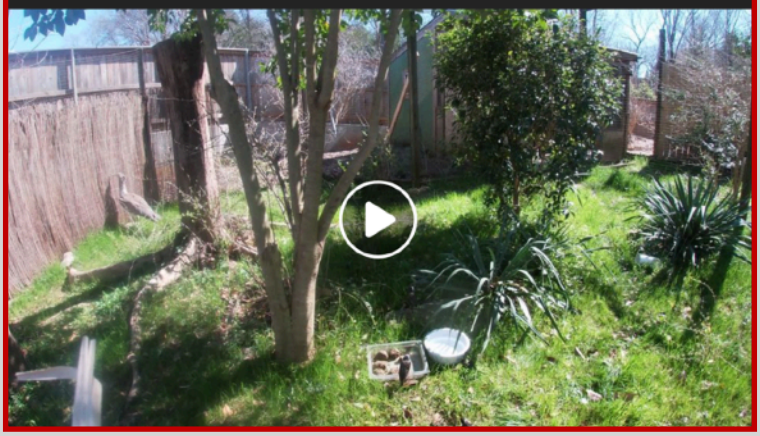
**Zoo Atlanta**
March 27, 2021 ·

Tuza and I have many native bird friends and neighbors that visit us every day. Whether we want to share or not, our bird neighbors come and eat our mealworms and our breakfast. The European starling family is especially good at stealing food from us. Brown thrashers and American robins are also frequent visitors.

Kori bustard populations in Africa are considered Near Threatened by the IUCN Red List of Threatened Species. These populations are believed to have declined around 25% over the past 47 years. Collisions with human-made structures, like power lines, are one of the leading threats to kori bustard populations in Africa. Many birds native to North America, like my neighbors, face a similar threat from collisions with windows.

For many of you, helping kori bustards in Africa is very difficult. You can donate money to support organizations that are doing research and conservation on the ground there. However, something you can do directly is to benefit your local feathered friends. By making small changes in your own lives, like putting bird tape on the windows of your house or business, you can help birds in your own bird neighbors and prevent collisions.

Thanks for joining me today for #KoriBustardDay! -- Zola the kori bustard #OnlyZooATL



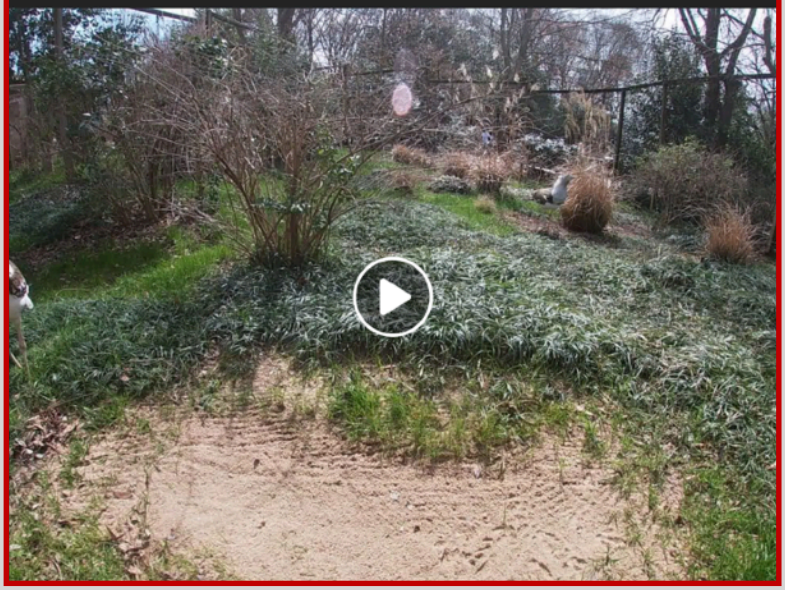
**Zoo Atlanta**
March 27, 2021 ·

What does a typical day look like for me?

Well, I usually wake up pretty early, sometime before 7 a.m. The team member who is taking care of me and Tuza for the day will come greet us in the morning. I especially like the days that the keepers bring bugs at their morning greeting.

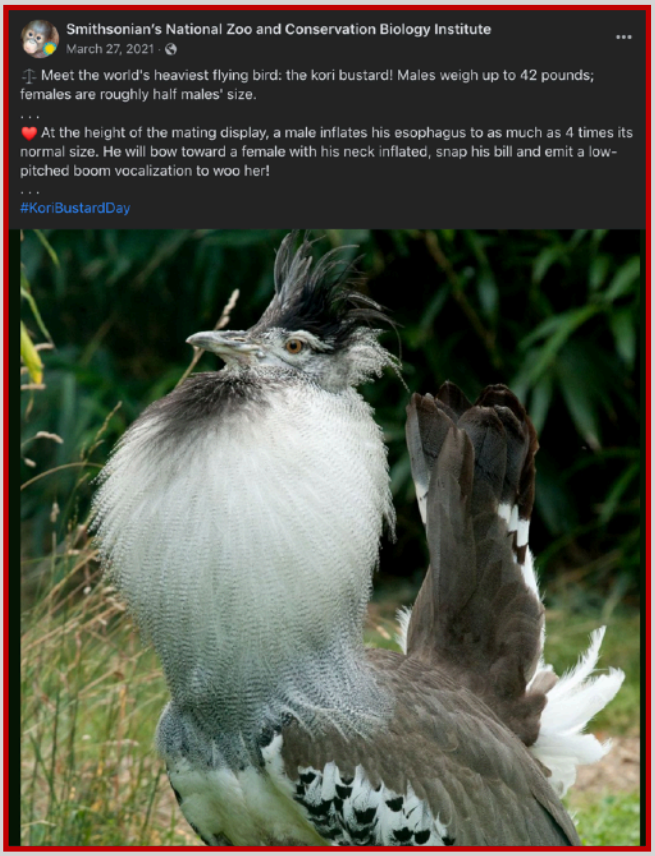
Afterwards, Tuza and I go on a walk around the habitat and do some morning wing stretching. At least once a day I like to preen my feathers while Tuza does her own thing. It's around this time that our team comes back to give us breakfast! I won't deny it, I am a foodie. I love food! Mealworms, mice and peanut butter are my favorites. The team will sometimes bring interesting items with them that they leave with us to investigate. They call this "enrichment." I am always a little nervous at first but quickly become more curious the longer the item is around. I have to touch everything with my beak!

On sunny afternoons, I lie down in the sunshine, letting the rays warm my feathers. Tuza usually comes to join me. We then go on another walk to inspect our habitat until our keepers come with our dinner. Dinner is when they say bye to us for the day. After dinner, we wind down for the night and fall asleep when the sun goes down. #KoriBustardDay – Zola the kori bustard #OnlyZooATL



ZOO ATLANTA


phoenixzoo
ARIZONA CENTER for NATURE CONSERVATION

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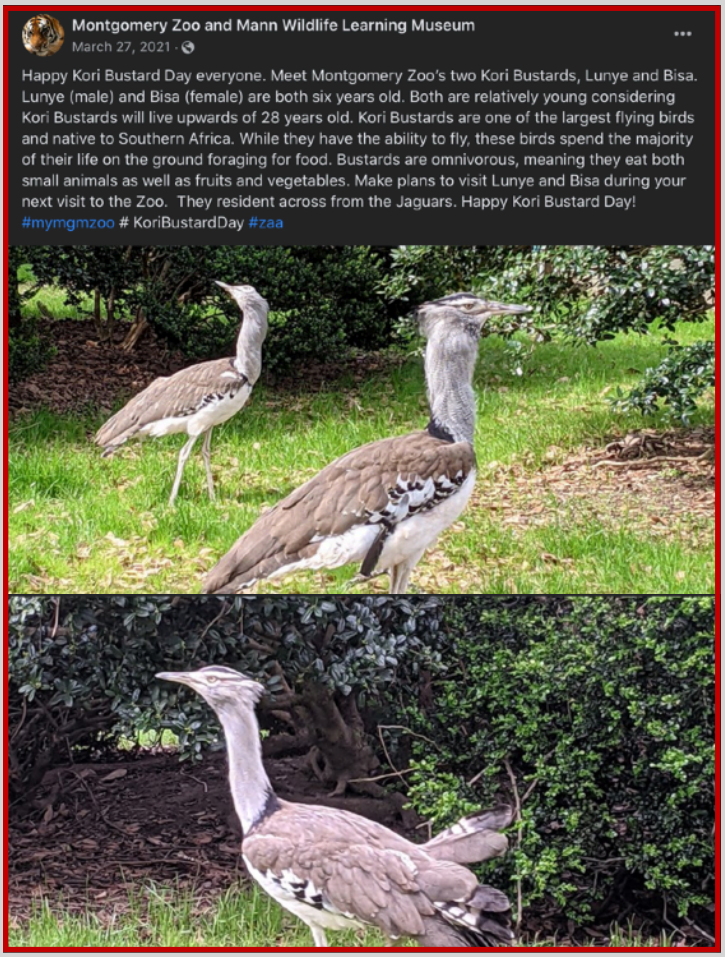



Video highlighting Kori Bustards, Kibibi and M'guu, for Kori Bustard Day 2021 at Zoo New England

MONTGOMERY ZOO
MANN WILDLIFE LEARNING MUSEUM

ZOO
NEW ENGLAND
Franklin Park Zoo ♦ Stone Zoo

# Celebrate Kori Bustard Day 2022!


## Host your very own Kori Bustard Day with these tips and tricks:

Use social media post(s) if you can so that people that are not visiting that day know that it took place and can learn about koris. It can just be a text and photo post. If you have time to do a video or facebook live, even better.

Plan your message. What is the theme for the day? What is the main thing you want them to know when they walk away?

• Our conservation message formula is:
1. What is the problem?
2. What is your Zoo doing to help?
3. What can guests do to help?

We have started relating kori collisions with power- lines to migratory bird collisions with glass here in North America. Other relevant messages are climate change and reducing your carbon footprint and using the kori feather project as an example of how zoos are making a difference in the fight against illegal hunting.

**-Melissa King**

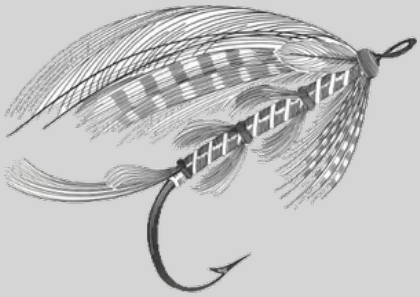
# Cheetah Family and Kori Bustard Cross Paths

**Photographed on the 2nd of October 2021 in the Auob riverbed, The Female cheetah, with 2 youngsters in tow, came upon a Kori bustard and the 2 youngsters challenged it but it fought back and they ran off.**

**Then the 2 youngsters came back to challenge it again and again until they lost interest or they were scared and walked away. The Kori Bustard walked away unharmed as well, only losing a wing feather!**

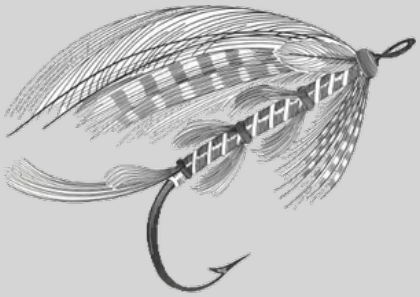
**As the heaviest flying bird in Africa, a Kori Bustard need quite an approach to get airborne...during which he is most vulnerable. This fella stood his ground like a boss and got to see another day!**

# Blank Park Zoo Hosts Kori Bustard Conservation and Fly-fish tying Workshop



BLANK PARK ZOO

IOWA'S WILDEST ADVENTURE



You don't have to be a kid to enjoy learning at Blank Park Zoo. Blank Park University will expand your understanding of the natural world through lectures led by some of Blank Park Zoo's awesome staff.

During a 45 to 60 minute interactive lecture, participants learned about Kori Bustard conservation and the fly-fish tying program from Blank Park Zoo staff. Participants were taught about current Kori Bustard conservation initiatives and what they can do to hep conserve these amazing birds. Folks were also introduced to the Kori Bustard Fly Fish Tie Program, which is a collaboration between John McLain, owner and founder of FeathersMc, and the Kori Bustard SSP to legally distribute fly fishing ties made from Kori Bustard feathers that are donated by AZA institutions. There is a large desire for bustard feathers in the fly tying community due to their effectiveness in attracting fish due to the natural dark and light patterning. This program helps raise awareness of the plight of the Kori Bustard while also helping to diminish the desire within the fly tying community to acquire these feathers illegally as well as raising money for the Kori Bustard SSP for conservation of this amazing bird. If you would like to learn more about this program or would like to contribute directly to it please follow the link below:


**www.feathersmc.com**

# New Hatches!!!!

## Dallas Chicks

The 2 Kori Bustards that hatched this year at Dallas Zoo are half siblings; both girls.

Monafiki hatched on 24 July.  Her name means: One who causes mischief.

Beans hatched on 14 September. She will be receiving a name that contains the word Beans (because she is the first and only Kori we have hatched at Dallas that LOVED!!! Green and Lima beans).

Beans Hatchday

Monafiki Day 2

Monafiki 4 months and Beans 2 months 8 days

# Fort Worth Chicks

fort worth zoo

# Current Bustard Conservation and Research

Below is a compiling of some of the most recently published research on the family Otididae. Each title is hyper-linked to the full article so just click on the title for access to the entire article.

## Hepatic lesions associated with iron accumulation in captive kori bustards (Ardeotis kori)

**Sarah K. Cudd[1], Michael M. Garner[2], Andrew N. Cartoceti[3], Elise E. B. LaDouceur[4]**

**1=Joint Pathology Center, Silver Spring, MD, USA,**

**2=Northwest ZooPath, Monroe, WA, USA, 3=Smithsonian National Zoological Park, Washington D.C, USA**

There are anecdotal reports of iron storage disease in captive kori bustards (Ardeotis kori), but detailed descriptions of this disease have not been reported. The goals of this retrospective, multi-institutional study were to (1) describe microscopic findings associated with iron accumulation in postmortem tissues of kori bustards and (2) use an adapted grading scale to score iron accumulation and associated hepatic lesions. Tissue sections from 19 adult captive kori bustards (age range 3–28 years; 12 males and 7 females) were evaluated histologically with hematoxylin and eosin, Masson's trichrome, and Prussian blue stains, and scored for iron accumulation. Hemochromatosis was diagnosed in cases with iron storage (in hepatocytes and/or Kupffer cells) and concurrent parenchymal damage (defined as having both necrosis and fibrosis). Hemosiderosis was diagnosed in animals with evidence of iron storage without necrosis or fibrosis. Ten of the 19 cases (age range 8–27 years; 7 males and 3 females) were diagnosed with hemochromatosis, including 6 with mild disease, 3 with moderate disease, and 1 with severe disease. Histologic evidence of iron accumulation was also identified in kidney, intestinal tract, adrenal gland, and spleen, but there were no associations between severity of iron accumulation in the liver and accumulation in other organs.

Photo by Bertina K/Macaulay Library at the Cornell Lab of Ornithology/ ML406768891

# Report on Ex situ Kori Bustard Breeding and Behavior

**Sara Hallager[1], Jeanette Boylan[2], Deborah Fripp[3], Lauri Torgerson-White[3]**

**1=Smithsonian National Zoological Park, Washington D.C, USA,**

**2=Tarrant County College, Fort Worth, Texas, USA 3=Darwin's Ark: Research Consulting and Coordination, Carrollton, Texas, USA**

In 2007, the kori bustard Species Survival Plan (SSP) sponsored a behavioral study on ex situ kori bustards housed at nine institutions in the United States. Over 75,000 behavioral observations were collected on 50 birds over five years using the Colonel Stanley R. McNeil Foundation's EthoTrak Observation System, a Palm®-based program. These data were used to investigate three areas of interest and to make management recommendations.

Photo by Meghan Murphy

**1) How do kori bustards spend their time?**

An ethogram of 31 behaviors organized into seven categories was adapted for the EthoTrak study from a pre-existing kori bustard ethogram. Analysis of the data generated overall activity budgets, which were compared for males vs. females, juveniles vs. adults, and breeding vs. non-breeding seasons. The kori bustards spent most of their time resting, as well as large amounts of time walking, performing body maintenance (e.g. preening), and feeding. Kori behavior differed significantly by age, sex, and season.

**2) Does social housing impact breeding behavior?**

The EthoTrak data in combination with institutional egg logs were used to investigate whether adult kori bustard breeding behavior was affected by the presence of same and opposite-sex conspecifics, heterospecific birds, and humans.

Male sexual behavior was the primary factor in whether females laid at all, but one of many factors in how many clutches a female laid. Male sexual behavior did not impact how much maternal behavior a female showed. The strongest impact on how many clutches a female laid and how much maternal behavior she showed came from the institution, with specific factors difficult to tease out of that effect.

Dominant males did not appear to interfere with displaying by other males. In fact, there was a trend toward multiple males stimulating each other to display. The strongest effect on male sexual behavior was the presence of other species of birds: males in exhibits with other species of birds performed significantly fewer display behaviors than males in kori-only exhibits.

**3) Do hand-reared and parent-reared birds have equivalent survival and breeding success?**

The EthoTrak data were combined with studbook data and data from a separate study on handreared chick behavior to investigate whether the choice to hand- or parent-rear kori bustard chicks impacted the chicks' future survival or breeding success. Both hand-rearing and parent-rearing of kori bustards were equally successful methods of producing chicks that survived to be successfully breeding adults. Hand- and parent-reared chicks behaved equivalently as chicks and adults. Chicks born to hand-reared and parentreared birds survived to adulthood at equivalent rates to each other and to chicks born to wild-caught birds.

**Management Recommendations:**

More research is needed to tease out the details of all of the results presented here. With that caveat, this research suggested the following recommendations:

- For institutions holding a pair that are not breeding, housing a second male in acoustic contact may stimulate more display behavior and lead to higher breeding success.
- Females in visual contact may have higher breeding success than those housed without other females or housed in physical contact.
- Managers should exercise caution when housing kori bustards with other bird species.
- Parent-rearing is acceptable, especially when staffing and resources are limited and predation is not an issue.

# An update on the conservation status of the Little Bustard Tetrax tetrax: global and local population estimates, trends, and threats

**Manuel B. Morales[1], Vincent Bertagnolle[2]**

**1=Terrestrial Ecology Group. Departamento de Ecología and Centro de Investigación en Biodiversidad y Cambio Global (CIBC). Universidad Autónoma de Madrid. c/ Darwin, 2. 28049. Madrid, Spain.**

**2=CEBC-CNRS, UMR 7372, CNRS and La Rochelle Université, 79360 Beauvoir sur Niort, France.**

The Little Bustard (Tetrax tetrax) is an iconic species and an indicator of healthy grassland and farmland ecosystems. It formerly ranged almost continuously from north-western Africa and Iberia to central Asia, encompassing France, Italy, southern Russia, and the Middle East, occupying natural grass steppes, pastured grasslands, and extensive cereal farmland. Today, two main distribution sub-ranges persist: a western one comprising the Iberian Peninsula, France, and Sardinia, and an eastern one encompassing mainly southern Russia and Kazakhstan but reaching north-western China and isolated spots in Turkey. We describe the changes that occurred across the species' range and were documented during the last and current centuries and revise the status and trends of Little Bustard populations throughout that range. We provide the first global estimate of the world population, as well as those of the two sub-ranges, discussing the main threats and global conservation implications of these estimates. Historically abundant in Europe and northern Africa, the Little Bustard has strongly declined over the second half of the 20th century, becoming extinct in at least 15 countries. Such spectacular regression is mainly associated with land-use change and agricultural intensification. Other threats are legal hunting, poaching, and collision with powerlines. In the last two decades, the species has severely declined (c.6% yearly rate) in its traditional population stronghold, the Iberian Peninsula. Conversely, there is evidence of recent population growth in some areas of the Eastern range, but increases are unquantified and require further study. Many populations are probably small and scattered, with no reliable information on size and trends. Nevertheless, the Eastern range may now be considered the species' stronghold with more than half the world's population. The diverging dynamics and ecological differences between the two sub-ranges require a global conservation strategy that treats each as a different conservation unit to assure the species' recovery.

Photo by ASalafa Deri/Macaulay Library at the Cornell Lab of Ornithology/ML399951521

# Current status of Great Bustard Otis tarda in Turkey: population size, distribution, movements, and threats

**İbrahim Kaan Özgencil[1], Ferdi Akarsu[2], Ramona Flatz[3], Mehmet Mahir Karats[3], Arzu Gürsoy-Ergen[4], Fulya Saygili-Yigit[5], Muharrem Karakaya[6], Melisa Soyluer[1]**

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The Great Bustard (Otis tarda) is a globally threatened species with populations inhabiting the steppe zones of Turkey. In recent decades, its populations in Turkey have suffered severe declines in range and size. Although the remaining populations are in urgent need of protection, there has been no national-scale study on the species since 2009, and huge information gaps remain concerning its range, abundance, and movements in the country. Here, we combined data from five years of fieldwork together with all available sight and literature records to present up-to-date estimates of distribution and population size in Turkey, to better understand its movement patterns, to reveal its recent and historical population changes, and to assess its national extinction risk and threats. We find that the species' breeding population has shrunk by 20–29% over the last five years, and there are only 559–780 breeding Great Bustards in Turkey distributed in two discrete subpopulations. Comparison with historical records shows that the species' range has shrunk by at least 60% since the beginning of the 20th century. We suggest possible migratory routes within and through Turkey and that Turkey might have a higher regional importance for the species than previously thought. Illegal hunting, agricultural intensification, shift to irrigated crops, overgrazing, collision with powerlines, and disturbance are the most severe threats to the species in Turkey. Our national Red List assessment yields an Endangered categorisation. Further studies are needed to understand the metapopulation structure and movements of the species and to conserve its remaining populations in Turkey.

| *Threat* | *Percentage of Studies Reporting* | *Impact Level* |
|---|---|---|
| Illegal hunting | 95.5% | High |
| Agricultural intensification/irrigation | 86.4% | High |
| Human and livestock disturbance | 54.5% | High |
| Agricultural pesticides | 54.5% | High |
| Collision with powerlines and wind turbines | 50% | High |
| Overgrazing | 45.5% | High |
| Loss of the chicks and eggs during harvest | 36.4% | High |
| Wetland drainage, dams and unsustainable water use | 31.8% | Medium |
| Urbanisation | 31.8% | Medium |
| Collection of the chicks and eggs | 18.2% | Low |
| Predation by feral dogs | 9.1% | Low |
| Loss of eggs due to stamping by livestock | 10% | Low |
| Forestation | 4.5% | Low |

Threats for Great Bustard populations in Turkey, the percentage of studies reporting them, and their estimated impact level (three levels: high, medium and low).

# The Perilous Plight of Great Indian Bustard (Ardeotis nigriceps) in the Thar Desert of Rajasthan

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This paper summarizes the population dynamics and distribution of the Great Indian Bustard (Ardeotis nigriceps), in the Thar Desert of Rajasthan from 2018 to 2020. The Scan and focal sampling along with the intensive seasonal survey methodology was adopted to assess the population dynamics and movement pattern of the state bird of Rajasthan. The entire study area is divided into 231 grids consisting of 3 blocks and covered using a transect of 3875.49 km, which helped systematic assessment of the Great Indian Bustard (GIB) population. A total of 54 potential grids for GIB has been identified based on the presence and absence of the species and associated habitat of the region. The authors had observed 42 distinct GIB individuals and a record sighting of 11 GIB in a flock at the Thar landscape of Rajasthan. This paper depicts the importance of seasonal migration, and land use utilization for GIB. Authors had also identified two distinct resident populations of GIB i.e. one each from the Khetoloi-Ramdevra belt and Sudashree-Chohani-Sipla belt. The paper had implicated the transboundary movement of this bird towards the Cholistan Desert of Pakistan and raises concern over the same.

Photo by Gobind Sagar Bhardwaj/Macaulay Library at the Cornell Lab of Ornithology/ML393439141

# Moonlight triggers nocturnal display in a diurnal bird

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The importance of nocturnal display in diurnal birds has been neglected for a long time, owing to the difficulties in recording behaviour by night. Using loggers with an accelerometer (ACC) we studied nocturnal display in male African houbara bustards, Chlamydotis undulata, ssp. fuertaventurae. Diurnal display of male houbaras consists of a visual component, the display run, and an acoustic component, the boom. Nocturnal display runs were only recorded twice, both on full moon nights. Nocturnal booming intensity was highest on full moon nights when it reached similar levels to those during peak diurnal display at dawn. The more favourable physical conditions for sound transmission and the reduced acoustic competition with wind and other birds at night have been proposed to explain nocturnal vocalizing. Minimizing copulation disruptions, a frequent intramale competition mechanism in bustards, could be an additional advantage of nocturnal display. However, these factors do not explain why vocal activity is highest on full moon nights. We suggest that moonlight may help displaying males to detect predators, as well as to communicate visually with approaching females. Moonlight also allows males to combine booms with visual signals produced by the white neck feathers exposed during booming into more efficient multimodal signals. Moonlight would thus ultimately lead to males achieving nocturnal copulations, which indeed might be more frequent than previously thought, according to rates of nocturnal ACC-recorded precopulatory movements. Finally, nocturnal booming sequences had almost twice as many booms as diurnal ones, which suggests that nocturnal vocalizations transmit higher-quality information about signalling males than diurnal vocalizations. Nocturnal booming significantly increased the total display time of male houbara bustards; thus, future studies should investigate whether nocturnal vocal activity represents an important contribution to individual fitness in this and other nocturnally vocalizing diurnal species.

Photo by Tomáš Grim/Macaulay Library at the Cornell Lab of Ornithology/ML399883171

# Is There Any Aerodynamic Obstacle to Gliding in Great Bustard?

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Gliding and soaring are important flight styles, which reduce the energy consumption of birds. Most of the migratory birds and raptors take advantage of these flight styles in order to stay in the air much longer. However, gliding and soaring cannot be seen in the great bustard (Otis tarda), which prefers continuous flapping flight style. This study has been focused on possible glide ratio performance, which is not related to the weight of the great bustard. In this study, the glide performance of the great bustard is proved and calculated by CFD simulations. Results show that although great bustard is known as poor flyer, there is no aerodynamic obstacle to perform gliding or soaring. The possible reasons such as the lack of long distance migrations and feeding behaviour are discussed.

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