

**Kearny High School-SCT  
APES- "Happy Fishing Game"**



**Background Information:** In 1968, a scientist by the name of Dr. Garrett Harden coined the concept called the “*Tragedy of the Commons*”. “*The Tragedy of the Commons*” is a problem that occurs when a resource –such as the ocean, water, and air- is open to everyone. Overtime, these resources become *overexploited* and the consumers face the choice of restricting their own *consumption* for the good of the resource and community, or continuing to consume/use the resource opting to face dire consequences at a later time. When people are not compelled to preserve resources for the welfare of future generations, the *Tragedy of the Commons* occurs.

**Lab Objective:** Students will participate in an activity that will help them better understand the concept of the “*Tragedy of the Commons*” and the difficulties associated with managing these shared resources.

**Preparation:** Divide students into groups of 4-6 participants. Each group should sit around the "lake" (*common resource*).

**Materials:**

- **Goldfish- Colored**
- **Bowl (*Lake*)**
- **Straws (*at least 1 per student*)**
- **Plastic spoons (*at least 1 per student*)**

**Scenario:** Each one of you represents the head of a family (***fisherman***) where the only source of income is to sell your daily fish catch. In order for your family to survive, you must catch enough fish to pay your ***operating costs*** and make profit to pay for your ***living expenses\****. The only food source is a small local lake, which can accommodate between **16-24** fish. You must catch the fish by sucking up the "fish" from the lake with straws (***fishing pole***) or using a spoon to scoop up the fish (***net***). Each student will get a chance to fish once a year (***which lasts 30 seconds***) and each time you fish you may take 0, 1, 2, 3 or 4 fish from the lake. **“It is your choice of how many fish (0-4) you take, however, if you only take one fish, you will not make enough to support your family and pay for your fishing expenses.”** Each fish has a different “redemption value” based on color. After the annual fishing season has ended, any remaining fish will reproduce **once** during the off-season- each remaining fish is able to reproduce and make one new fish (***based on color***). If you are unable to catch enough fish to support your fishing activity your game is over for you and your family- you have gone bankrupt. **The student with the most “money” (*based on # of fish and value*) at the end will win a prize.**

### Activity Procedures:

1. Each student will start with **\$25** in ocean currency
2. Students are given the option of fishing gear:
  - a. **Fishing pole (straw)** – cost \$1 **one-time fee**
  - b. **Fishing net (spoon)** – cost \$5 **annual fee**
3. Students will get 30 seconds to fish. **Remember, you must catch enough to support your family and pay your annual expenses** (*at least \$20 per year*).
4. At the end of each year (*round*), the teacher will add an additional goldfish for each fish remaining in the lake. Make sure to add according to the colors remaining. **Each fish can replicate x 1 each**
5. At the end of the first fishing season, fill in your worksheet. If you are unable to cover your annual expenses, you are unable to fish the next year. ***You have gone bankrupt and must sit out of the game.***
6. If your group still has fish remaining in the lake, continue to run another annual fishing season (***Year 2a***).
7. Repeat steps 2 – 5. *Again, if you are unable to cover your annual expenses, you are unable to fish the next year.*
8. Once the fish are exhausted - total up your worksheet.

### Student Rules

#### **9. NO TALKING DURING ACTIVITY**

10. Fisherman can only “fish” ***one fish at a time***.
11. *No “hitting” or “knocking” other fisherman- will result in a fine (see teacher for details)*
12. Keep all catch fish in front of you- *for teacher to count after round*
13. If you are out of fish or out of money- *you will have to sit out!*
14. **There is a PRIZE for the player that has the most money at the end of the game!!**

### **Teacher Notes:**

Now here comes the “true” learning process. After running the first game, *allow the groups to analyze their results and have a free discussion to invent their own rules in order to increase their harvests during a second game.* The focus here has been on the rules (*methods of play*) groups spontaneously generate: these are essentially group-generated attempts at solutions to the commons dilemma. So far, results have suggested two main types of solutions: (a) those involving numbers (*such as the group which decides systematically to take only "one" fish per person per 15-second interval*); this type of solution is quite effective in preserving the pool) and (b) nonnumerical solutions (*group decides that each person must run to the end of the room and back before fishing*).

Restart the fishing game from steps 2 – 5 (Year 1b).

If some groups still have fish remaining in the lake continue to run another annual fishing season (Year 2b).

Repeat steps 2 – 5. Again, if any student is unable to cover their annual expenses they are unable to fish the next year.

Continue until all fish are exhausted or the predetermined amount of time is met.

## Happy Fishing Budget Sheet

Fisherman Name: \_\_\_\_\_

Year 1- Operating Costs/Profits-      Starting Amount- \$25      \$25

Annual (*once a year*) Fishing Fees      *Minus*

Fishing Permit – \$5 per year      \$ \_\_\_\_\_

• Boat Maintenance/Fuel/Slip Fees- \$5 per year      \$ \_\_\_\_\_

• Cost of Living (Rent, Food, etc.) - \$10 per year      \$ \_\_\_\_\_

*Option- Choose which type of fishing equipment you will use*

• Fishing Pole (Straw)- \$1 initial fee (*no annual charges*)      \$ \_\_\_\_\_

• Large Fishing Nets (Spoon)- \$5 *annual fee*

**TOTAL Operating Costs (year one)**      \$\$ \_\_\_\_\_

*\* Need at LEAST \$20 worth of fish each year to survive*

### Year 1- Fishing Profits

• Goldfish- \$5 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

• Greenfish- \$6 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

• Redfish- \$8 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

• Yellowfish- \$12 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

**Total Profits** (*Calculate by # and value of fish*)      \$\$ \_\_\_\_\_

*Operating Costs (Subtract from profits)*      \$ \_\_\_\_\_ *Minus -*

**Total (+-) for Year 1: (Profits MINUS costs)**      \$ \_\_\_\_\_

*Question: Did you make a profit? Did you go bankrupt? Explain what happened.*

Fisherman Name: \_\_\_\_\_

Year 2- Operating Costs/Profits-      *Starting Amount ?*      \_\_\_\_\_

Annual (*once a year*) Fishing Fees      *Minus*

Fishing Permit – \$5 per year      \$ \_\_\_\_\_

• Boat Maintenance/Fuel/Slip Fees- \$5 per year      \$ \_\_\_\_\_

• Cost of Living (Rent, Food, etc.) - \$10 per year      \$ \_\_\_\_\_

*You will need to pay another fee if you chose to use the nets*

• Large Fishing Nets (Spoon)- \$5 *annual fee*      \$ \_\_\_\_\_

**TOTAL Operating Costs (year one)**      \$\$ \_\_\_\_\_

*\* Need at LEAST \$20 worth of fish each year to survive*

**Year 1- Fishing Profits**

• Goldfish- \$5 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

• Greenfish- \$6 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

• Redfish- \$8 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

• Yellowfish- \$12 Each      x \_\_\_\_\_ =      \$ \_\_\_\_\_

**Total Profits**      \$\$ \_\_\_\_\_

*Minus -*

*Operating Costs (Subtract from profits)*      \$ \_\_\_\_\_

**Total (+-) for Year 2:**      \$ \_\_\_\_\_

***Question: Did you make a profit? Did you go bankrupt? Explain what happened. Did you change your strategy for the 2<sup>nd</sup> round? How?***

## Happy Fishing Lab- Tragedy of the Commons

### DISCUSSION QUESTIONS

1. Did anyone in your group take too many fish? How did that make you feel? Did everyone try to take as many as possible? Why or Why not? *Does society reward those with the “most”?*
2. Did anyone sacrifice the # of fish, *for the good of the community?* *Why or why not?* *Does society ever reward that type of person?*
3. In Game two... **how** did your strategy change, if at all? *Does it make a difference to know what the rewards are?*
4. Is it possible to maximize the number of fish caught/person **AND** the number of fish remaining in the pond **at the same time?** *Why or Why not?*
5. What are some **natural resources** that are **common** resources?
6. What are the **global commons**? Are these being used wisely? *Why or why not?*
7. *What can people do to use these resources most wisely?*
8. Did a particular “type” of fish disappear faster than others? *How does this relate to “economically valuable” species in nature and their extinction rates?*

### Postlab:

*Briefly summarize* the results of this simulation, and discuss the implications of this simulation on the management of common resources in the environment. *What were the main ideas of the simulation- what did you learn?* In your summary please *discuss relationships between human societies and the environment* as well as *possible methods to remediate overuse* through cooperation. *What other resource management examples can you think of where this topic is relevant? What would you suggest in these situations?*



