BZZZ!

New Mexico
Supercomputing Challenge
Final Report
April 4, 2007

Team Number 69
Melrose High School

Team Members

- Elizabeth Green

- Kye Skelton

- Kendra Jacobs

Teachers

- Rebecca Raulie

- Alan Daughtery

Table of Contents

Executive Summary:

Our project is the spread of Africanized Bees. We are also studying the process of Africanization. We found out that most bees are not born Africanized. Most of the Africanized bees are born in hives in the wild. There are three types of bees we are studying to get our results. There are domesticated hives, controlled by beekeepers; there are also the hives found in the wild, and there is the Africanized hives. Africanized hives cannot invade and attack domesticated hives, as the beekeepers will kill the Africanized bees. On the other hand, wild bees are vulnerable to the attacks of Africanized bees and are susceptible to being overrun by them.

After finding out this information, we used a computer program to model this information. We modeled this problem in StarLogo. When using StarLogo we made the different hives and different bees. We let the bees leave the hives and breed and interact with the other types of bees.

In our research, we found out that Africanized bees in the western hemisphere descended from twenty-six Tanzanian queen bees. The process of Africanization takes place within the hives. Africanized Bees moved from Brazil south to northern Argentina and north the South and Central America, Trinidad (West Indies), Mexico, Texas, Arizona, and New Mexico, and Southern California.

Problem

The problem is the spread of Africanized bees. The Africanized bees seem to spreading at a high rate. Since Africanized bees originally came from 26 queen bees they have increased greatly. Now 99% of Hybrid bees are Africanized. They have also been found in the area around New Mexico and further areas in the United States. Since the bees can be an agricultural problem as well, the bees could be devastation to our area. To solve the problem we plan to make a model to show how the bees spread in great sizes. We have already found out the breed grow at a drastic rate until they reach a domesticated hive. Theoretically the European beekeeper will "kill off" the Africanized bees. This is why we are using StarLogo for our project. The "turtle" will act as the bee in our project.

Though solving the problem is something the community will have to help with, we have theories that the domesticated hives will dominate over the African and wild bees. This is theory is best proven with the Star Logo model that we made. The project shows that the domesticated hives population grows will the other decrease by drastic amounts. This project may have to be worked again for further in depth problem solving.

Method:

We used StarLogo as our method to model this problem. In our model we had different colors and shapes to represent the different types of bees and hives. We made the program so that the hives stay in one place and the bees leave the hives and breed and interact with the different types of bees. When the bees interact they will either breed or kill each other. We also decided to include a sample part of our StarLogo code. Here is part of our code.

```
breeds [af dom wild ]

turtles-own [xhive yhive]

to go
move
af_attack
dom_attack
end

to move
rt random 15
lt random 15
fd .5
end

to af_attack
if breed = af
        [grab one-of-wild-here
                [set breed-of partner af]   ]
end

to dom_attack
if breed = dom
        [grab one-of-af-here[set breed-of partner dom]
        ]
end
```
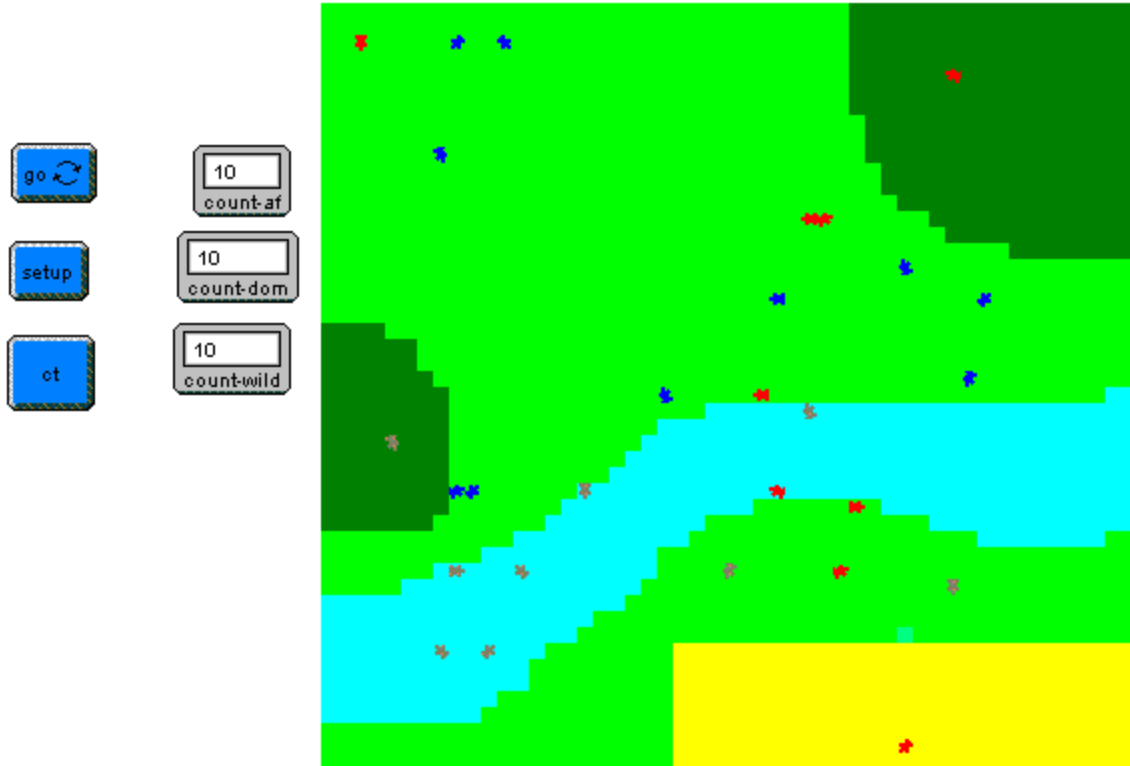
Here is an example of our StarLogo screen.

After hitting "go" the bees are in action and "killing" off one another.

The background shows a river running through a grass area. The yellow represents a cornfield.

The red "turtles" represent Africanized bees
The blue "turtles" represent the domesticated bees
The brown " turtles" represent the wild bees.

Results and Conclusions:

Being a very young and inexperienced team we did not find all the results we were hoping for. We would like to expand this project into next year. However we did find out that eventually the wild bees will die off as they have no way to protect themselves from the Africanized bees when they attack. The domesticated bees however, have the beekeepers to help them fight off and defend themselves against the Africanized bees. The Africanized bees have no predators other than humans, therefore they will not die off but their population will not rapidly expand. The domesticated bees have no predators either, since humans are in their favor. The domesticated bees will continue to rapidly expand and increase their population with few obstacles.

We did encounter obstacles in the making of our code and our model. One of the problems we encountered was when we made our code and our population counters, we found that the counters will show a different population count than the StarLogo screen does. We also found at the beginning that our code had excessive problems in the commands section. Another problem we have had is the domesticated bees appear to be indestructible.

Software

The software we have used is StarLogo, Microsoft Word, and Microsoft Power Point. We have used StarLogo throughout this whole project. We used StarLogo because it's "easy and cheap". We also thought this would be the best way to model what we were trying to do better than any other program. Microsoft Word we used for reports. Power Point was for presentations of the project, to students and staff at ENMU. Though we didn't use much Microsoft it was necessary for reports and documentation.

Originality in our Project:

This project is one of a kind from what we know. The project as we know is fairly in depth and has a lot of work in it. Star Logo is a learning program. This project is very important to us, as we have had personal experiences with the Africanized bees. This is the number one reason we decided on this project. Though we have endured problems with the project the results came out different than we thought. The project itself is unlike any other this year. Our most original accomplishment this year is by far getting StarLogo to work with our project with the numerous shapes, colors, and designs we have put into our model.

Acknowledgments:

We would like that thank Mr. Daughtery and Mrs. Raulie for their assistance and patience with this project. We would also like to thank them for helping us with modeling our project on StarLogo. We would also like to acknowledge Dale Henderson for helping us edit and write our code. Willard Smith also helped us with telling us how we could improve our project and how to start modeling it.

Bibliography

For our resources, we used Africanized bee. (2007). In *Wikipedia* [Web]. Retrieved 1-3-07,

from http://en.wikipedia.org/wiki/Africanized_bees. .

We also used Visscher, "Africanized Honey Bee Information In Brief." 27 01 2007. 11 002 2007

http://bees.ucr.edu/ahb-facts.html to get more reasearch.

For pictures on our presentations, we used 20 02 2007

<http://images.search.yahoo.com/search/images?p=Africanized+Bees&fr=yfp-t-

501&toggle=1&cop=mss&ei=UTF-8>.

Appendix

1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005

Where are Africanized honey bees now?

First found in southern Texas in 1990, Africanized honey bees are now found in most of the Southwest.

Africanized Honey Bee