



## Population status and trend of lesser flamingos at Lakes Natron and Manyara, Tanzania

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### Abstract

The wild lesser flamingo population count at Lake Natron and Lake Manyara was carried out in January 2012, 2016 and 2017. The population of lesser flamingos was estimated using a ground count technique with the aid of a pair of binoculars and telescope to identify and count flamingos at each side of the two lakes. A total of 20,378 flamingos were observed and recorded at both sides of Lake Natron while at Lake Manyara a total number of 25,262 flamingos were counted at both sides of the Lake. The results revealed that the average count of lesser flamingos for the ten years from 1992 to 2012 at Lakes Natron and Manyara were  $193,756 \pm 63083.9$  and  $404,854 \pm 223404.2$  birds respectively. The general trend of the lesser flamingo population for these ten years for these two lakes indicates that the population is declining. A larger decline was observed at Lake Manyara from 1995 to 2017 in

contrast to at Lake Natron. From this study, recommendations are given for more counts to be conducted to further improve our understanding of the temporal and spatial distribution and abundance of lesser flamingos in Tanzania, and across Africa as a whole.

## Introduction

The lesser flamingo (*Phoeniconaias minor*) occurs in eastern, southern and western Africa, as well as in Pakistan and northwestern India. In East Africa, the lesser flamingo is a characteristic bird of soda lakes in the Rift Valley, where it is highly gregarious and nomadic (Britton, 1980; Zimmerman, Turner, Pearson, Willis, & Pratt, 1996). The lesser flamingo breeds mainly in the Rift Valley lakes of East Africa including Lakes Natron, Eyasi and Magadi in Kenya. Three other smaller breeding populations occur in West Africa, in southern Africa, in India and Pakistan (BirdLife International, 2016). The lesser flamingo is been categorized as “Near Threatened” due to a declining population, which might be caused by few number of breeding sites, anthropogenic activities and infrequent breeding (BirdLife International, 2016). Other factors are considered to be a threat to the lesser flamingos specifically at Lake Natron- the hydroelectric power scheme proposed by the Government of Kenya at Ewaso Ngiro River (Anonymous, 1993; Johnson, 1994), which pours its water into Lake Natron might alter the inflow of water into the lake. A reduced or abrupt change of inflow into the lake could lead to the alteration of the hydroecology of the lake and pose danger to the breeding site and survival of flamingos.

Despite Lake Natron being considered as the main and only regular breeding site for lesser flamingos (Brown & Britton, 1980; BirdLife International, 2013), the population of lesser flamingos at Lakes Natron and Manyara have been declining subsequently from 1994 to date- however multiple factors may contribute the decline of the species (Baker, 1996; Pennycuick, Fuller, Oar, & Kirkpatrick, 1994; TWCM, 1995). Based on these past predictions and published information on population trends, the purpose of the present survey was to assess the current population and distribution of the lesser flamingos at Lakes Natron and Manyara via a ground counting method.

## Study area

Lake Natron (02°25S 36°00E 2.417°S 36°E; 02°25S 36°00E / 2.417°S 36°E / ) is a shallow endorheic lake on the floor of the Eastern Rift Valley. The Lake is elongated in shape, extending 58km south of the Kenya border with a mean width of 15km and 3.3m depth, with a total surface area of about 950km<sup>2</sup> (Figure 1). The water is highly caustic with chloride

concentrations reaching 65,000mg/litre and is unsuitable for direct human and livestock use (Collar, Crosby, & Stattersfield, 1994). The surrounding land is dry bush dominated by *Acacia* thorn-trees and inhabited by pastoral Maasai. There is some seasonal cultivation along the riverbanks and a small settlement in the south associated with a minor soda-extraction plant and a few small tourist camps (Njaga & Githaiga, 1999).

Lake Manyara (03°30'S; 35°60'E is also located in the Rift Valley, about 120km southwest of Arusha (Figure 1). It is a shallow alkaline lake (pH ~9.5) and covers approximately 231km<sup>2</sup>. Lake Manyara is within the Manyara National Park that is also designated as Biosphere Reserve by the IUCN. The Lake is home to over 300 migratory bird species, including flamingos. The Lake is used as a wintering water body for flamingo after breeding at Lake Natron.

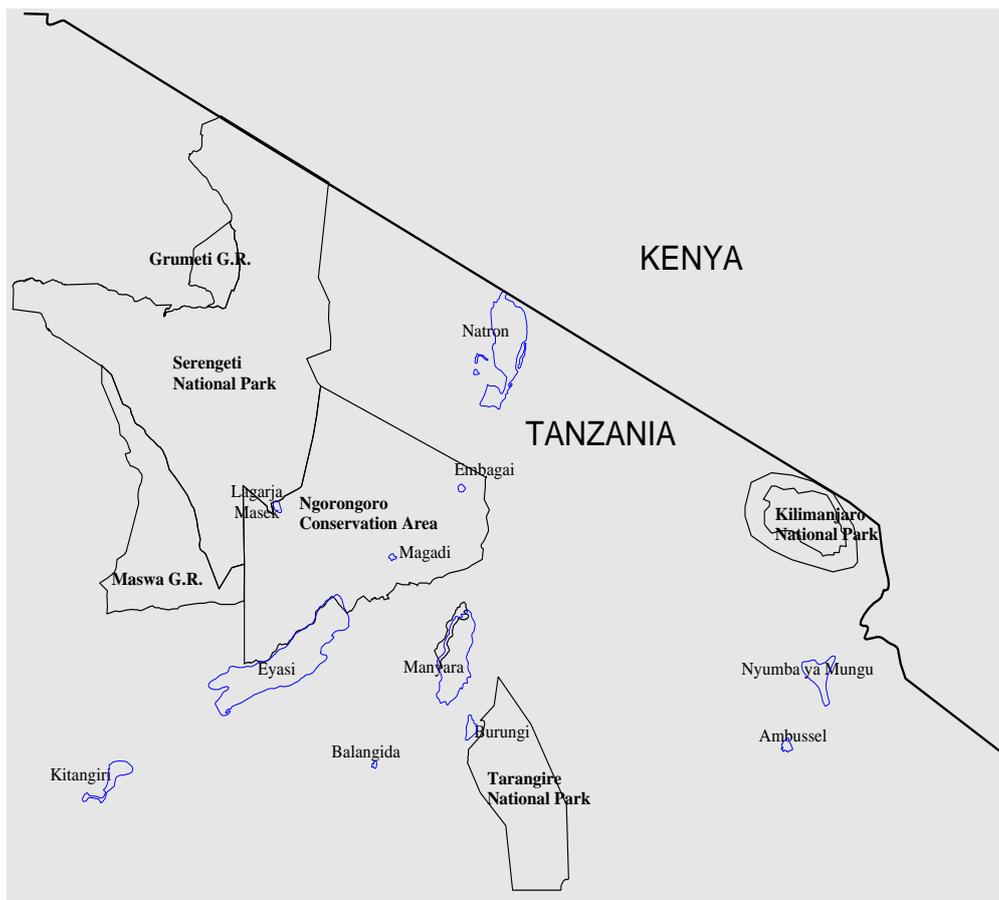


Figure 1: A map of Tanzania showing the study areas (Lakes Natron and Manyara) and the other soda lakes in this region.

## Methods

Flamingo counts were conducted in January 2012, 2016 and 2017 at Lake Natron and Lake Manyara National Park with the aim of knowing abundance and distribution. Each lake was divided into two sides namely the western and the eastern side. In each surveyed lake, a point with high elevation was selected for ease of observing and counting the flamingos. The lesser flamingo population was estimated using a ground count technique with the aid of binoculars and telescopes to identify and count flamingos at each side of the two lakes. The participants stood at the highest point of the lake so that they could see the scenery of the lake from a-far for easy counting of the flamingos. Flamingo flocks were divided into equal group sizes and individuals in each group were then counted. The total individuals in a counted group were multiplied by the number of obtained groups of flamingos. Each participant estimated the number of each flock of flamingos and then each participant's counts were summed and divided by the number of participants to get the total flamingo population estimate in each lake. Where flocks were small, direct counts of individuals were made.

## Results

A total of 20,378 flamingos were recorded at both sides of Lake Natron in 2012. The highest number of flamingos were counted from the western side of the Lake- 13,617 individuals compared to from eastern side where flamingo count was 6,761 individuals. At Lake Manyara a total of 25,262 flamingos were counted from both sides of the Lake; 20,830 flamingos were counted on the eastern side and 4,432 were counted from the north-west of the Lake. The flamingo survey was again conducted in 2016 and 8,403 flamingos were counted at Lake Natron and 34,000 at Lake Manyara.

In 2017 1,500,000 flamingos were counted at Lake Natron and 100,000 at Lake Manyara. However, during 2016/2017 counts were performed over the entire Lake regardless of sides. The result revealed that the average count of lesser flamingos for the period 1992 to 2012 was  $193,756 \pm 6.3$  (Lake Natron) and  $404,854 \pm 2.2$  (Lake Manyara). The general trend of the lesser flamingo population over these ten years, for these two Lakes, may indicate an

overall population decline. A larger decline was observed from Lake Manyara from 1995 to date in contrast to that from Lake Natron.

## **Discussion**

The lesser flamingo is a highly nomadic species that is dependent on a range of soda lakes to complete its annual cycle (Zaccara et al., 2011). The nomadic behaviour of Lesser flamingo is demonstrated by annual fluctuations in the total number of birds counted in two lakes, ranging from less than 100,000 birds in 1969 to nearly two million in 1991. This situation is further demonstrated by annual changes in numbers at individual lakes. Based on census data currently available, the distribution of lesser flamingos in Tanzania is restricted to soda lakes within the Rift Valley and volcanic highlands in the northern part of the country. It has been noted that the distribution and abundance of flamingos are related to food supply (Burgis & Symoens, 1987; Tuite, 1981). Thus, changes in the numbers of flamingos at a particular soda lake both during the year and between years may reflect fluctuations in the availability of their food supply. The lesser flamingo is specialized for feeding on *Spirulina*, a species of blue-green algae that is found in alkaline water (Middlemiss, 1958; Pennycuick & Bartholomew, 1973). Increased siltation and chemical pollution from agricultural activities pose a major threat to most of the lakes which are not well protected (Mlingwa & Baker, 2006). The chemical pollutants produced from agricultural activities may affect the availability of the *Spirulina* food supply for lesser flamingos that, in turn, affects the distribution of flamingos. Such human activities can greatly affect the abundance and distribution of lesser flamingos in these two soda lakes under study.

## **Conclusions**

The soda lakes of Kenya and Tanzania are the most important habitat for the lesser flamingo in Africa. However, most of the important lakes in Tanzania are outside of the network of highly protected national parks and game reserves. Only a portion of Lake Manyara is within the Lake Manyara National Park, while Lake Eyasi is completely unprotected as it falls within community land. Lakes Empakai, Lagarja, Masek and the Momella are the only soda lakes

located within highly-protected areas. A similar situation is also found for the soda lakes in Kenya. The two countries should therefore take responsibility for conserving all of their existing soda lakes, regardless of size, in order to ensure the continued survival of this near-threatened flamingo (and other waterbird species too). Any human activities that can be detrimental to the Rift Valley drainage system should be discouraged. There are no synchronised counts of lesser flamingos across all African countries where soda lakes could be an important habitat for this flamingo species. Thus, estimates of the lesser flamingo population for Africa as a whole remain incomplete. We therefore suggest that continent-wide co-ordinated counts of lesser flamingos are important to improve our understanding of the spatial-temporal distribution and abundance of this flamingo species, and to assist in the planning of effective conservation action.

### Acknowledgements

The authors of this paper would like to thank the Wildlife Division and Tanzania Wildlife Research Institute for providing funds and other logistics for this particular study.

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Citation: Mmassy, E., Maliti, H., Nkwabi, A., Mwita, M., Mwakatobe, A., Ntalwila, J., Lowassa, A., Mtui, D., Liseki, S. & Lesio, N. (2018). Population status and trend of lesser flamingos at Lakes Natron and Manyara, Tanzania. *Flamingo e1*, early view.