

Bees of Ireland

And predicting their populations
By Eva Mizer

The Problem

Client

Scientists

Local and regional
politicians

Concerned citizens

Problem

Bees as a whole are in
decline

- Which species?
- How much?
- What to do?

Solution

- **Make** models to predict population
- **Compare** to future survey data
- **Recommendations** based on comparison

The Solution

Step 1

Data

- Bees of Ireland
- National Biodiversity Data Centre

Step 2

Species Selection

- Three species
- One per genus
- Red List focus

Step 3

Model Creation

- Use times series modeling to predict future population growth/decline

Species Selection

Which of 101 species to focus on?

- Genus *Bombus* - Bumblebees (21)
- Genus *Apis* - Honey Bee (1)
- Solitary Bees (79)

Gold-fringed Mason Bee
Osmia aurulenta



Chosen species

Bombus Muscorum
Large/Moss Carder Bee



Apis Mellifera Mellifera
The European Dark Bee



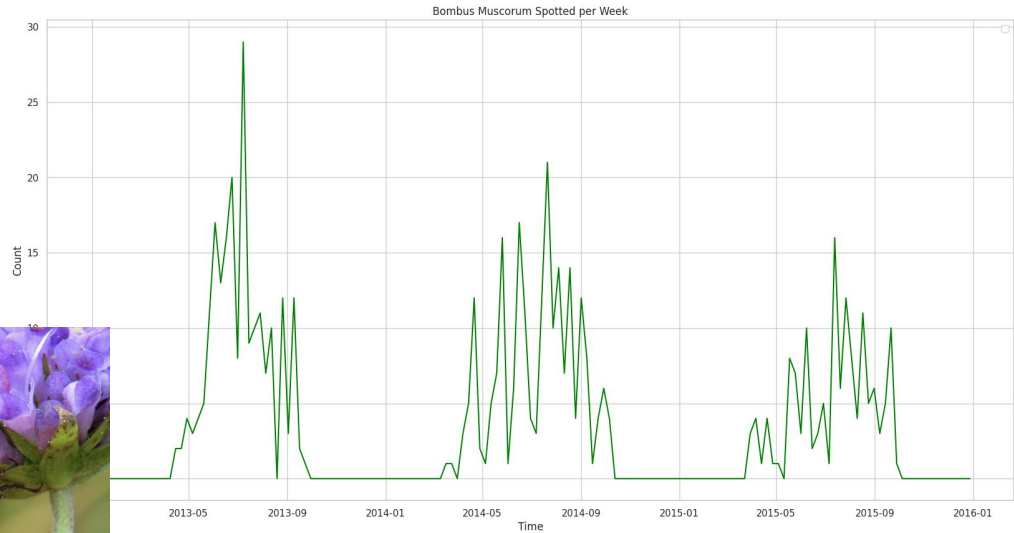
Andrena haemorrhoa
Orange Tailed Mining Bee



Bombus Muscorum - Carder/Moss Bumble Bee

Why?

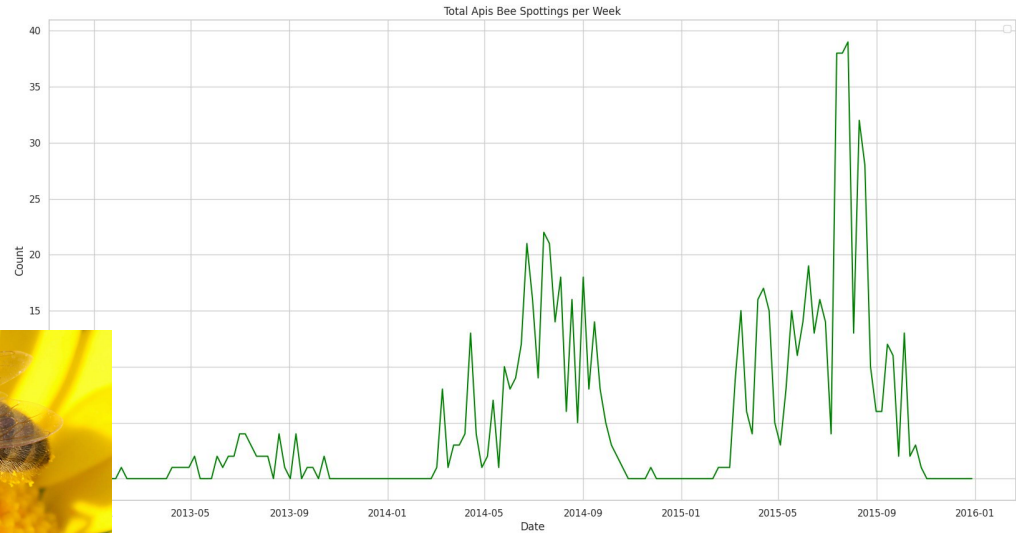
- Short foraging range
- Tiny nests
- **Near Threatened**



Apis Melliferas - Dark European Bee

Why?

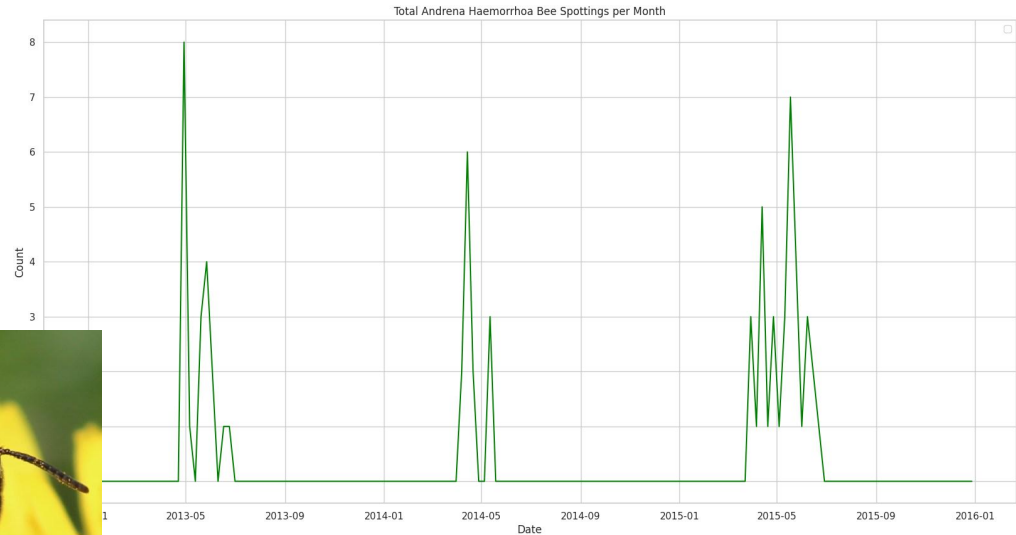
- Only native honeybee
- Massive decline in early 1900's
- Wild and domesticated presence



Adrena Haemorrhhoa - Orange Tailed Mining Bee

Why?

- Short season
- Small nests
- Host to cleptoparasitic species





Modeling and Predictions

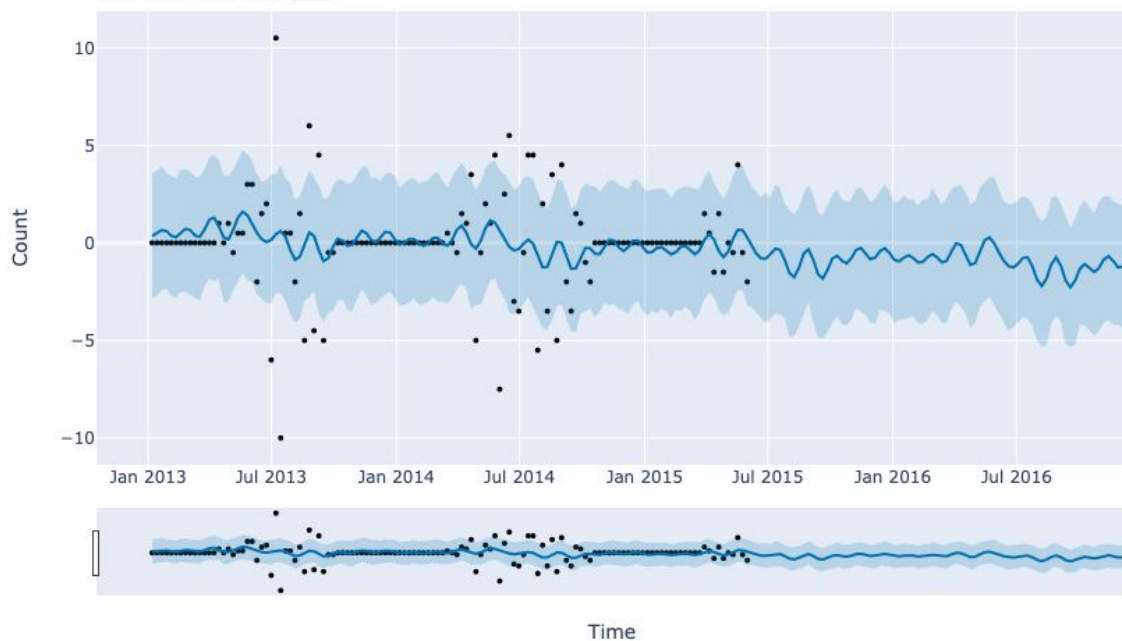
Modeling

- Years 2013-2015
- Totalled weekly
- ARIMA
- SARIMAX
- Prophet



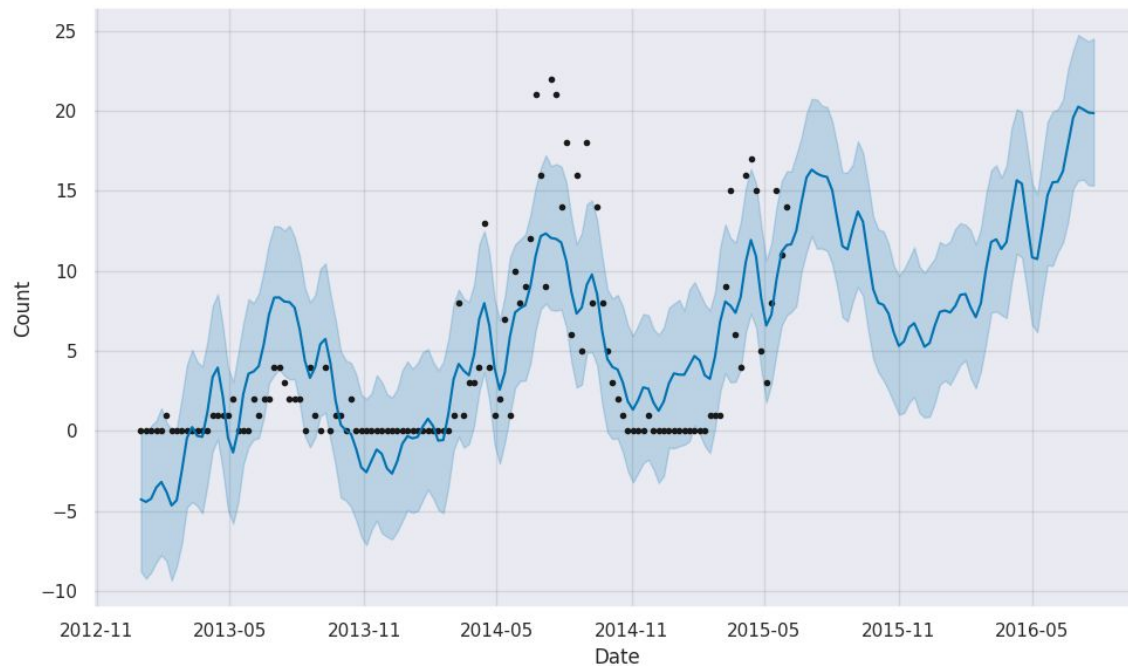
Predictions

Bombus Muscorum
Large/Moss Carder Bee



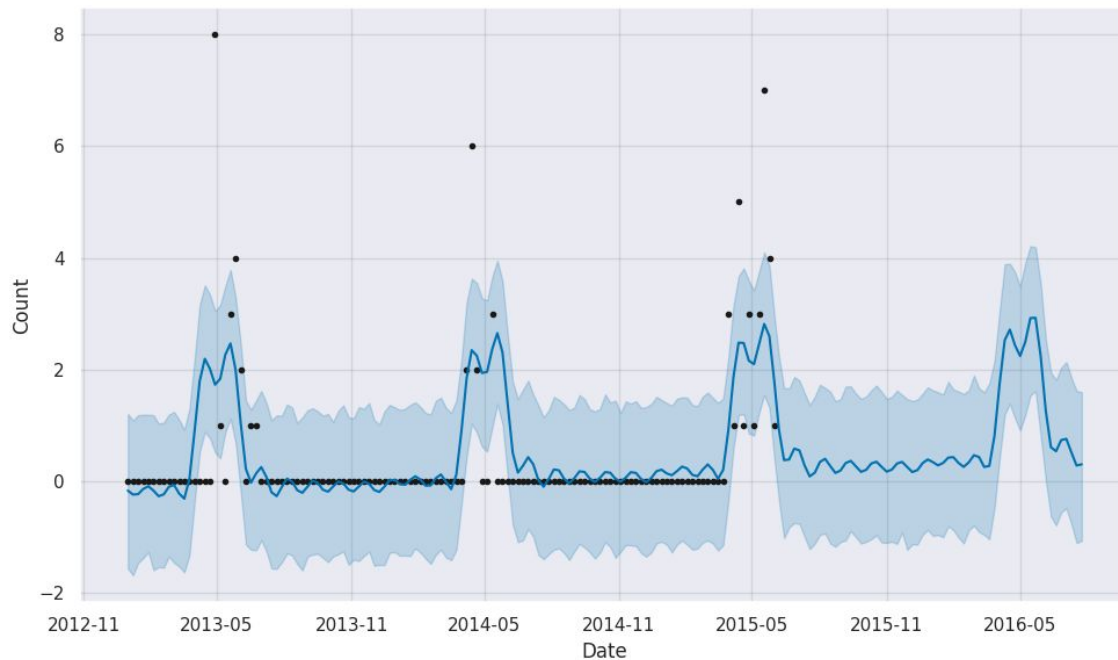
Predictions

Apis Mellifera Mellifera
The European Dark Bee



Predictions

Andrena haemorrhoa
Orange Tailed Mining Bee



Next Steps

Step 1

Predict

- Use models to predict populations for each species

Step 2

Collect New Data

- Continue efforts for spotting

Step 3

React

- If more than predicted, find possible reasons
- If less than predicted, enact species-specific action plans

Recommendations

If less than predicted:

- Evaluate outside factors
- Increase food and housing resources
- Expand survey efforts

If more than predicted:

- Evaluate outside factors
- Continue current efforts





Thank You!

Any questions?

Email: ev@evamizer.com

GitHub: [@evamizer](https://github.com/evamizer)

LinkedIn: [linkedin.com/in/evamizer/](https://www.linkedin.com/in/evamizer/)

