Final Report

School Name: Melrose Middle School

Team Number: Melrose Mid. 4

Area of Science: Ecology

Computer Language: NetLogo

Team Members Grade: 7th grade

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Project Title: Quail Population

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Sponsor: Alan Daugherty

Executive summary:

We have made a model of quail population and the predators that hunt them so we could see how quick quail die off. This model has brush for quail and water to drink also for the quail. The predators are able to follow the quail and have a 50/50 chance of catching and killing the quail. The predators can also kill each other if they get in a certain radius of each other. The hunters though cannot be killed because none of the animals will kill it in real life. We know most of what happens to the population of all these animals we have built sliders to adjust the amount of animals so the outcome will be realistic. We have talked to local hunters, game officers, and farmers and our model was matching to what they said quail population was over the years. The results of our study were that we found out was that we had made a model with all the variables until it was close to what happens in real life. The conclusions was that the predators would get rid of the quail quick but the most dangerous quail were probably tied between the hawk and hunter.

Definition of the problem:

Our project is about the population of quail. It will represent the ecology of quail and how they live. Our team members are all hunters and we are interested in finding ways to have more quail for better hunts and determining how to hunt quail more effectively. We all love to hunt and be outside a lot. We have all noticed that the population decreases when hunted a lot but increases when there is barely any hunting. We all plan to figure out how this happens and why. We are going to make a NetLogo model and talk to people who can help us reach our goal becoming better hunter by knowing what's happening to quail.

Plan for Solving the Problem:

We are researching information by talking to local experts such as Fish and Game Officers to get research information about quail. We are making a NetLogo model to show the quail population in an area and to show how the population is increasing and decreasing. The variables we are using include: the number of quail present, vegetation amounts, quail food resources, quail reproduction rates, and quails predators (including hunters). We have patches where when the quail land on it gets energy and when it runs it loses energy.

Verification and Validation

After we did our project we had others look at it to make sure it was right. We used very valid sources including our parents, agriculture teacher, hunters from the area, and local farmers. Our resources

helped us on giving us insight on how some of our predators reacted and ate around the ecosystem. They also helped us on making sure that everything on our program was similar to what would happed in real life.

Progress to date: We have started research and we have started talking to experts to determine the information we need to form our model. We have begun preparing a model that shows all the variables we will include. We can then fine tune it to make it more realistic. WE have progressed our model got everything we need on it which includes all the energy, land, water, predators, hunters, and all the things we need.

Expected Results and Usefulness:

We intend to make a model that helps determine the population of quail and make quail hunting more successful. We have made a model to show how the populations increase and decrease and how they are hunted and what they are hunted by such as coyotes, hawks, snakes, and hunters.

Our finished model will represent the quail population of an area and how that population changes based on the amount of hunting and the amount of vegetation. Our finished model shows everything we need conclude this project.

Achievements

One of our achievements of this year's supercomputing program is that we got familiar with using a computer and knowing how to program. Obviously knowing how to use a computer and how to run a program is very important in supercomputing and sense it is our first year getting familiar with it is very good for us to know to do this kind of stuff.

Another achievement of ours is that we learned how to model and ecosystem to look and react like it would in real life. Sense we are doing our project on the topic of Ecosystems we are trying the best we can to make it look and feel like it would happen in real life.

Acknowledgments and Citations:

We would like to thank everyone who has helped us with getting all of the information and insight including all of the farmers, teachers, and local hunters. We appreciate all the help from everyone. Here are our citations.

1-www. Biology.unt.edu/unt-quail/research

2-www.wildlife.state.nm.us/hunting/information-by-animal/upland-game 3-http://www.clemson.edu/extension/natural_resources/wildlife/publications/fs7_bobwhite_quail.html

4-http://www.wildlife.state.nm.us/download/conservation/habitat-handbook/project-guidelines/NewMexico-Quail-Habitat-Guidelines.pdf

5-Interview New Mexico Department of Game and Fish Officer. Fall 2016.

CODE

```
breed [quails quail]       ;; This allows our agents to be five different types of animals.
breed [snakes snake]
breed [coyotes coyote]
breed [hunters hunter]
breed [hawks hawk]
```

(above) This allows our agents to be the kind of animals that they need to be in our map

```
quails-own [energy]        ;; This allows the quail to keep track of their energy.
```

(above) this procedure allow the quail to maintain energy through ought its life

```
to setup
  clear-all
  crt 12 [set size 4 set breed quails set shape "quail" set energy 100 ]       ;; Makes the world and quial.
end
```

(above) this procedure give all the quail energy and makes the map

```
to wander
  ask quails [ rt random 180 lt random 180 fd 1.5 set energy (energy - wanderlose )
       if pcolor = 55 [set energy ( energy + brushgain)]   if pcolor = 85 [set energy ( energy + watergain)]]
  ask coyotes [ rt random 95 lt random 95 fd 1 ]
  ask hawks [ rt random 5 lt random 5 fd 3 ]
```

ask hunters [rt random 90 lt random 90 fd 1]

ask snakes [rt random 350 lt random 350 fd .5]

end

(above) On the second line asks the quail to move and lose energy. In the third line it says on what patch color the quail gain energy. On the fourth line it asks the coyotes to move a direction and up one. On the fifth line it asks the hawks to barley turn and to go up three. On the sixth line it asks the hunters to move a direction and go up one. On the seventh line it asks the snakes to move almost any direction and up only a little.

to setupmap ;; This is where we make the bushes be.

ask patches [set pcolor 65]

create-turtles 1 [set color 52]

ask turtles [setxy -28 27 brush]

ask turtles [setxy 31 6 brush] ;; Calls the procedure that makes up our map.

ask turtles [setxy -3 -31 brush]

end

(above) This procedure is used to make the map where all the actions occurs. It draws in all of the bushes, water, and grass.

to brush

repeat 25 [

set pcolor 52

rt random 90

fd 1]

set pcolor 85

end

(above) this makes a pile of brush that can be 25 squares big. It is made by the turtles going in any direction. This means that our map will never be the same twice

to setuppredators

create-turtles coyotecount [set breed coyotes set color 35 set shape "wolf" set size 4.5 setxy random-pxcor random-pycor] ;;This creats all the animals shape, size, and color.

create-turtles snakecount [set breed snakes set color 33 set shape "snake" set size 4 setxy random-pxcor random-pycor]

create-turtles hawkcount [set breed hawks set color 31 set shape "hawk" set size 3 setxy random-pxcor random-pycor]

create-turtles personcount [set breed hunters set color 25 set shape "person" set size 5.5 setxy random-pxcor random-pycor]

end

(above) This is where the predators are made. It show what shape, size, color, and what breed they are going to be.

to hunt

let cprey [quails in-cone 120 10] of one-of coyotes

ask coyotes [if cprey = nobody [set color red set heading towards cprey]]

let sprey [quails in-cone 120 10] of one-of snakes

ask snakes [if sprey = nobody [set color red set heading towards sprey]]

let hprey [quails in-cone 120 10] of one-of hawks

ask hawks [if hprey = nobody [set color red set heading towards hprey]]

let tprey [quails in-cone 120 10] of one-of hunters

ask hunters [if tprey = nobody [set color red set heading towards tprey]]

;; ask hunters [if any? quails in-cone 90 3 [set heading towards quail]]

ask quails [if (any? turtles-here with [breed = snakes]) and (random 100 < 50) [die]] ;; This creates the food chain from lowest to highest.

ask quails [if (any? turtles-here with [breed = hawks])and (random 100 < 85) [die]]

ask quails [if (any? turtles-here with [breed = hunters])and (random 100 < 80) [die]]

ask quails [if (any? turtles-here with [breed = coyotes])and (random 100 < 75) [die]]

ask snakes [if (any? turtles-here with [breed = hawks]) and (random 100 < 85)[die]]

ask snakes [if (any? turtles-here with [breed = coyotes])and (random 100 < 75) [die]]

ask snakes [if (any? turtles-here with [breed = hunters])and (random 100 < 95) [die]]

ask hawks [if (any? turtles-here with [breed = coyotes])and (random 100 < 5) [die]]

ask hawks [if (any? turtles-here with [breed = hunters])and (random 100 < 15) [die]]

ask coyotes [if (any? turtles-here with [breed = hunters]) and (random 100 < 35) [die]]

end

(above) on the third line it shows the vision of the coyote. On the fifth line it shows the vision of the snakes. On the seventh line it shows the vision of the hawks. On the ninth line it shows the vision of the hunter. Below that it show the food chain from lowest to highest.