**REVIEWER 1**

COMMENT:

The abstract and introduction part needs the revision , for readers to quickly catch your contribution, it would be better to highlight major difficulties and challenges, and your original achievements to overcome them, in a clearer way in abstract and introduction. In discussion part author should address to global audience by providing adequate literature and compare the findings.

RESPONSE:

We have added some information about main challenges and ways to overcome them on the abstract. In the introduction we feel we should speak about what challenges BIRDIE is trying to solve rather than jump straight into the challenges we have faced. However, we have added some of that information to the discussion. At the same time, by doing so we have cited some more references.

REVIEWER 2

General Comments:   
The paper is well written and describes an innovative approach in developing a data pipeline from citizen science and publicly available data sets. Combining this information with environmental data and bridging the gap between raw data and end users via the BIRDIE system has tremendous value for bird conservation in Africa as well as providing an approach that is applicable in other regions. The manuscript will make a strong contribution to this particular approach of science delivery in the future.  
  
Abstract  
Line 3-9: Could be a little more concise.  
Line 25-27: Could mention species summaries or broader reports as well.  
  
Introduction  
Line 71-72: I am not convinced that BIRDIE is designed to “inform the general public” but instead provides other end users some effective tools to reach that goal. The visualizations may provide a step in that direction but providing context and understanding is critical for the general public to become fully engaged. The “what does this mean” element is often hard to deliver.

Indicators and Statistical Methods:   
Line 324-326: The general approach of using a “rich set of variables” sounds reasonable but since this is a site level analysis that scales up, it might be prudent to build a process into BIRDIE which allows local managers to suggest variables for inclusion that might be important at that local scale. Allowing for that local input may help refine the models and improve estimates.  
  
Web Application:  
Line 366-368: It would be helpful to provide a description of what format these reports are in (i.e. text files, html, etc.). Also, can the sites and species summaries be easily downloaded from the site.  
Lines 369-372: Same comment as above. A bit more detail on these summaries and how they are delivered to the end user would be helpful.  
  
Discussion  
Lines 395-401: While BIRDIE relies on citizen science and the continued collection of these data, it would be good to have some discussion on the trajectory of this approach to data collection. Figure 3 indicates a decline in active sites being counted. Is this a cause for concern and could BIRDIE possibly provide motivation for adding new sites or continuing others? It would be great to include some of that information here to demonstrate the stability of this approach moving forward.  
Line 408-409: The integration of environmental data and the raw data within the analyses would benefit from additional description (perhaps more so in the methods). Having it available for display is helpful to end users but understanding more directly how it was used to inform your models might be helpful as well and possibly help inform the end users on which environmental inputs would be helpful to display and examine.   
Line 412-413: I think the stakeholder engagement deserves more description in the methods.   
  
Figures and Tables:   
Figure 1: Nice simple depiction. May be a bit oversimplified as I would guess that there is cleaning and validation across multiple steps in this conceptual model as an example. You might consider revising to include a bit more complexity in your system design.   
Figure 2: Not sure this is the best way to express your point regarding scale and main users. At the least provide more information in the figure legend to clarify what you are trying to emphasize in this figure.  
Figure 3 is essentially two figures. Either provide better description and interpretation of these two figures in the legend or separate into multiple stand-alone figures.

REVIEWER 3

I found this to be an interesting paper that tackles a real problem in how to use data collected in large, on-going monitoring programs, albeit with significant data challenges inherent in large, long term, and citizen science datasets.  
My main comments on the manuscript are I found there were areas of repetition throughout, these could be removed. Secondly, it is noticeable that this manuscript doesn't deal with the wetlands component of the pipeline. I think the title should be altered to show that this is the waterbird data component only, and the wetland component of the pipeline will be in a separate manuscript.

Specific comments  
  
Line 123 is a repeat of earlier text – not needed again here.  
  
Line 63 - 65 – these specifics not needed in Intro and are repeated at Lines 129.  
  
Line 128-131 – it would be good to have more information on how these counts are done – are they ground based with scopes? Aerial?  
  
Line 134 – how many sites have useable data? would be good to have a n= ?  
  
Line 161 – the comment “are unrealistic” I think should be changed. There are a number of international examples of large scale, long term data sets collecting bird data e.g. https://www.usgs.gov/data/2022-release-north-american-breeding-bird-survey-dataset-1966-2021; Kingsford, R. T., J. L. Porter, K. J. Brandis, and S. Ryall. 2020. Aerial surveys of waterbirds in Australia. Scientific Reports 7. ; https://www.nature.com/articles/s41597-021-00804-2   
  
Line 179 – not really national – just southern Africa.  
  
Line 182 – I think the term ‘population’ should be changed, it is really abundance at a wetland site, or scaled up to a region. It is not strictly the population. Could be easily altered to ‘Local population’.  
  
The authors outline the indicators for waterbirds (Lines 181-189) but they do not really address the indicators for wetlands. This is a significant gap as Birds is touted as a pipeline for Wetlands and Waterbirds to assist in reporting on wetland status (line 383), but it is not clear how this happens, what data is used, or how it is interpreted.   
  
Line 194 – typo ,,  
  
Line 238 – typo \_.  
  
Line 279 – what are the rules for borrowing data? is there a distance rule? Wetland type? It would be good to have a little bit more info here.  
  
Fig. 3 It might be easier to assess the data if rather than a colour ramp they were set colours, especially highlighting those sites that have >10 years of data.  
  
Line 327 – Does this, and other caveats (Line 427) on the data impact on the confidence for reporting or assessing status? What impact would this have on decision making?  
  
I notice in the discussion that the authors plan to further integrate the wetlands data. This paper is essentially the first part – the waterbird data, and the next stage will be the wetlands component. It might be appropriate to either reword the title – to show that this is stage 1: waterbird data. This paper doesn’t deal with the wetland component of the pipeline at all. This should be noted in the introduction as well.

REVIEWER 4

The authors described a pipeline “South African Biodiversity Data Pipeline for Wetlands and Waterbirds (BIRDIE)” for bridging gap between raw ecologist datasets and final users in South Africa at multiple temporal and spatial scales. It is fast efficient and efficient information uptake pipeline for estimating indicators related to abundance, distribution and diversity of water birds. The BIRDIE web application is very interesting for end user.   
The authors need to check in text citation and bibliography as there are some mistakes in references.   
Lines 41and 49: Please correct P. Stephenson et al., 2017 as there should be last name of author in citation. Similarly check in-text citation at lines 379 and 385