Carrying Capacity
5th Grade

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Benchmarks:

SLC 17A: Students will identify how plant and animal species are affected by changes in an ecosystem over time (succession, change and maintenance of habitats, interrelationships).

Objectives:

Students should be able to define the carrying capacity as the limit to the number of individuals of a species that a habitat can support. (Or paraphrase). Students should be able to identify several limiting factors, including availability of food, shelter, and water, and the presence of predators.

Materials:

- Overhead transparency of field
- Handouts of succession environment

Please note: This is a simplification. The rules set up for the animals may be more restrictive than for real animals.

Initial Demonstration:

Place the transparency of the field on the overhead. Ask the students what animals they think could live in this habitat. Choose one, say fish, and ask if more than one fish could live in this habitat. Ask if they think there is a limit to the number of fish that could live here?

Target Observations:

- There is a river and grass. Water animals, such as fish could live here. Field animals such as mice could live here.

Target Model:

- More than one animal can live in a habitat. It probably depends on how much food is available.

Procedure:

Pass out the handout and have the students look at the field on their paper. Following the rules for fish, place an F for every fish that can be on the page. How many fish can live in this habitat? What else can limit the number of fish? (The number of bears). How many bears can live in this habitat? Walk the students through the rest of the field.

Target Revised Model:

- Water and food affect the number of animals that can live in a habitat.

Procedure:

Ask the students what other things limited the number of each species. Do you think if this area underwent ecological succession it could support different animals?

Have the students calculate the carrying capacity for each species in each stage of succession. It may be helpful to have the students calculate the total number of animals at each stage, and notice that the climax community has the most variety, but not the most number of animals.

Target Revised Model:

- The types of food available to animals affects the kinds of animals in an ecosystem

Summary:

It is important to summarize this activity with the students. They should discuss what factors made a difference in the carrying capacity for the different animals. They should notice that food, water, shelter, and predators are all limiting factors for the animals. You may want to note the number of mice in the hardwood forest. Will there be enough mice to feed the owls for the next year? Also, it can be noted that species that eat a variety of foods can live in a broader area. For example, the squirrels here only eat acorns, so they cannot live in any habitat without hardwood trees. If a different kind of squirrel ate acorns but also pine cones, that species would have a broader range (could live in more habitats).

Carrying Capacity Game Rules

Follow these rules for finding the carrying capacity of each habitat.

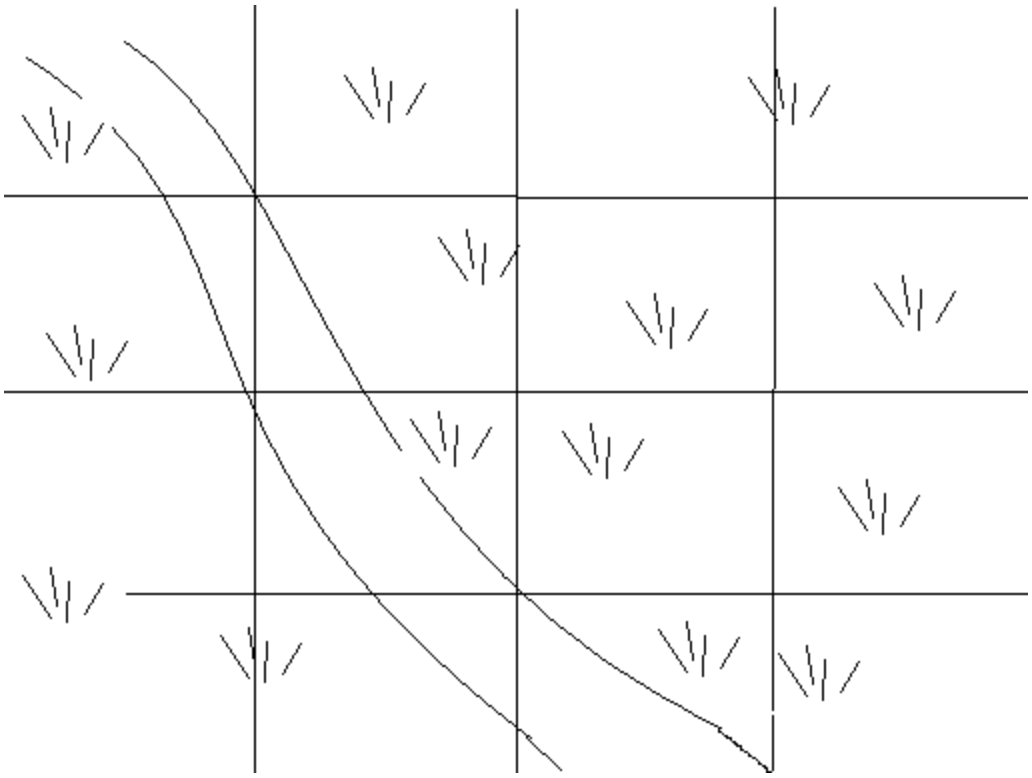
Fish: 5 fish for every square with river
-3 fish for every bear
Mice: Mice must live within 2 squares of the river
7 mice for every square with grass
10 mice for every square with shrubs
-5 mice for each owl
Squirrels: squirrels must live within 3 squares of the river
3 squirrels for every square with hardwood tree (round)
Owls: 1 Owl for every tree
Bears: 1 Bear for every 5 trees.

Directions:

Place an F for each fish that can live in each square. Count the total number of fish and write this on the line for "supports." Place an M for each mouse that can live in each square. Remember, if the square is not touching a square with the river, the mouse can't live there. Follow this procedure for each species.

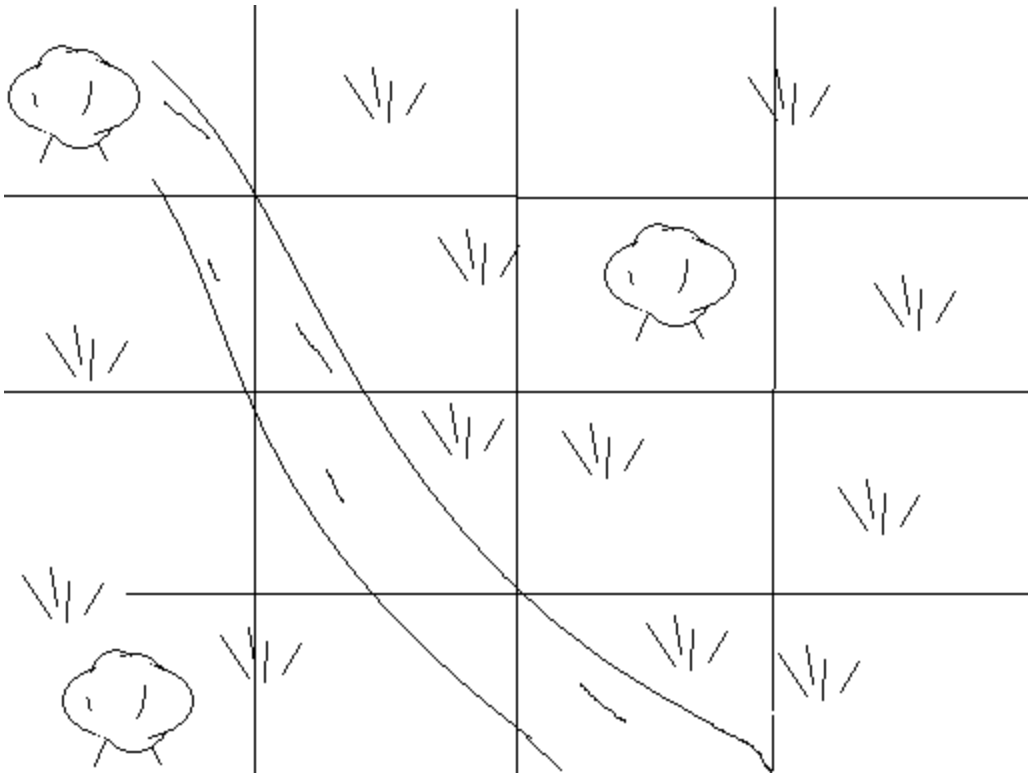
Now, count the number of bears. Determine how many fish will get eaten and write this on the line for "Predator." Count the number of owls and determine how many mice will be eaten. Write this on the mouse line for predators.

Calculate the total number of animals of each species.



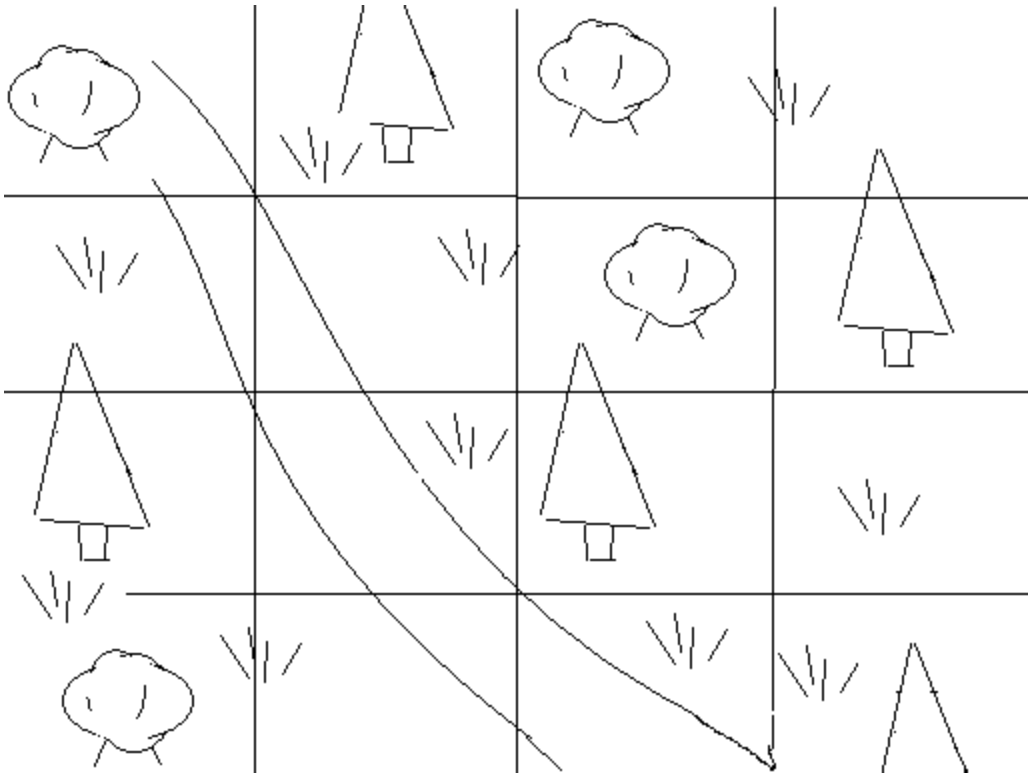
Field

Animal	Supports		Predators		Total
Fish	_____	-	_____	=	_____
Mice	_____	-	_____	=	_____
Squirrels	_____				_____
Owls	_____				_____
Bears	_____				_____



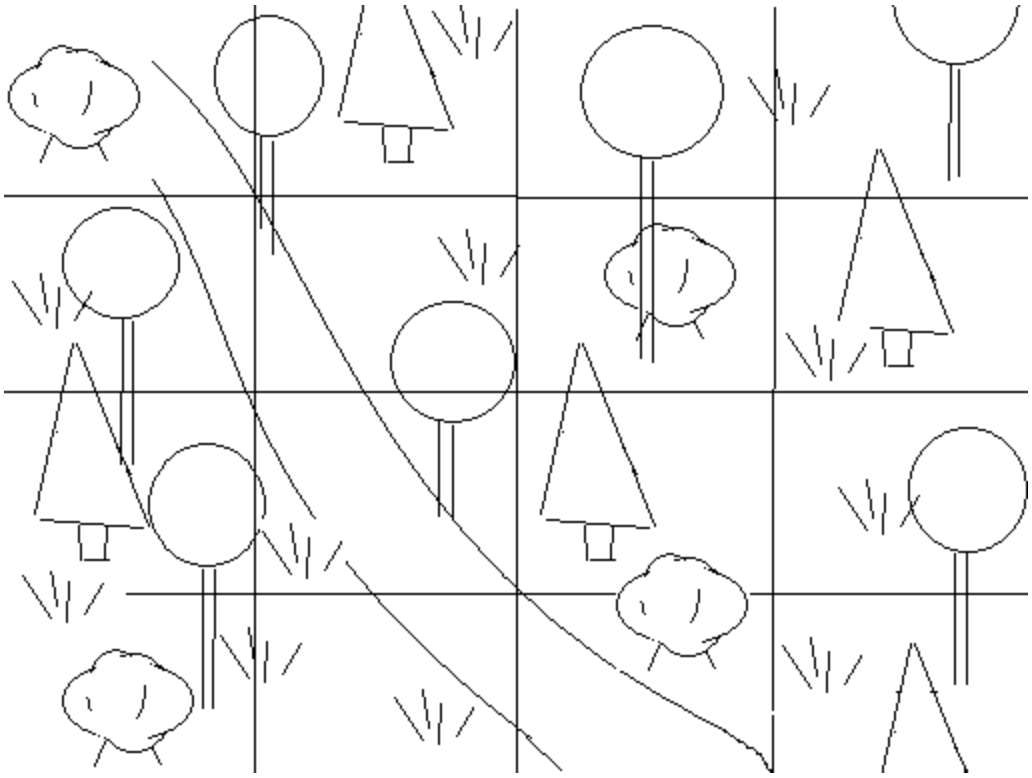
Shrubland

Animal	Supports		Predators		Total
Fish	_____	-	_____	=	_____
Mice	_____	-	_____	=	_____
Squirrels	_____				_____
Owls	_____				_____
Bears	_____				_____



Pine Forest

Animal	Supports		Predators		Total
Fish	_____	-	_____	=	_____
Mice	_____	-	_____	=	_____
Squirrels	_____				_____
Owls	_____				_____
Bears	_____				_____



Hardwood Forest

Animal	Supports		Predators		Total
Fish	_____	-	_____	=	_____
Mice	_____	-	_____	=	_____
Squirrels	_____				_____
Owls	_____				_____
Bears	_____				_____