SCC #37 Predator Prey Relationships

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WHAT IS IT?

For my supercomputing project I coded a model of a predator prey relationship.



HOW IT WORKS

- 1. Made the grass patches, some green and some brown
- 2. Made sheep and wolves.
 - a. energy is 100
- 3. asked sheep and the wolves to move randomly
 - a. when each moves, it's energy level goes down
 - i. sheep loses 1 energy
 - ii. wolves lose 2 energy
 - b. Grass gets energy from sunlight.
 - c. Sheep need to get energy by eating grass
 - i. If sheep is on green patch, it eats grass and gets 1 energy
 - ii. If sheep's age reaches 40 it dies
 - iii. If sheep's energy is 150, then sheep has baby, then energy is divided by 2
 - d. Wolves get energy by eating sheep
 - i. if wolf eats a sheep and gets 10 energy
 - ii. If wolf's age reaches 40 it dies
 - iii. If wolf's energy is 150 it has baby, then energy is divided by 2
 - e. Hunters kill wolves

HOW TO USE IT

http://www.netlogoweb.org/launch#Load



- a. Sliders tell how many animals and hunters to make
- 2. Go
 - a. starts the simulation

THINGS TO NOTICE

- If you have too many wolves, then all sheep die quickly, then the wolves die
- If you have too many sheep then they eat all the grass and die.
- If you have too many hunters then all the wolves die.

THINGS TO TRY

- move sliders
 - You can change how fast the grass grows.
 - You can change how fast the animals reproduce.



EXTENDING THE MODEL

I can add a weather variable (rain) and a natural disaster variable, that affects the grass. I will make it so
that the wolves and sheep can drink from a stream. I could make it so that there has to be a male and
female to reproduce. I could make it so wolves stay in packs and sheep are in flocks.

RELATED MODELS

http://www.netlogoweb.org/launch#http://www.netlogoweb.org/assets/modelslib/Sample%20Models/Biology /Wolf%20Sheep%20Predation.nlogo

Version 1 - Wolves and Sheep don't eat yet		
Version 1 - Wolves and Sheep don't eat yet breed [sheep a-sheep] breed [wolves wolf] patches-own [countdown] turtles-own [energy] to setup clear-all ask patches [set pcolor one-of [green brown]] create-sheep number-of-sheep [set shape "sheep" set color white set size 2 setxy random-xcor random-ycor set energy 100] create-wolves number-of-wolves [set shape "wolf" set color black set size 2 setxy random-xcor random-ycor set energy 100] reset-ticks end	to go ask sheep [move set energy energy - 1] ask wolves [move set energy energy - 2] tick end to move rt random 90 It random 90 fd 1 end	

Version 2 - Wolves and Sheep use energy and die when all energy is used up

breed [sheep a-sheep] breed [wolves wolf] patches-own [countdown] turtles-own [energy]

to setup clear-all ask patches [set pcolor one-of [green brown]

create-sheep number-of-sheep

set shape "sheep" set color white set size 2 setxy random-xcor random-ycor set energy 100

create-wolves number-of-wolves

set shape "wolf" set color black set size 2 setxy random-xcor random-ycor set energy 100

reset-ticks end



Version 3 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy			
breed [sheep a-sheep]	to go	to move	
breed [wolves wolf]	ask sheep [rt random 90	
patches-own [countdown]	move	It random 90	
turtles-own [energy]	set energy energy - 1	fd 1	
	if energy < 1	end	
to setup	[
clear-all	die		
ask patches []		
set pcolor one-of [green brown]			
]]		
create-sheep number-of-sheep	ask wolves [
	move		
set shape "sheep"	set energy energy - 2		
set color white	if energy < 1		
set size 2			
setxy random-xcor random-ycor			
set energy 100	if any 2 aboon here		
	r any? sneep-nere		
r create-wolves number-or-wolves			
L set shane "wolf"	ask sheep here		
set color black			
set size 2	die		
setxy random-xcor random-ycor			
set energy 100	1		
reset-ticks	tick		
end	end		

<mark>Version 4 -</mark> Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, <mark>Sheep eat grass to gain</mark> energy

breed [sheep a-sheep] ask wolves [to go breed [wolves wolf] ask sheep [move patches-own [countdown] set energy energy - 2 move turtles-own [energy] set energy energy - 1 if energy < 1if energy < 1to setup die clear-all die ask patches [if any? sheep-here set pcolor one-of [green brown] if pcolor = green set energy energy + 80 create-sheep number-of-sheep set pcolor brown ask sheep-here set countdown 0 set shape "sheep" set energy energy + 2 die set color white set size 2 setxy random-xcor random-ycor set energy 100 tick end create-wolves number-of-wolves to move set shape "wolf" rt random 90 set color black It random 90 set size 2 fd 1 setxy random-xcor random-ycor end set energy 100 reset-ticks end

Version 5 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back

ast patches uniformation and the second	
if pcolor = brown set energy energy - 2	
to setup if energy < 1	
clear all set countdown countdown - growth	
ask patches [die	
set pcolor one-of [green brown]	
if pcolor = brown if any? sheep-here	
set countdown 100	
create-sheep number-of-sheep	
set shape "sheep" set energy energy - 1	
set color white if energy < 1	
set size 2	
setxy random-xcor random-ycor die tick	
set energy 100 end	
if pcolor = green	
set shane "welf"	
set color black	
set size 2	
set vize 2 Id I	
set energy 100	
reset-ticks	
end	

Version 6 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce

breed [sheep a-sheep] breed [wolves wolf] patches-own [countdown]	reset-ticks end
to setup clear-all ask patches [set pcolor one-of [green brown] if pcolor = brown	to go ask patches [if pcolor = brown [set countdown countdown - growth if countdown < 1
set countdown 100 create-sheep number-of-sheep set shape "sheep" set color white set size 2 setxy random-xcor random-ycor set energy 100	[set pcolor green]]
] create-wolves number-of-wolves [set shape "wolf" set color black set size 2 setxy random-xcor random-ycor set energy 100]	

Version 6 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce			
ask sheep [move set energy energy - 1 if energy > 150 [ask wolves [move set energy energy - 2 if energy > 150 [to move rt random 90 It random 90 fd 1 end	
set energy 75 hatch 1 [set shape "sheep" set color white set size 2 set energy 75	set energy 75 hatch 1 [set shape "wolf" set color black set size 2 set energy 75		
] if energy < 1 [die]] if energy < 1 [die]		
if pcolor = green [set pcolor brown set countdown 100 set energy energy + 2]]	if any? sheep-here [set energy energy + 80 ask sheep-here [die]		
	J] tick end		

Version 7 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce, hunters kill wolves			
breed [sheep a-sheep]	set energy 100		
breed [wolves wolf]]		
breed [hunters hunter]	create-hunters number-of-hunters		
patches-own [countdown]			
turtles-own [energy]	set shape "person"		
	set color black		
to setup	set size 2		
clear-all	setxy random-xcor random-ycor		
ask patches [set energy 100		
set pcolor one-of [green brown]]		
if pcolor = brown	reset-ticks		
[end		
set countdown 100			
]	to go		
]			
create-sheep number-of-sheep	ask patches [
[if pcolor = brown		
set shape "sheep"	[
set color white	set countdown countdown - growth		
set size 2	if countdown < 1		
setxy random-xcor random-ycor	[
set energy 100	set pcolor green		
]]		
create-wolves number-of-wolves]		
[]		
set shape "wolf"	ask sheep [
set color black	move		
set size 2	set energy energy - 1		
setxy random-xcor random-ycor	if energy > reproduction		

Version 7 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce, <mark>hunters kill wolves</mark>			
[set energy 75 hatch 1 [set shape "sheep" set color white set size 2 set energy 75	[set shape "wolf" set color black set size 2 set energy 75]] if energy < 1	ask wolves-here die l tick	
]]	[die]	end to move	
if energy < 1 [die	if any? sheep-here [set energy energy + 90	rt random 90 It random 90 fd 1	
] if pcolor = green [ask sheep-here [die	end	
set pcolor brown set countdown 100 set energy energy + 2			
]] ask wolves [ask hunters		
move set energy energy - 2 if energy > reproduction + 25 [set energy 75	if any? wolves-here		
hatch 1			

Version 7 - Wolves and Sheep use energy and when all energy is use, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce, hunters kill wolves, both sheep and wolves have age when the older they get the bigger they get and they die when age reaches 40

breed [sheep a-sheep]	set age random 10
breed [wolves wolf]	set size age / 5
breed [hunters hunter]	setxy random-xcor random-ycor
natches-own [countdown]	set energy 100
furfles-own [energy gender age]	
tuttes-own [energy gender age]	state hunters number of hunters
to optim	
ciear-ali	set snape "person"
ask patches [set color black
set pcolor one-of [green brown]	set size 2
if pcolor = brown	setxy random-xcor random-ycor
[set energy 100
set countdown 100]
]	reset-ticks
]	end
create-sheep number-of-sheep	
i i i	to go
set shape "sheep"	
set color white	ask patches [
set age random 10	if pcolor = brown
set size age / 5	h ri
setxy random-xcor random-ycor	set countdown countdown - growth
set energy 100	if countdown < 1
create-wolves number-of-wolves	set pcolor green
]	
set shape "wolf"	li
set color black	
set size 2	ask sheen [

Version 7 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce, hunters kill wolves, both sheep and wolves have age when the older they get the bigger they get and they die when age reaches 40

		-
move	T I I I I I I I I I I I I I I I I I I I	ask sheep-here
set energy energy - 1	die	[
if energy > reproduction		die
[set age age + 0.2]
set energy 75]]
hatch 1	ask wolves []
[move	ask hunters
set shape "sheep"	set energy energy - 2	
set color white	if energy > reproduction + 25	[
set age 1		move
set size age / 5	set energy 75	if any? wolves-here
set energy 75	hatch 1	
]	[ask wolves-here
]	set shape "wolf"	[
	set color black	die
if energy < 1	set age 1]
[set size age / 5	
die	set size 2	
]	set energy 75	
if pcolor = green]	tick
]	end
set pcolor brown	if energy < 1	
set countdown 100		to move
set energy energy + 2	die	rt random 90
]]	It random 90
if age > 40	if any? sheep-here	fd 1
		end
	set energy + 90	

Version 8 - Wolves and Sheep use energy and when all energy is use, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce, hunters kill wolves, both sheep and wolves have age when the older they get the bigger they get and they die when age reaches 40, wolves and sheep have gender pink is a girl and blue is a boy.

breed [sheep a-sheep] breed [wolves wolf] breed [hunters hunter] patches-own [countdown] turtles-own [energy gender age] to setup clear-all ask patches [set pcolor one-of [green brown] if pcolor = brown set countdown 100 create-sheep number-of-sheep set shape "sheep" set color white set age random 10 set size age / 5 set gender one-of ["male" "female"] if gender = "male" set color blue

if gender = "female"

set color pink

setxy random-xcor random-ycor set energy 100

create-wolves number-of-wolves

set shape "wolf" set color black set size 2 set age random 10 set size age / 5 set gender one-of ["male" "female"] if gender = "male"

set color blue

if gender = "female"

set color pink

setxy random-xcor random-ycor set energy 100

create-hunters number-of-hunters

Version 8 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce, hunters kill wolves, both sheep and wolves have age when the older they get the bigger they get and they die when age reaches 40, wolves and sheep have gender pink is a girl and blue is a boy.

	hatch 1	if age > 40
set shape "person"	_	
set color black		die
set size 2	set shape "sheep"]
setxy random-xcor random-ycor	if gender = "male"	set age age + 0.2
set energy 100]
]	set color blue	ask wolves [
reset-ticks		move
end	if gender = "female"	set energy energy - 2
		if energy > reproduction + 25
to go	set color pink	
		set energy 75
ask patches [set age 1	hatch 1
if pcolor = brown	set size age / 5	ſ
[set energy 75	set shape "wolf"
set countdown, countdown - growth		if gender = "male"
if countdown < 1		I gondol malo
	1	set color blue
L set peolor, green	if energy < 1	
	r energy < r	if conder = "fomale"
		act color pink
] aak ahaan [j if naslan — maan	
ask sheep [ii poolor = green	
move		set size 2
set energy energy - 1	set pcolor brown	set energy 75
If energy > reproduction	set countdown 100	
l	set energy energy + 2	
set energy 75		if energy < 1

Version 8 - Wolves and Sheep use energy and die when all energy is used up, Wolves eat sheep to gain energy, Sheep eat grass to gain energy, grass grows back, both wolves and sheep reproduce, hunters kill wolves, both sheep and wolves have age when the older they get the bigger they get and they die when age reaches 40, wolves and sheep have gender pink is a girl and blue is a boy.

[die] if any? sheep-here [to move rt random 90 It random 90 fd 1 end	
set energy energy + 90 ask sheep-here		
[die		
]		
1,		
ask hunters [
move if any? wolves-here		
[ask wolves-here		
]		
]		
tick		
end		

ANY QUESTIONS?