

Supplementary Figure S1

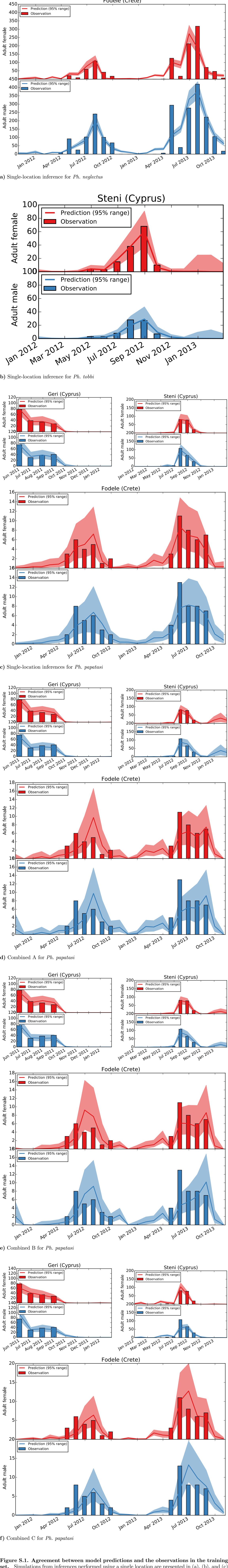
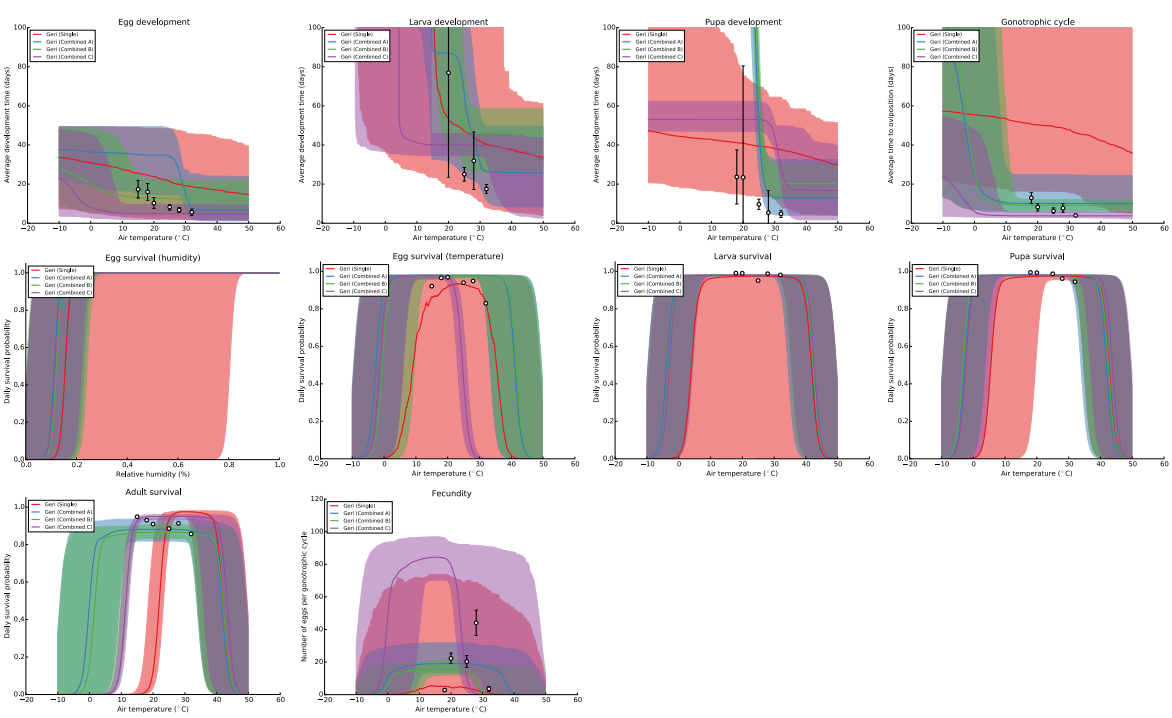
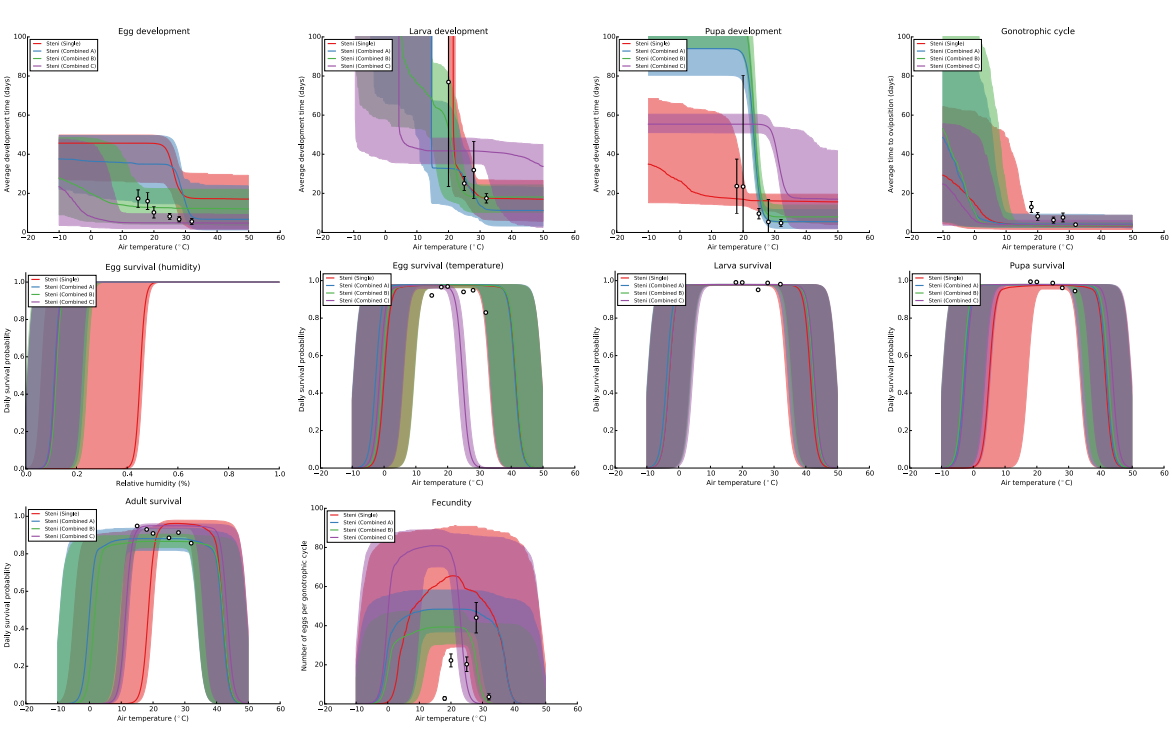


Figure S.1. Agreement between model predictions and the observations in the training set. Simulations from inferences performed using a single location are presented in (a), (b), and (c) for *Ph. neglectus*, *Ph. tobbi*, and *Ph. papatasi*, respectively. Simulations from combined inferences A, B, and C are plotted in (d), (e), and (f), respectively, for *Ph. papatasi*. Data and predictions for female (red) and male (blue) adult sand flies are given separately. Observations are shown with bars, which correspond to the total number of collections at the location for a given time point. Median and 95% range of predictions are plotted with a solid line and a shaded area, respectively.

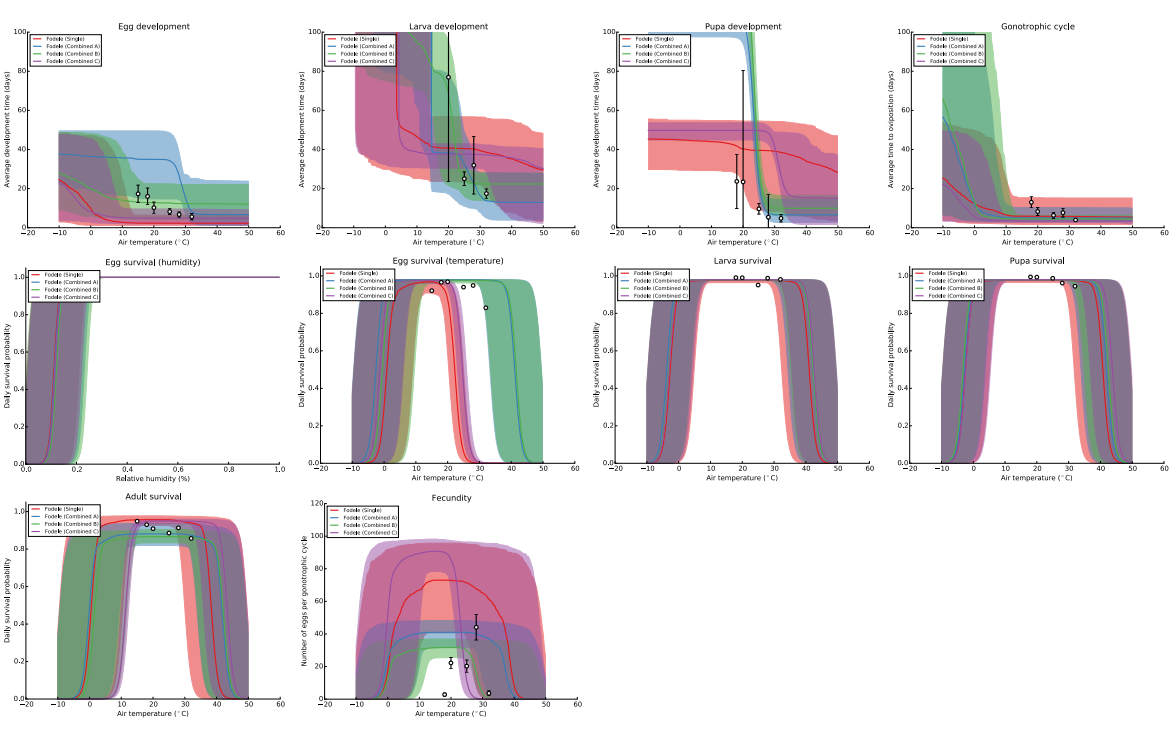
Supplementary Figure S2



a) Inference of environmental dependence for Geri (Cyprus)



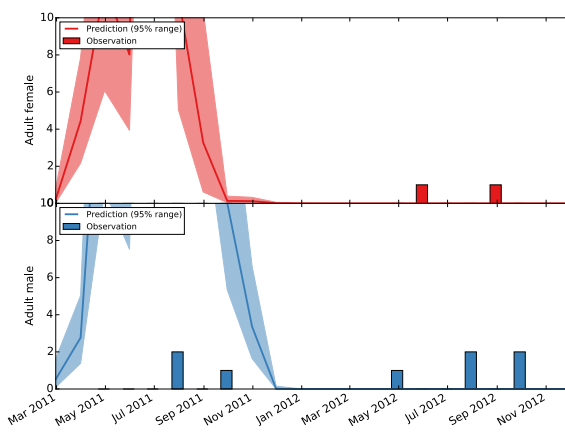
b) Inference of environmental dependence for Steni (Cyprus)



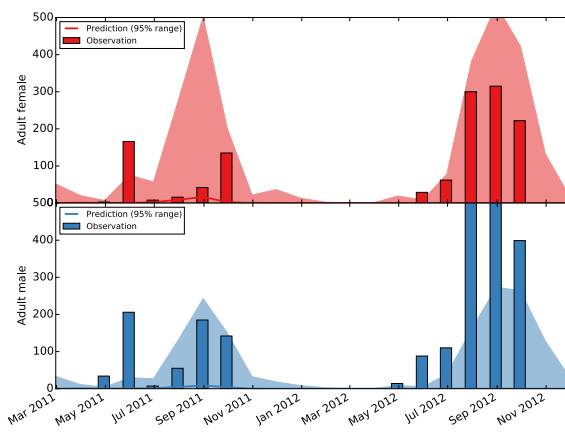
c) Inference of environmental dependence for Fodele (Crete)

Figure S.2. Functional forms of environmental dependence. Solid lines and the shaded areas indicated the median and the 95% range. Circles and vertical lines represent the average and the standard deviation, respectively, of the experimental data.

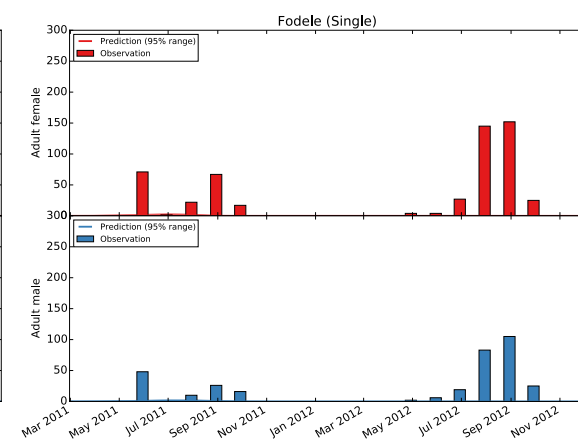
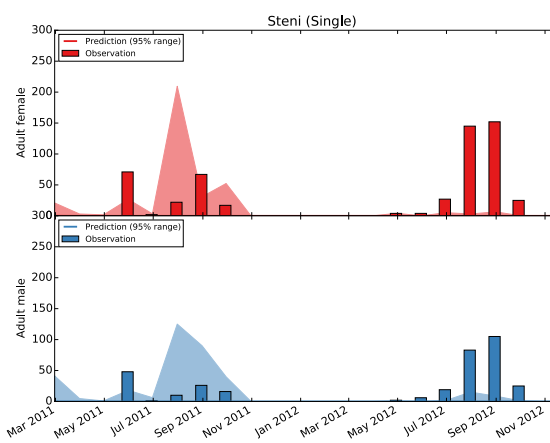
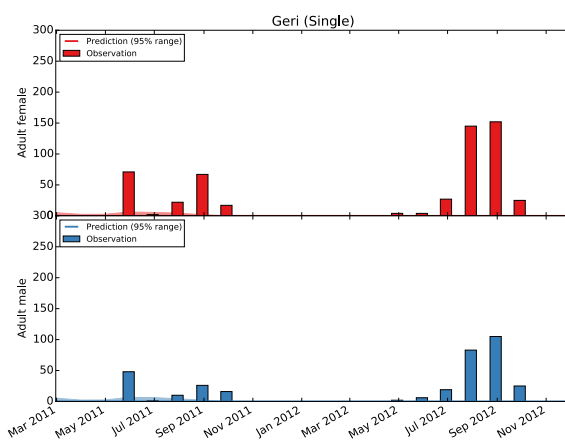
Supplementary Figure S3



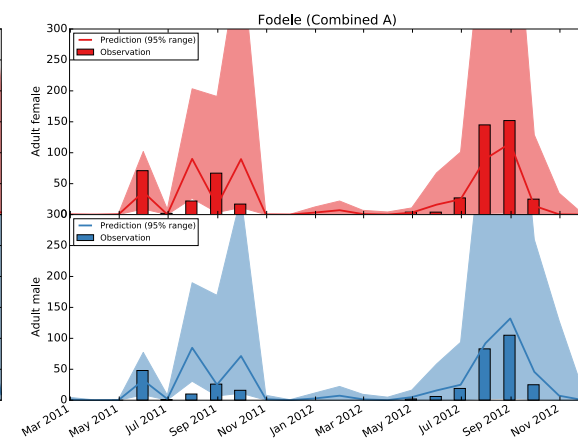
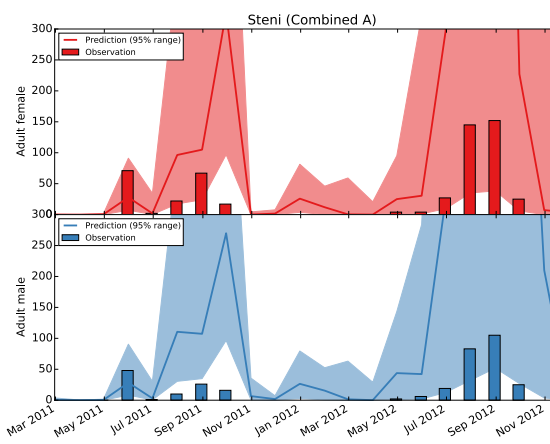
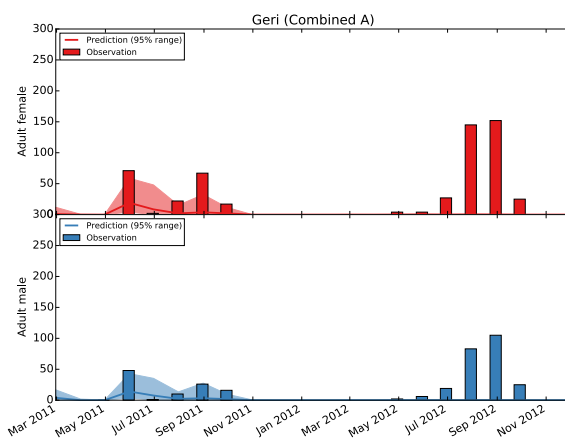
a) Single-location inference for *Ph. major s.l.*



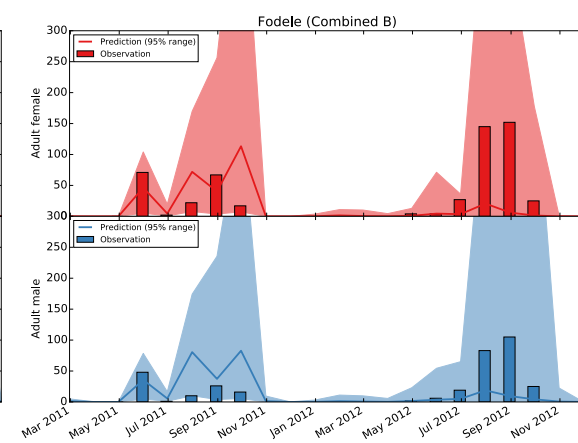
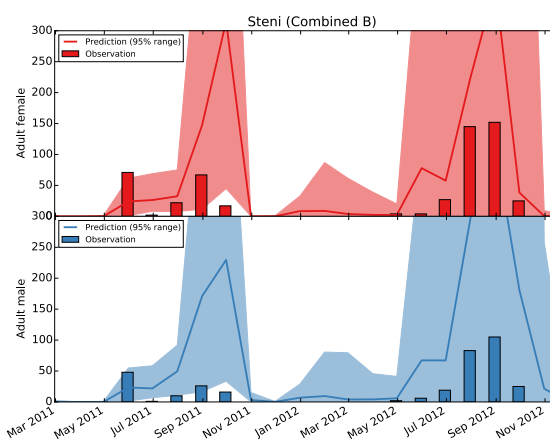
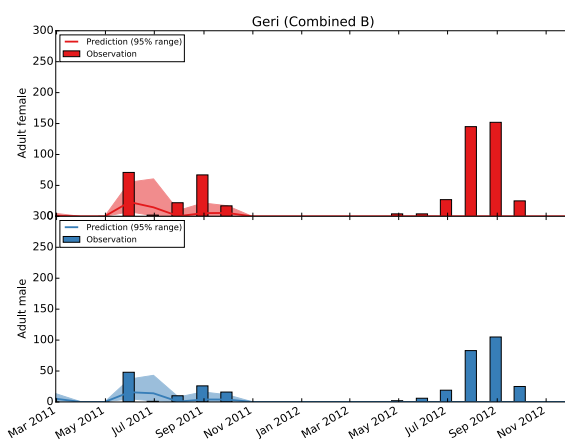
b) Single-location inference for *Ph. tobbi*



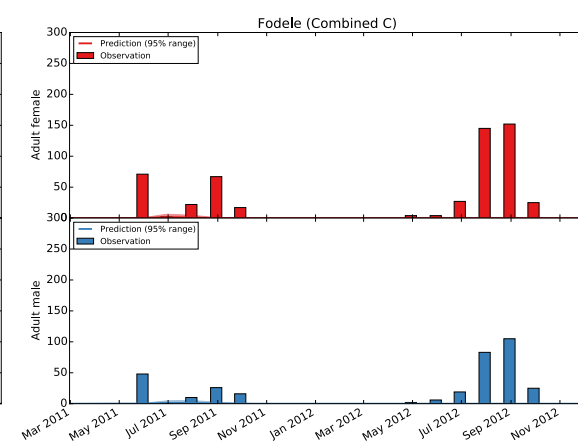
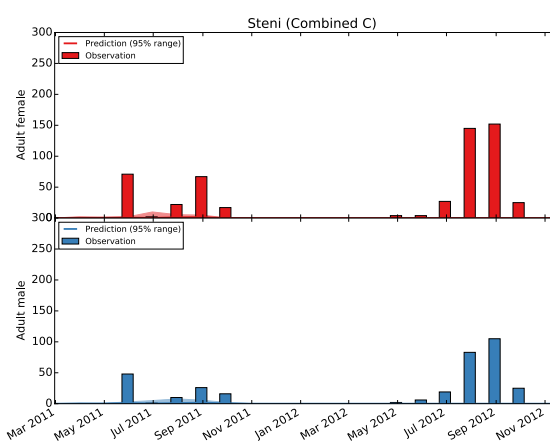
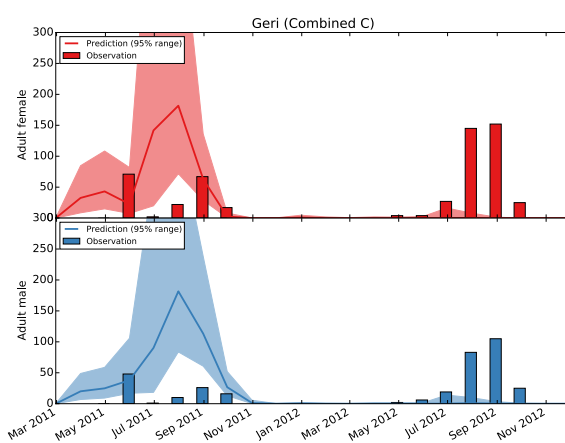
c) Single-location inferences for *Ph. papatasi*



d) Combined A for *Ph. papatasi*



e) Combined B for *Ph. papatasi*



f) Combined C for *Ph. papatasi*

Figure S.3. Model performance over the test set with different posterior modes. Prediction of *Ph. major s.l.* (a), *Ph. tobbi* (b), and *Ph. papatasi* (c-f) abundance in the Koyunevi region of Adana. Predictions were performed using single-location inferences for *Ph. major s.l.* and *Ph. tobbi*. For *Ph. major s.l.*, the single-location inference for *Ph. neglectus* was used. For *Ph. papatasi*, predictions are displayed both with the three single-location inferences and with the three multi-location inferences (Combined A-C).