

Invasive species are classified as any sort of living organism that harms an environment that it's not native to, not necessarily another country. These organisms are one of the biggest threats to native wildlife. 42% of endangered species alone are at risk from these invasive species. (National Wildlife Federation) Many examples of human introduced invasive species have become famous amongst local populations for how they affected the ecosystem such as the emerald ash borer, a type of beetle that is destroying populations of ash trees across the U.S. and was likely brought on trading ships from Asia. (Duguid and Kuebbing) While this example was likely an accident on humanities part, with these accidents causing a large majority of invasive species introductions (National Wildlife Federation), there are examples of humans introducing an invasive species to an area. One famous example is Kudzu. It was introduced to the U.S. and advertised to farmers for its positive properties on soil, but it soon took over the south east. Cane toads, brought into Australia to control cane beetles, are yet another example of human imported invasive species. (Duguid and Kuebbing) Historically speaking, whether intentional or unintentional, humans introducing invasive species causes many problems to that ecosystem. So, having a tool that could help us understand and/or prevent this problem would be very useful.

This is where my program would come in. It will be a highly customizable program that simulates one population of prey and one of predators in an environment. The customizability of the program will allow you to plug in different parameters to represent two different species together. You'll be able to see in real time how the populations interact with each other with the option to export graphs of the simulation data. This program could be used by professionals to predict the outcome of two

species interacting to see which relationship the two develop. The tool could also be used in an educational setting to teach about invasive species and, more generally, about different types of relationships between species. This is the optimistic future of the project.

The scope of the project at the moment intends to have the simulation only simulate between two populations. Currently, I'm looking at the Grey Wolf population of New Mexico, as the fish and wildlife service have a lot of data on it, (Maestas) and some other prey species that New Mexico wolves feed off of.

As of now, the program is written in Rust and uses Bevy, a data-driven, game engine library that uses an entity component system for its logic. (Bevy Contributors) This library is being used as it's general enough for the project's needs, it has good performance, and I've never programmed with an ECS and wanted to gain experience with this technology. There are also potential plans on making a basic version of the simulation with NetLogo due to its popularity amongst hundreds of thousands of students, teachers, and researchers. ("NetLogo")

## Works Cited

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