

BEE SWARM POPULATION SIZE

*A deterministic model to explore the essential swarm size to
start a successful bee colony.
By: Kyle, Hadleigh, & Ricky.*

OBJECTIVE

- To approximate the population of a single bee colony over the course of three years in order to the number of bees required to start a successful hive
- Useful for bee keepers seeking to begin new hives, or wanting to artificially split a hive

METHODOLOGY

- We are using data from a variety of beekeepers to set our parameters, which include
 - Birth and death rates during different seasons.
 - Average swarm sizes.
 - The maturation periods for eggs, and larvae.
 - Varied hive starting size
- Coding structure

METHODOLOGY

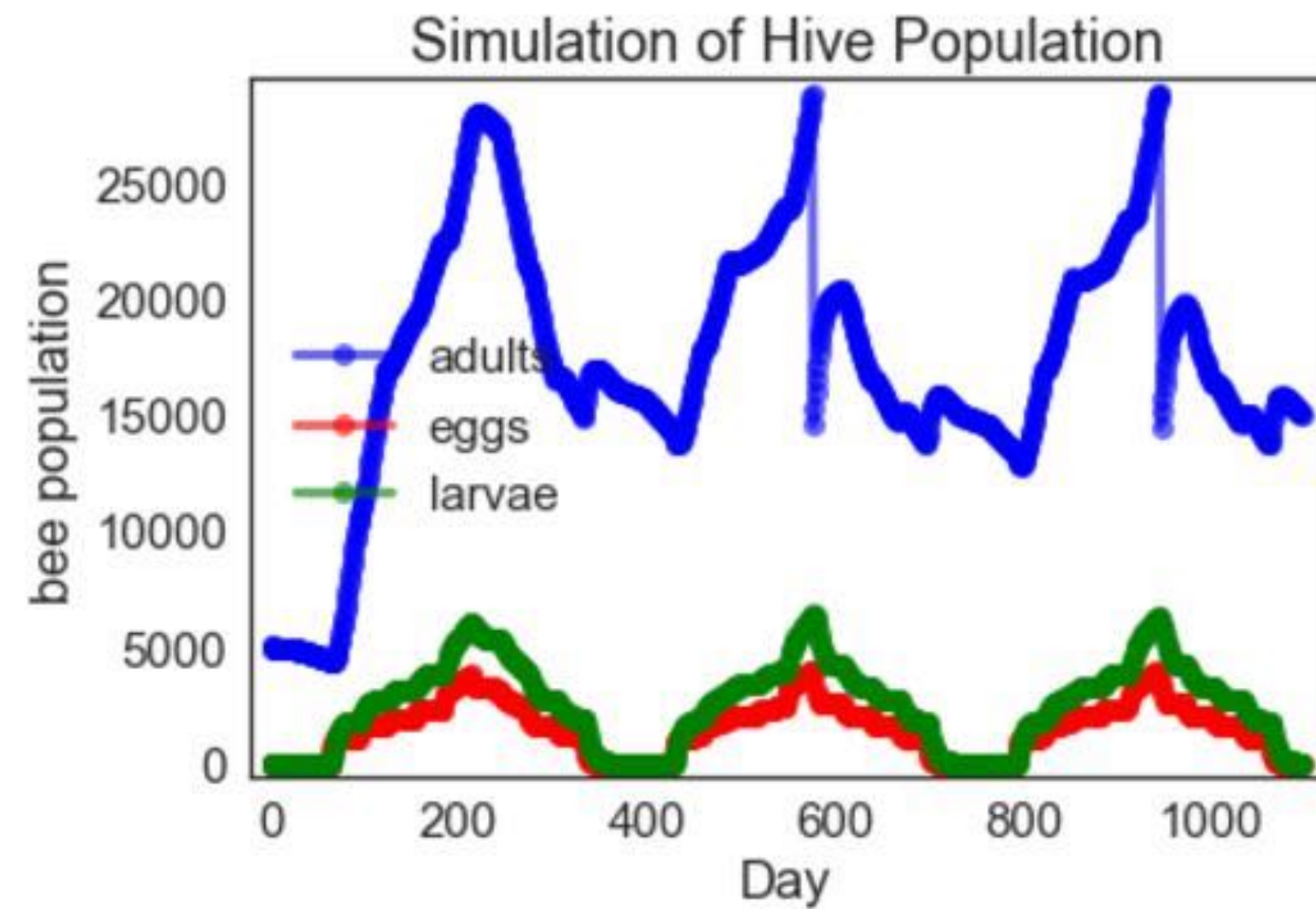
Parameters

- Birth and death rates during different seasons.
- Average swarm sizes.
- The maturation periods for eggs, and larvae.
- Varied hive starting size

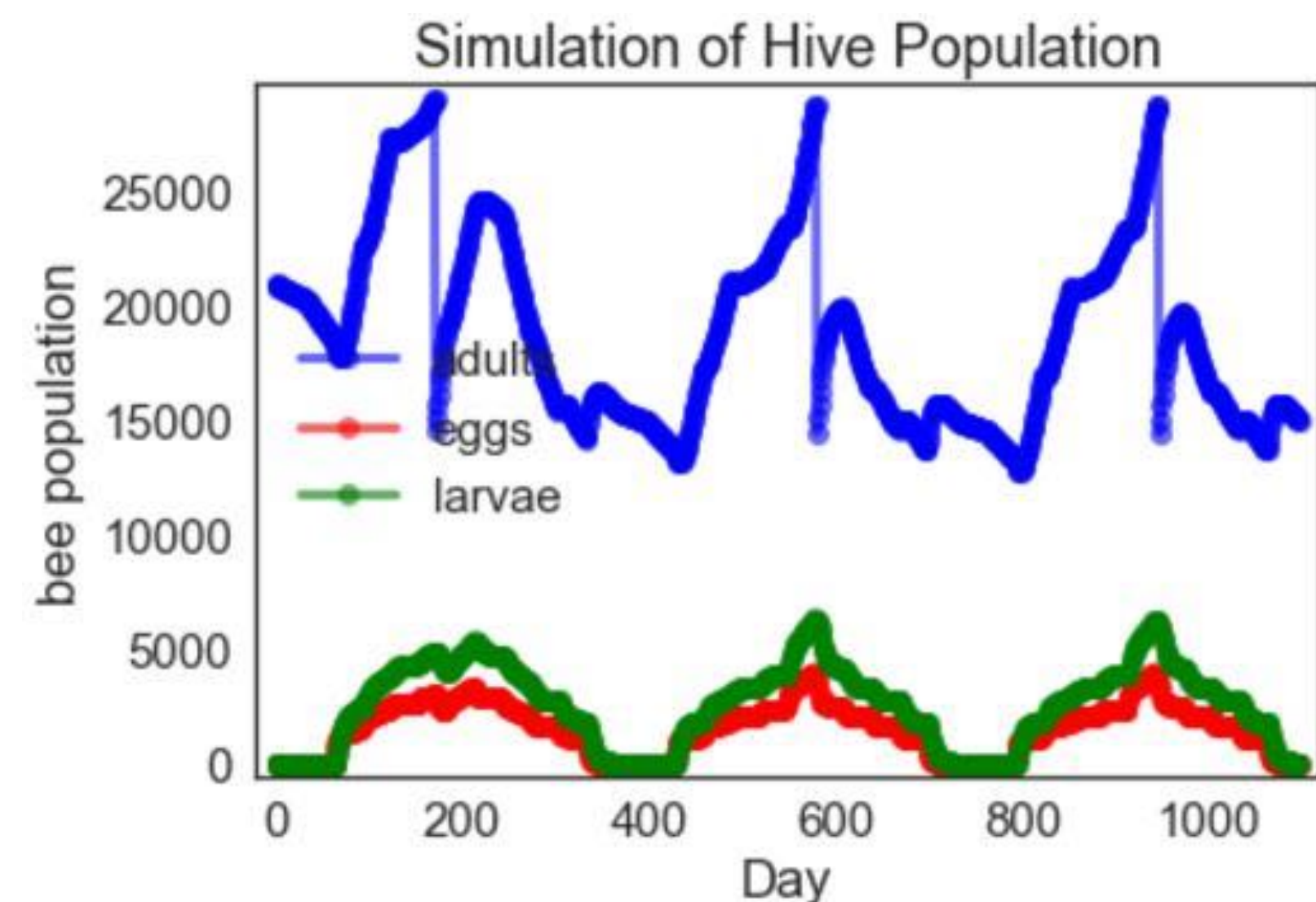
Coding Structure

- Used 12 part piecewise function to model changing birth and death rates throughout the year
- Called the varied birth and death rates using a separate function we called with in our simulation.
- Swept parameters to test different initial population sizes

RESULTS



- Plot of bee population within a single hive within 3 year.
- Hive splits when population reaches 30,000



CONCLUSIONS

- Bee populations converge to the same population curve within 3 years
- Limitations include
 - Not reliable for populations < 3000
 - Does not account for weather/environmental changes between years