Table 1: Details for each Scenario that include the predictor variables, the target variable, the equations used to calculate biomass, the type of source file used to acquire the values for the predictors, and a short description of each scenario.

Scenario	Predictors	Target	Equations Used	Source File Description	Scenario Description
1	Macronutrient (mol kg^{-1}); Micronutrient (mol kg^{-1}); Irradiance (W m^{-2})	Biomass (mol kg^{-1})	1, 2	Monthly Output from BLING	Nutrient distributions (predictors) from BLING were fed to Eq. 1 and 2 to calculate the biomass (target)
2	Macronutrient (mol kg^{-1}); Micronutrient (mol kg^{-1}); Irradiance (W m^{-2})	Biomass (mol kg^{-1})	1, 2, 5	Daily Output from BLING	1) Hourly values for the predictors were interpolated using the Daily Output of BLING 1a) The macronutrient and micronutrient hourly values were calculated using a standard interpolation between the daily points. 1b) The irradiance hourly values were calculated from Eq. 5 using the value of the BLING daily input, hour of day, time of year, and location. 2) Hourly values of the predictors were fed to Eq. 1 and 2 to calculate hourly values for the biomass (target) 3) Daily-averaged values were calculated by averaging 24 hours for each location through one year 4) Weekly-averaged values were calculated by averaging 168 hour blocks of time for each location through the year 5) Monthly-averaged values were calculated by averaging the number of hours in each month (days per month * 24) for each location through the year 6) The true relationships were calculated by using the range of the hourly values for the predictors and calculating the biomass based on Eq. 1 and 2.
3	Macronutrient (mol kg^{-1}); Micronutrient (mol kg^{-1}); Irradiance (W m^{-2})	Biomass (mol kg^{-1})	6, 7 (Equations within BLING used to determine the biomass)	Monthly Output from BLING	Nutrient distributions from the BLING Output were used as the predictors; Biomass from the BLING Output itself was used as the target

Table 2: The R^2 values for the diagnostic test used to determine the how the number of nodes in the hidden layer of a single layer neural network affected the performance of the time-averaged datasets of Scenario 2. The target variable was biomass (mol kg^{-1}). A separate NNE was trained for each of the time-averaged datasets (daily, weekly, monthly) for each set of nodes (ex. A unique NNE for the daily-averaged dataset with 1 node was trained, a unique NNE for the weekly-averaged dataset with 1 node was trained, etc.). Each NNE contained 10 individual neural networks and kept the same training and stopping specifications outlined in the original manuscript. The trained NNEs made predictions on the validation subset and the R^2 values were calculated based on the comparison between those predictions and the actual values of the validation subset.

		R^2 Values		
		Daily	Weekly	Monthly
Number of Nodes	1	0.5533	0.5472	0.5624
	2	0.7655	0.7705	0.7806
	5	0.9283	0.9248	0.9363
	10	0.9633	0.9628	0.9673
	15	0.9676	0.9678	0.9713
	20	0.9693	0.9694	0.9727
	25	0.9700	0.9702	0.9732
	35	0.9709	0.9709	0.9737
	50	0.9716	0.9715	0.9743

Table 3: The R^2 values for the diagnostic test used to determine the how the number of hidden layers and nodes within individual neural networks affected the performance of the Scenario 2 time-averaged datasets. The target variable was biomass (mol kg^{-1}). A separate NNE was trained for each of the time-averaged datasets (daily, weekly, monthly) for each set of nodes (ex. A unique NNE for the daily-averaged dataset with 25 nodes was trained, a unique NNE for the weekly-averaged dataset with 25 nodes was trained, etc.). Each NNE contained 10 individual neural networks and kept the same training and stopping specifications outlined in the original manuscript. The trained NNEs made predictions on the validation subset and the R^2 values were calculated based on the comparison between those predictions and the actual values of the validation subset. The layers and number of nodes in the table are specified as follows: # nodes in first layer - # nodes in second layer. If only one number is listed, this specifies the number of nodes in the single hidden layer and that a second layer was not used.

		R^2 Values		
		Daily	Weekly	Monthly
Layers and Number of Nodes	25	0.9700	0.9702	0.9732
	25-10	0.9722	0.9724	0.9750
	25-25	0.9726	0.9727	0.9756

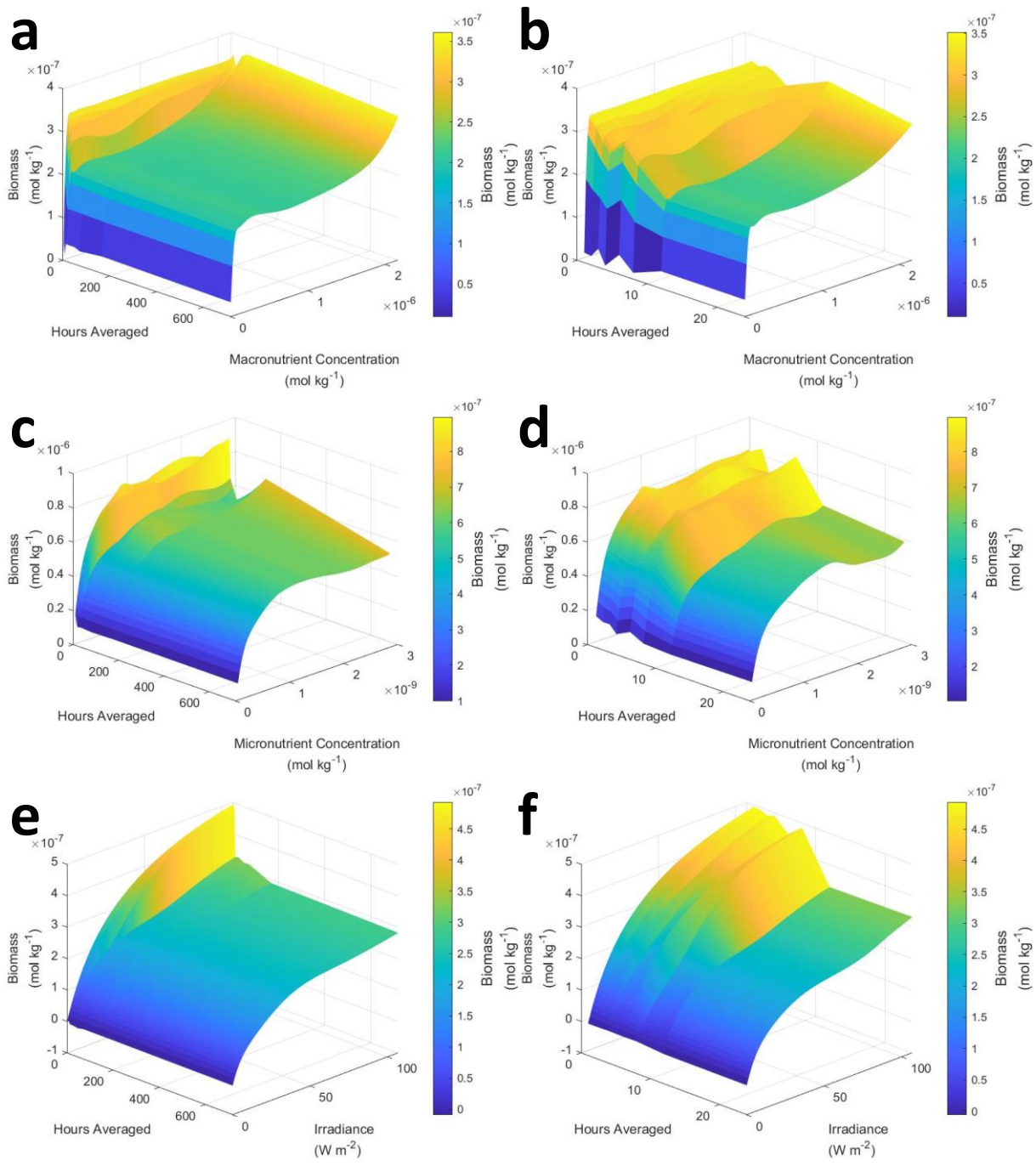

Figure 1: Contour plots showing the apparent relationships found across different averaged timescales for Scenario 2. The timescales range from 1 hour (original hourly set) up to the 720 hours (monthly). The three plots on the left show the relationships across the entire range of timescales (1 through 720 hours). The three plots on the right show the timescales at and below 24 hours. The top plots show the relationships for the macronutrient, the middle plots show the relationships for the micronutrient, and the bottom plots show the relationships for irradiance. Variables not varying across their range were set at their 50th percentile (median) value. The conditions of the sensitivity analyses were based on the conditions of the monthly-averaged

(720-hour) dataset. It was necessary to give the same conditions to the all of the time-averaged datasets so that a direct comparison could be made between the predictions from each time-averaged dataset.

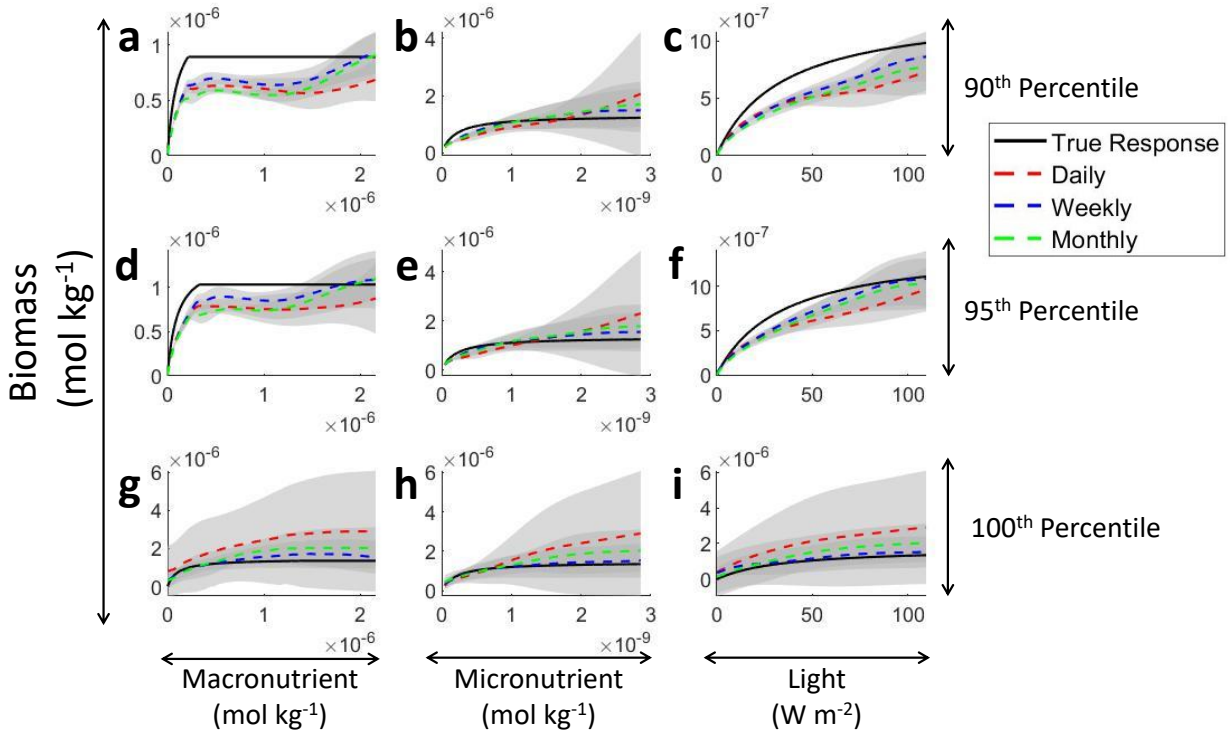

Figure 2: Sensitivity analysis for Scenario 2 showing the true and predicted relationships for how each predictor affects the biomass when the other predictors are set at higher percentiles (90, 95, and 100). The columns correspond to the predictors and the rows correspond with the percentile value at which the other predictors were set. The black line shows the true intrinsic relationship calculated from Eq. 1 and 2. The dashed lines show the predicted apparent relationships for each time-averaged dataset (Daily – red; Weekly – blue; Monthly – green). The gray region around the dashed lines shows the standard deviation of the predictions. The conditions of the sensitivity analyses were based on the conditions of the monthly-averaged dataset. It was necessary to give the same conditions to the all of the time-averaged datasets and to the simple model so that a direct comparison could be made between the true response and the predictions from each time-averaged dataset.

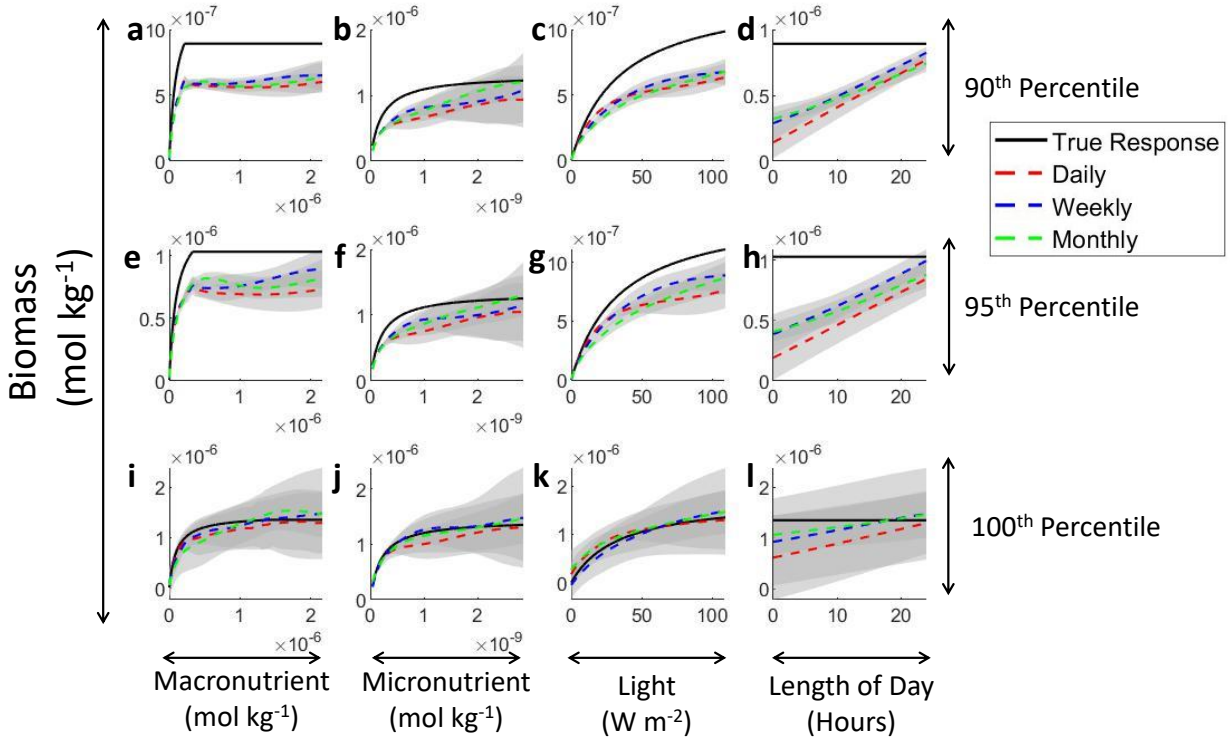

Figure 3: Sensitivity analysis for Scenario 2 with Length of Day as an additional predictor showing the true and predicted relationships for how each predictor affects the biomass when the other predictors are set at higher percentiles (90, 95, and 100). The columns correspond to the predictors and the rows correspond with the percentile value at which the other predictors were set. The black line shows the true intrinsic relationship calculated from Eq. 1 and 2. The dashed lines show the predicted apparent relationships for each time-averaged dataset (Daily – red; Weekly – blue; Monthly – green). The gray region around the dashed lines shows the standard deviation of the predictions. The conditions of the sensitivity analyses were based on the conditions of the monthly-averaged dataset. It was necessary to give the same conditions to the all of the time-averaged datasets and to the simple model so that a direct comparison could be made between the true response and the predictions from each time-averaged dataset.