Introduction

Reserved

Methods

*Study site and subjects*

Reserved.

*Data collection protocol*

Reserved.

*Statistics*

*Seasonality in inappetance*

The analysis of the seasonality of inappetence in the MGC was conducted by first calculating (and depicting graphically through line plots) the monthly average proportion of feeding behaviour observed. As the catfish could not be differentiated individually, proportion of feeding fish was simply calculated as number of fasting fish divided by the total number of fish (*n* = 6). Subsequently, we then used the monthglm command (with a logit link) in R software (package “season”) to estimate the odds ratio (OR) and 95% confidence intervals (CI), of a respiratory specimen testing positive for influenza (or RSV) in each month compared to the peak month (taken as reference), defined as the month with the highest average positivity rate for that virus in that city [16]. The monthglm command fits a generalized linear model using a categorical month variable as independent variable, and is suitable when dealing with non-sinusoidal time series. An OR could not be calculated in those months (from late spring to early autumn) where no cases of influenza or RSV were reported.

Results

Between 2019–2021, the studied catfish enter a state of inappetence collectively during

the later months of each studied year (i.e., September to November; Figure 1). This annual

pattern of inappetence in the studied catfish appears largely driven by an endogenous cycle

as results from the model selection analysis found that the model characterised by Southwest

monsoon periods (i.e., June–November) observed in the Mekong Basin (i.e., see Mekong model; Table 1) was the best-fitted model for describing the fasting behaviours in the studied catfish (ΔAICC < 2.0; Table 1). In addition, the variance across years, included as random effects, were significantly low (≤ 0.01).

The monthly average rainfall (measured in mm) has seemingly less of an effect on

feeding rates (Figure 2) as correlations from 2019–2021 were low (*R2* = 0.008, < 0.001, 0.002, respectively). This is further supported in Table 1 where rainfall measured in Singapore (mm), regardless of local or Mekong seasons, had less of an effect on the catfish’ feeding behaviours (*wt* ≤ 0.04, ΔAICC > 2.0; Table 1).

Table 1. Summary result of the six models that reflects the average number of feeding Mekong giant catfish (*n* = 6) explained by monsoon period (i.e., Mekong and Local) and rainfall at the Singapore Zoo between 2019–2021. The number of parameters (*k*), log-likelihood (*LL*), second-order Akaike Information Criterion (AICc), ∆AICc and Akaike weights (*wt*) are presented.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model | *k* | *LL* | AICc | ∆ AICc | *wt* |
| Mekong | 3 | -15.2 | 37.0 | 0.0 | 0.8 |
| Mekong + Rainfall | 4 | -15.2 | 39.5 | 2.5 | 0.2 |
| Local | 4 | -22.5 | 54.2 | 17.1 | 0.0 |
| Local + Rainfall | 5 | -22.3 | 56.4 | 19.4 | 0.0 |
| Null | 2 | -26.4 | 57.1 | 20.1 | 0.0 |
| Rainfall | 3 | -26.4 | 59.4 | 22.5 | 0.0 |

Table 2. Summary result of the six models reflects the average number of feeding Mekong

giant catfish (*n* = 6) explained by monsoon period (i.e., Mekong and Local) and rainfall

at the Singapore Zoo between 2019–2021. The number of parameters (*k*), log-likelihood

(*LL*), second-order Akaike Information Criterion (AICc), ∆AICc and Akaike weights (*wt*) are

presented.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model | *k* | *LL* | AICc | ∆ AICc | *wt* |
| Mekong | 3 | -15.2 | 37.0 | 0.0 | 0.8 |
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| Local | 4 | -22.5 | 54.2 | 17.1 | 0.0 |
| Local + Rainfall | 5 | -22.3 | 56.4 | 19.4 | 0.0 |
| Null | 2 | -26.4 | 57.1 | 20.1 | 0.0 |
| Rainfall | 3 | -26.4 | 59.4 | 22.5 | 0.0 |

Table 3. Summary result of the three models reflecting the proportion of Mekong

giant catfish (*n* = 6) entering a state of in-appetance explained by seasonality, and rainfall

at the Singapore Zoo between 2019–2021. The number of parameters (*k*), log-likelihood

(*LL*), second-order Akaike Information Criterion (AICc), ∆AICc and Akaike weights (*wt*) are

presented.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Model | *k* | *LL* | AICc | ∆ AICc | *wt* |
| Null | 12 | 7.49 | 16.80 | 0.0 | 0.71 |
| Year | 13 | 8.49 | 19.02 | 2.22 | 0.24 |
| Year + Rainfall | 14 | 9.28 | 22.00 | 5.20 | 0.05 |

Chart, line chart

Description automatically generated

Figure 1. The seasonal rhythmicity of Mekong giant catfish (*n* = 6) entering a state of inappetence in the Singapore Zoo. The red, green and blue dotted lines represent observational data collected from 2019, 2020 and 2021, respectively.

Discussion

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References

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