Lesson 2 : Population Dynamics Activity

Shark Unit. Lesson 2: Grades 6-10

ESSENTIAL QUESTION OF THE DAY (EQOD):

How do sharks affect population sizes of other species within a marine ecosystem?

Sharks are an important contributor to marine ecosystems. In this activity, students will have the opportunity to observe population dynamics in real time within a habitat consisting of Tiger Sharks, Green Sea Turtles, and Sea Grasses.

MATERIALS:

- Grass Field or Gymnasium
- Pinnies or vests to delineate roles to students
- Clipboards for data collection
- Cones

Procedure:

1. Mark a field measuring approximately 30' x 15' in size.
2. Students will be divided into 3 potential groups:
    a. **Tiger Shark**: Eat Green Sea Turtles
        i. Can Run Throughout The Grid
        ii. Begin each round standing on one end line of grid
    b. **Green Sea Turtle**: Eat Sea Grass
        i. Can Skip Throughout The Grid
        ii. Begin each round standing on end line of grid opposite tiger sharks
    c. **Sea Grass:** Provide nutrition for Green Sea Turtles
        i. Fixed In Place Throughout The Grid, Can Not Move
    d. **Decomposers:** Outside Of Grid For 1 Generation, Regenerate Into Sea Grass
        i. No students to start, but some will become decomposers in subsequent generations/rounds

Set Up & Rules:

- Start the game with the approximate ratios:
  - 2 Tiger Sharks (start on one end line of grid)
  - 20 Sea Grasses (fixed positions throughout grid)
  - 8 Sea Turtles (start on other end line of grid)

- Allow each round to last for 1:00 (adjust as needed)

- If a Tiger Shark 'eats' (tags) 1 sea turtle, they survive. If a Tiger Shark 'eats' 2 sea turtles, each additional will become a Tiger Shark in the next generation.

- If a Sea Turtle 'eats' (tags) 2 sea grasses, they survive. If a Sea Turtle 'eats' 3 sea grasses, each additional will become a Sea Turtle in the next generation.

- If Sea Grass tags a Tiger Shark, the Tiger Shark must walk for the rest of that round.

- Dead Tiger Sharks, eaten Sea Grasses & Sea Turtles will become Decomposers for the next generation.

- Decomposers become Sea Grasses following their 1 generation as a Decomposer.

- At Generation 10, introduce a scenario (ex. Overfishing decimates the Tiger Shark population, leaving 1 left, etc.)

- Record data between each round to be used for later analysis.

Data Table:

Generation	Tiger Shark Population	Sea Turtle Population	Sea Grass Population
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			

Graph:

Create a line graph that displays the changes of population over 16 generations. Be sure to include Tiger Sharks, Green Sea Turtles, and Sea Grass in your graph. Predict a realistic carrying capacity for the Green Sea Turtle and draw a dotted line in your graph to represent this.

POST-ACTIVITY ASSESSMENT ?'S

1. Draw & Label a correct food chain as it relates to this simulation:

2. Describe your graph. How did predator & prey population change over time?

_____

_____

_____.

3. According to your results, how does prey population affect predator population?

_____

_____

_____.

4. Assume a disease completely wipes out the Tiger Shark population from this ecosystem. What would happen to the Green Sea Turtle population <u>first?</u>

_____

_____

_____.

5. From #4, what might happen to the Green Sea Turtle population later on?

_____

_____

_____.

6. Although Tiger Sharks do not directly prey on Sea Grass, how do they affect the population of Sea Grasses?

_____

_____

_____.

7. Identify 1 limitation of this simulation as it relates to a real ecosystem. (What is something that may affect these populations in the real world that the simulation overlooks?)

_____

_____

_____.

Population Growth Rate = $\Delta N/\Delta T$ (change in population size ÷ change in time)

Use your data table for # 8.

8. What was the Green Sea Turtle population growth rate from generation 4 to generation 10? *Show your work*