

# BYCATCH IN A BUCKET (GAME)



## HOW TO USE?

See [Teacher Outline](#) for context and slide set [Environmental Impact of Fishing](#) for supporting slides and information.

[Adapted from TeachEngineering.org]





## MATERIALS

- Small containers (one per group)
- Large buckets or containers (one per group)
- “Nets” (different sized mesh, will need to be strong to sustain picking up marbles, balls, shells or rocks)
- Assortment of marbles, balls, shells or rocks
- Water
- Paper and pens for recording data
- Copies of the worksheet
- Clip board and pencil
- Blindfolds

## LEARNING OBJECTIVES

- Understand that fishing can impact habitat and non target species (and understand that these impacts must be minimised for fish to receive the MSC Blue Fish Tick)
- Investigate how one or more fishing methods impact on marine habitats and non target species
- Identify how fishing methods can be modified or new methods created to reduce bycatch and impacts on habitats
- Use scientific and fishery related vocabulary

## TEACHER PREPARATION

- Fill each large bucket or container about  $\frac{3}{4}$  full with water
- Add a variety of items (balls / marbles / rocks / shells) to each bucket or container
- Pick one of these items (ideally a medium sized item) as the ‘target fish’ (the other items have the potential to be caught as bycatch)
- Create groups with four learners in each group



# PROCEDURE

## Part One (Pre-Activity Values Continuum: 10+ minutes)

1. Discuss with learners different points of view about fishing and bycatch. These might include: bycatch is acceptable as fishers need to make a living; people want to buy fish at a good price; not a single endangered species (including marine mammal or seabirds) should be sacrificed in the process of catching fish.
2. Have all learners in the class position themselves on a values continuum. At one end of the line are those who support the view that 'no bycatch is acceptable when fishing' and at the other end of the line are those believing that 'bycatch is an acceptable and inevitable part of fishing'. Justify your position!

## Part Two (Bycatch simulation (in groups): 20+ minutes)

1. Outline the activity to learners and explain that this is a simulated experience so they can experience some of the problems related to bycatch that are experienced by commercial fishers.
2. Have learners develop a hypothesis about which net they think will catch the most target species.
3. In their groups, one learner becomes the fisher and selects a fishing net to use. Blindfold the fisher.
4. The blindfolded fisher attempts to fish for the target species by making two swoops with the net. Their catch is placed in the small container.
5. Remove the blindfold.
6. Make a table and record the following data: Initial number of items in the bucket. Number of target items 'caught' during fishing. Exact number of each other item 'caught'.
7. Each member of the group completes a turn. Combine data once all four learners in each group have had a turn.
8. Calculate the following:
  - a. percentage of "target fish" in the initial full bucket (number of total "target fish" divided by number of total fish)
  - b. percentage of "target fish" that comprised the total number of fished items (number of target fish obtained in the net divided by the total number of items obtained fishing)
  - c. percentage of "target fish" caught (number of "target fish" caught divided by the total number of "target fish")
  - d. the percentage of other 'fish' caught
9. Discuss and analyse the results.
10. Extend learning by trialling different nets and / or gathering devices.
11. Collate and graph findings from your group (i) Create a bar graph showing the number of target species v non target species caught (ii) Create a bar or pie chart showing the percentage of each bycatch species caught (iii)



### Part Three (10+ minutes)

1. Discuss the principles of bycatch – why it happens, what species are affected and review and evaluate the activity. What did we learn? What more do we want to learn...
  - Do you think bycatching affects your life? Do you think it is an important issue? How does it affect you?
  - Did you find it easy or hard to just catch the "target species"? Why or why not?
  - If you trialled different gathering devices then which types of gathering devices worked the best, and why?
  - What types of results did you get, in reference to your calculations? Were you surprised by your results? Did your teammates get similar or different results? Why?
  - Can you think of ways of designing a net that could be more effective? Are there any other materials you wish you could have tried? What are they and why do you think they would work better?
  - Are there other methods you think would be successful in reducing bycatch besides modifications in fishing gear design?
2. Consider ways to reduce bycatch by improving the efficiency of the nets. Have learners design nets that would allow certain species to escape whilst retaining the target species.

## KEY WORDS

**Bycatch**

**Fishing method**

**Target species**

**Habitat**

**Non-target species**

## CURRICULUM LINKS

### Nature of Science (Level 3-5)

- Investigating in science
- Communicating in Science
- Participating and Contributing



### **Living World (Level 3-5)**

- Ecology

### **Science (Level 6)**

- Ecology
- Participating and Contributing

### **Social Studies (Level 3-5)**

- Understand how people make decisions about access to and use of resources (Level 3)
- Understand how people's management of resources impacts on environmental and social sustainability (Level 5)

### **Geography (Level 6, 7, 8)**

Relevant achievement standards related to:

- Geographic research
- Geographic issue of a global scale
- New Zealand contemporary issue
- Geographic concept: Sustainability

### **Technology**

- Nature of technology

### **Maths (Level 3-5)**

- Statistics

### **Pūtaiao**

- The Natural World: The Biological Environment: Investigate the effect of human actions, and natural processes, on an Aotearoa ecosystem (Level 6)