2024-06-30 skeeter forecast

Good afternoon! Here is your Skeeter report for June 30, 2024.

Today we counted 26 skeeter rafts. The closest prediction today was made by Jim with a prediction of 17. Get your predictions in before tomorrow's count for a chance to show off your prediction skills!

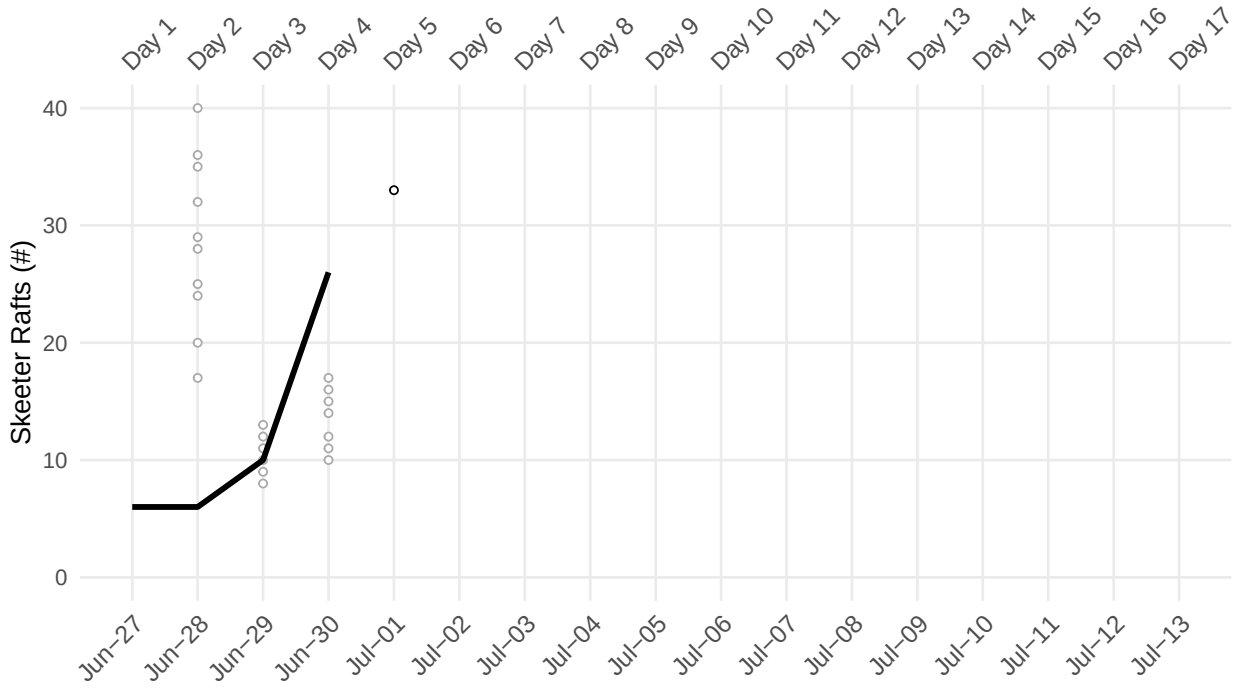


Figure 1: Daily predictions (past = grey circles, current = black circles) and observations (black line) of mosquito rafts counted in mesocosms.

To measure prediction accuracy, we will calculate the mean absolute error,

$$MAE = \frac{\sum_i^n |y_i - x_i|}{n}$$

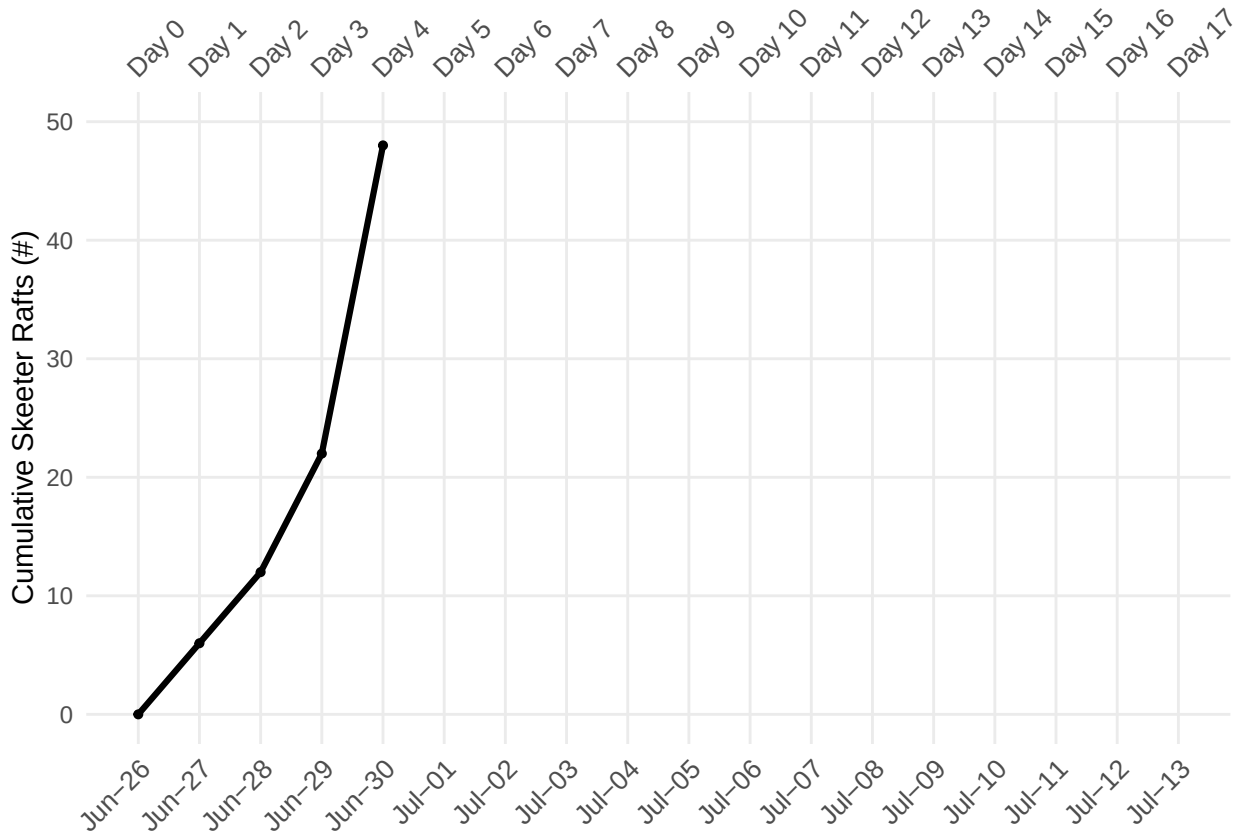
where, y_i is the prediction, x_i is the observed value, and n is the number of observations.

Rankings

Table 1: The rankings to date are:

name	2024-06-28	2024-06-29	2024-06-30	MAE
ZC	11	3	-14	9.333333
JRJ	22	0	-9	10.333333
JMR	26	1	NA	13.500000
JRB	29	2	-10	13.666667
GD	14	NA	NA	14.000000
JD	34	-1	-11	15.333333
AM	30	-2	-15	15.666667
ARM	18	NA	-16	17.000000
EAC	23	NA	-12	17.500000
CRG	19	NA	NA	19.000000

Cumulative patterns



Forecasts

Here are a few different models to forecast raft counts for 2024-07-01.

Previous value

The simplest prediction is to simply predict the previous raft count.

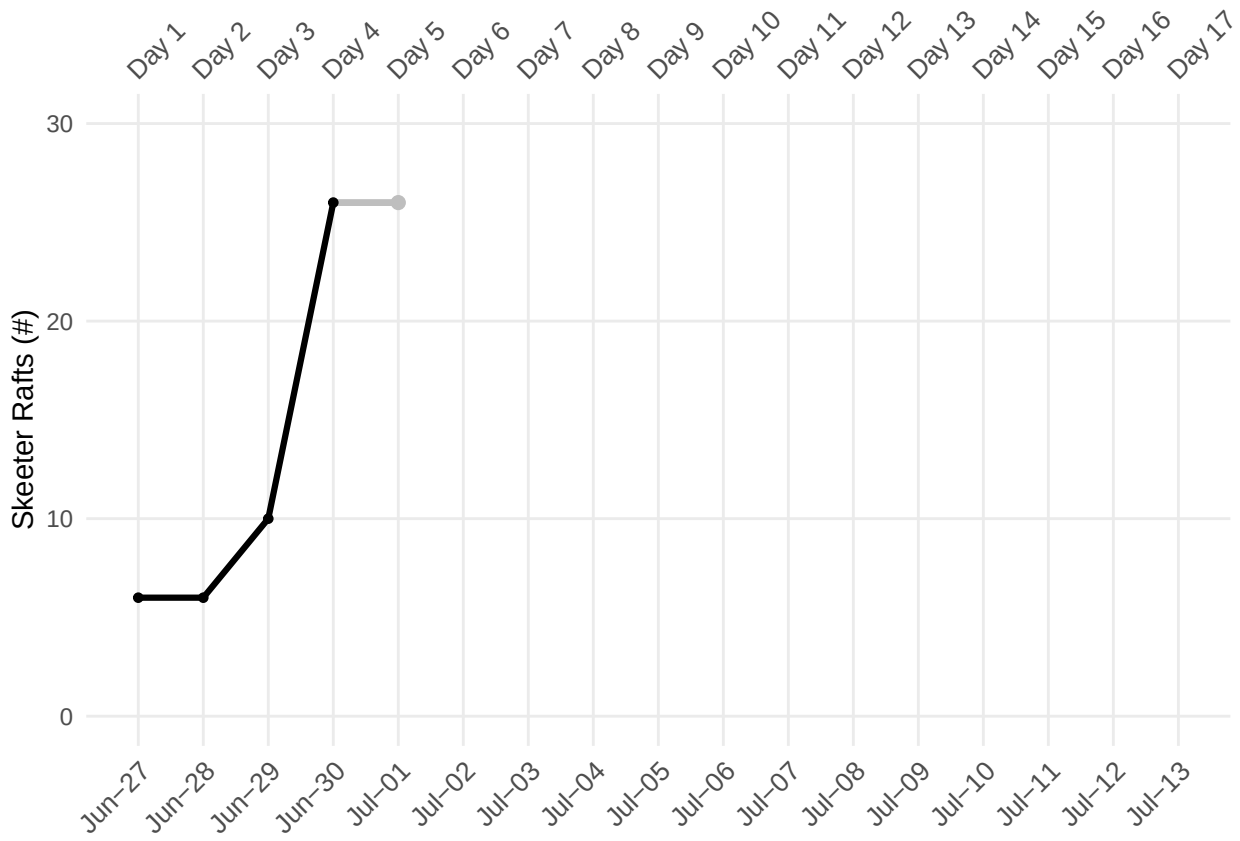


Table 2: Mean predictive deviation of last value approach

2024-06-28	2024-06-29	2024-06-30	MAE
0	-4	-16	6.666667

Global Average

Another simple prediction is to use the global average. This method allows for a calculation of uncertainty based on the variation we observe over time. Importantly, day-to-day variability in egg raft numbers is not related to any process, but arises from random noise centered around some relatively fixed mean value.

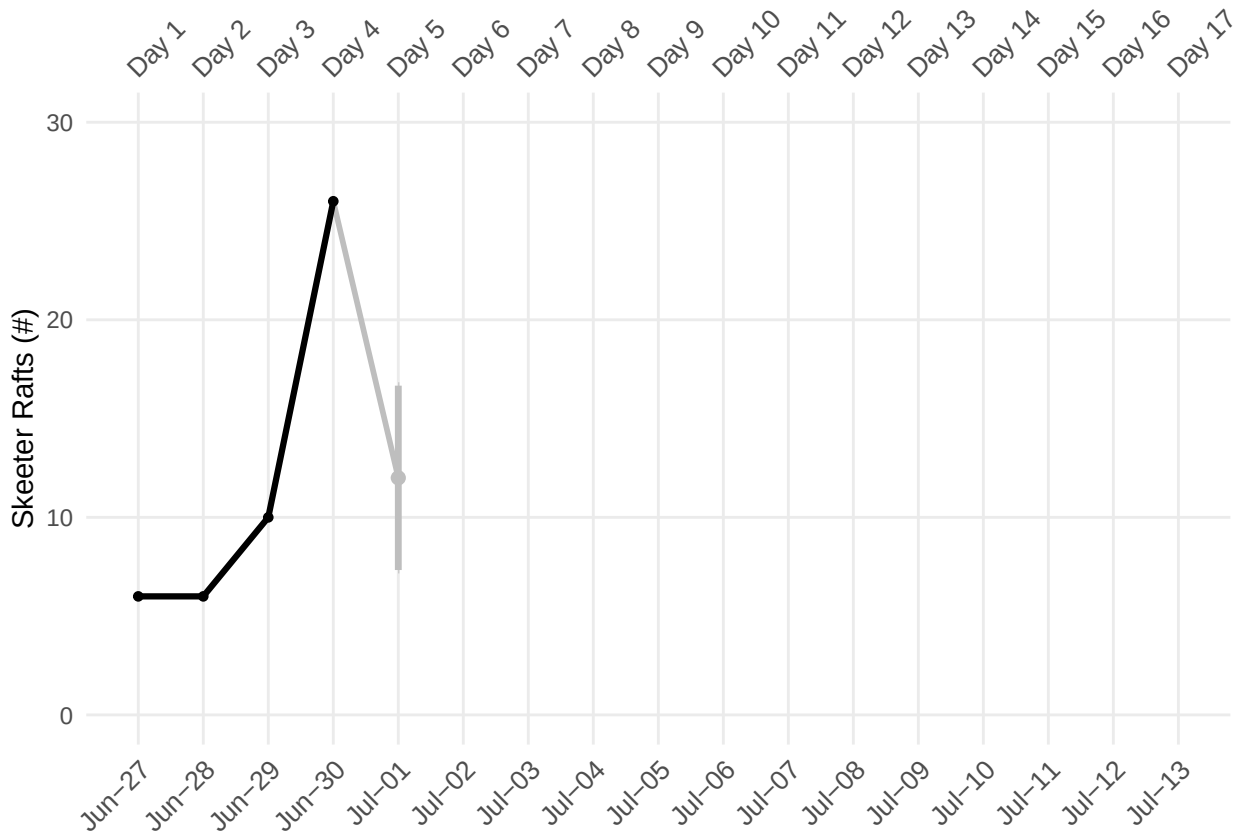


Table 3: Mean predictive deviation of global average approach

2024-06-28	2024-06-29	2024-06-30	MAE
0	-4	-18.66667	7.555556

However, this approach ignores an important bit of information—the fact that egg rafts are counts and can only take whole numbers (i.e., 1,2,3,...).

More complex predictions

We can start to make more complex predictions. The best way to begin this is to switch to making predictions at the mesocosm-level and scale up to total counts. This will allow us to possibly include more specific information to the experiment. As the global average example above highlighted, we have to think about the type of data we are taking, in this case counts. There are a number of distributions available for use with count data such as the Poisson and Negative Binomial distributions. Let's take a look at these distributions compared to the most recent distribution of counts.

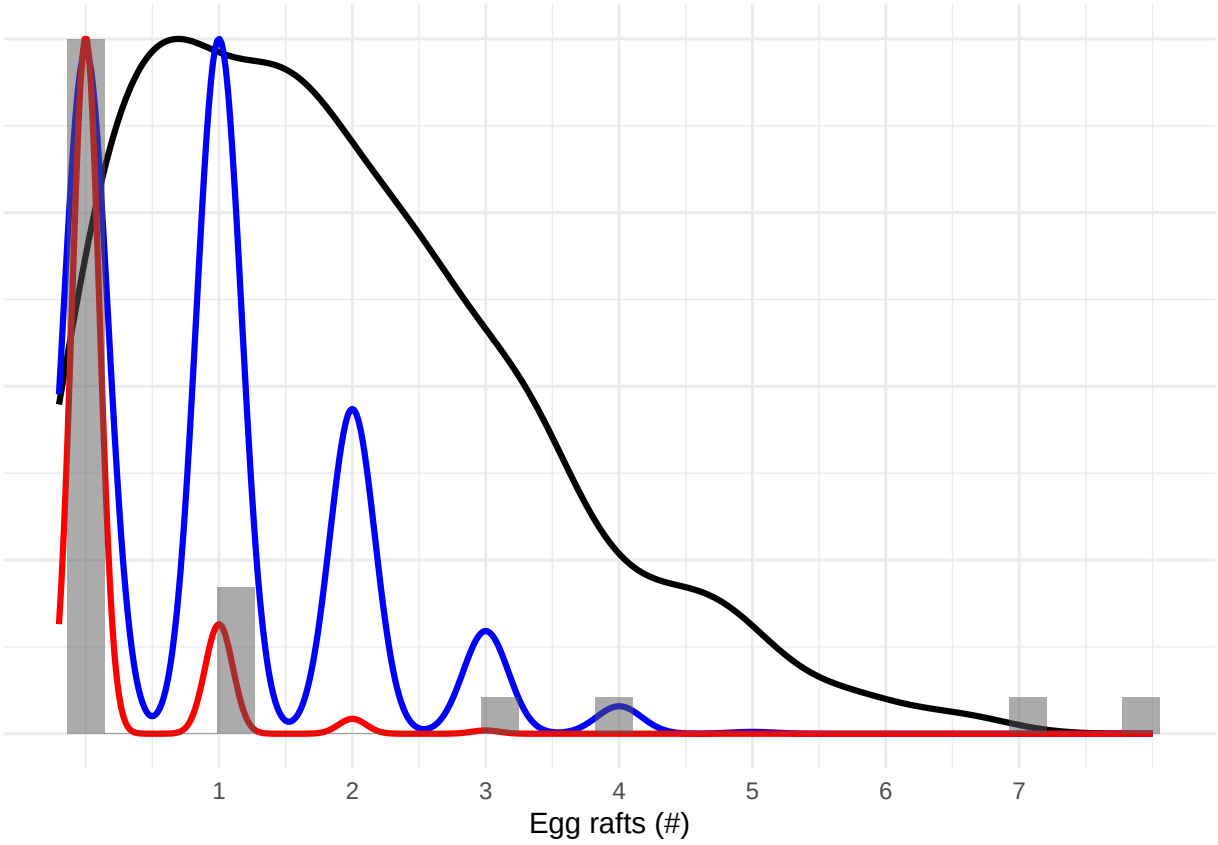


Figure 2: The distribution of egg raft counts from the most recent sampling (bars). We can see the difference in the predictions from the Poisson (blue line) and Negative Binomial (red line) distributions compared to the Guassian (black lines).

Poisson

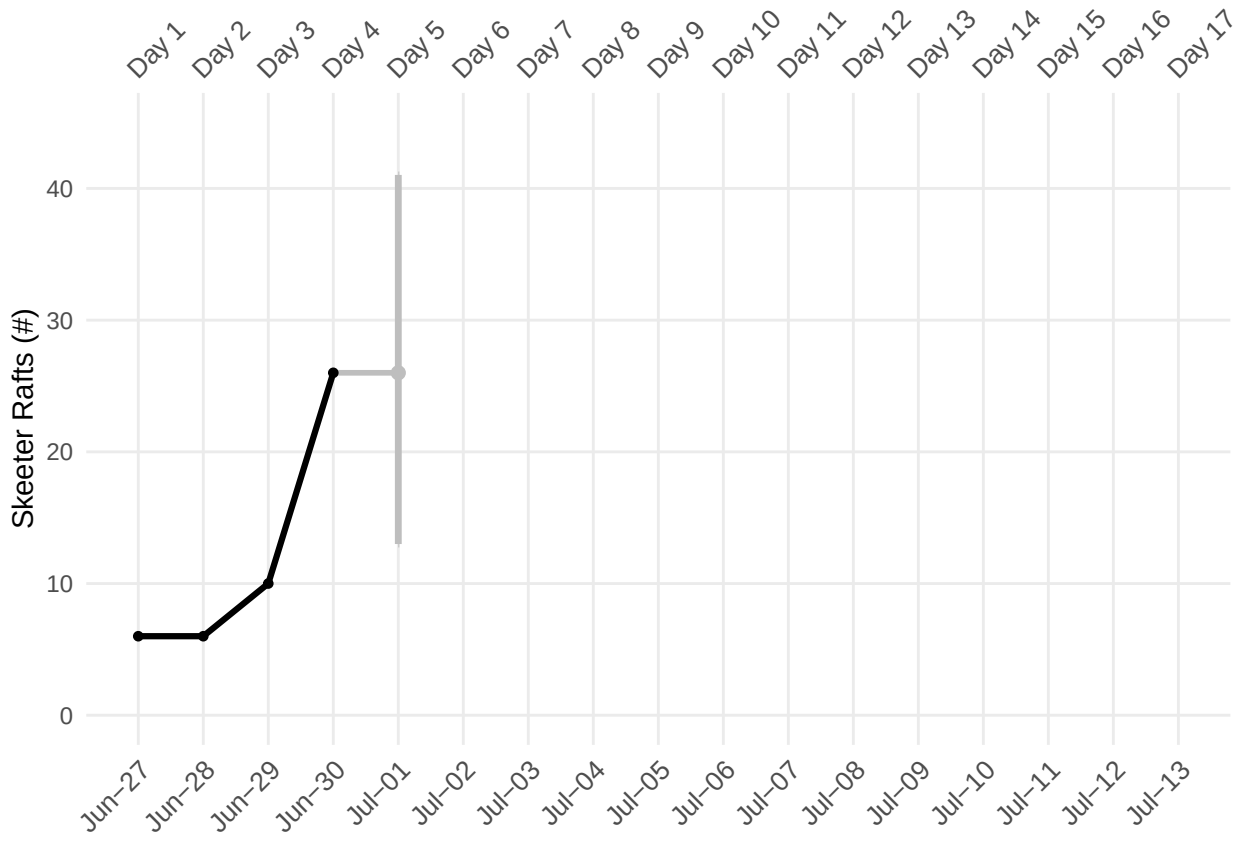


Table 4: Mean predictive error of a simple Poisson model

2024-06-28	2024-06-29	2024-06-30	MAE
0	-5	-17	7.333333

Negative Binomial

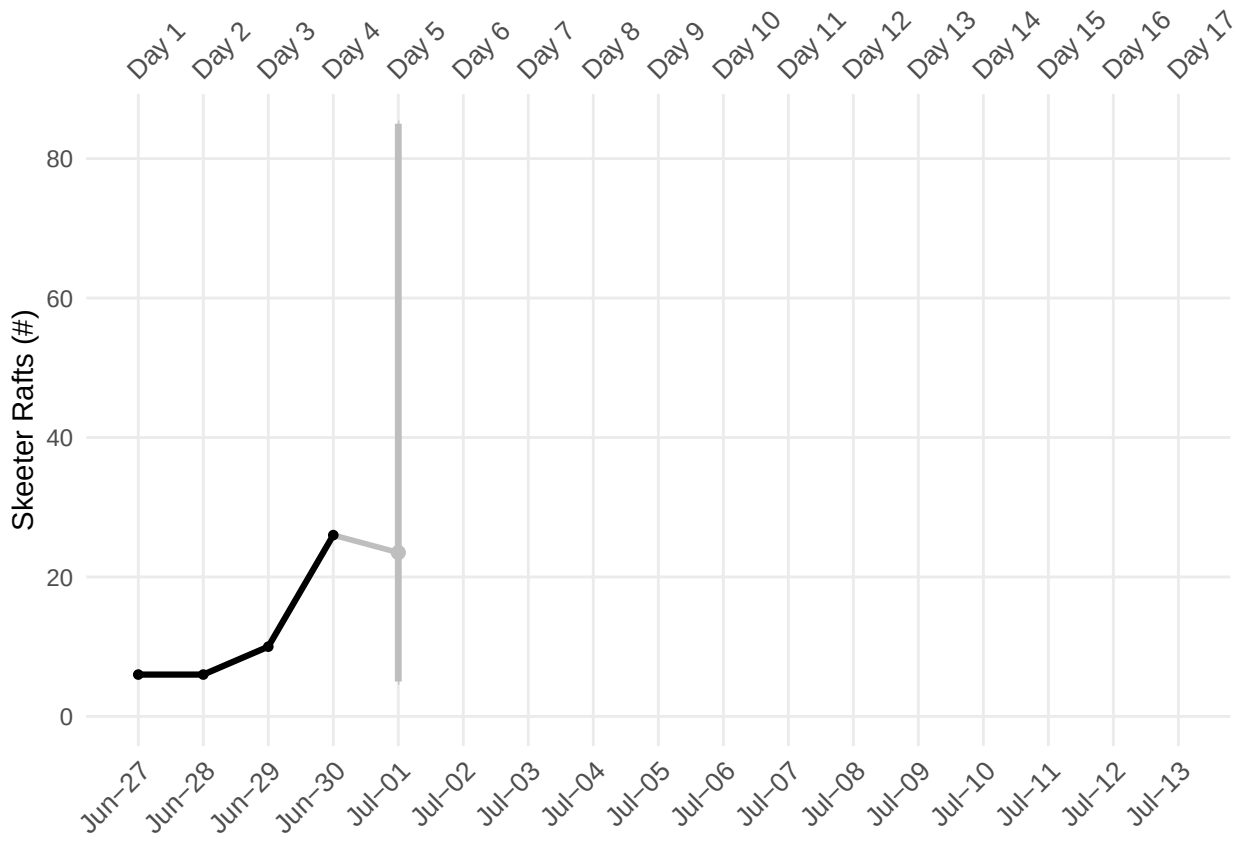


Table 5: Mean predictive error of a simple Negative Binomial model

2024-06-28	2024-06-29	2024-06-30	MAE
0	-5	-17	7.333333

more forecasts to come???