

Ocean Ecosystem	Grade 4 & 6
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Biodiversity Bay	Assessment	Assessment <i>for learning</i>
	Cross-curricular	Math (number sense and numeration)

Big Ideas

Grade 4: Understanding Life Systems

- Changes to habitats can affect plants and animals and the relationships between them
- Society relies on plants and animals

Grade 6: Understanding Life Systems

- Because all living things are connected, maintaining diversity is critical to the health of the planet
- Humans make choices that have an impact on biodiversity

Overall Expectations

Grade 4: Understanding Life Systems

1. Analyze the effects of human activities on habitats and communities
3. Demonstrate an understanding of habitats and communities and the relationships among the plants and animals that live in them

Grade 6: Understanding Life Systems

1. Assess human impacts on biodiversity, and identify ways of preserving biodiversity
3. Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans

Specific Expectations

Grade 4: Understanding Life Systems

- 1.1** Analyse the positive and negative impacts of human interactions with natural habitats and communities, taking different perspectives into account, and evaluate ways of minimizing the negative impacts.
- 1.2** Identify reasons for the depletion or extinction of a plant or animal species, evaluate the impacts on the rest of the natural community, and propose possible actions for preventing such depletions or extinctions from happening.
- 3.1** describe ways in which humans are dependent on natural habitats and communities

Grade 6: Understanding Life Systems

- 1.2** assess the benefits that human societies derive from biodiversity and the problems that occur when biodiversity is diminished
- 3.5** Describe interrelationships within species, between species and between species and their environment, and explain how these interrelationships sustain biodiversity.

Description

Students will be playing a game, guided by the teacher, to learn about overfishing, endangered species, fisheries and economics.

<p>Materials</p> <ul style="list-style-type: none"> • Token (e.g. paperclip) • Downloadable tracking sheet (printed) • Downloadable map of Biodiversity Bay (printed) 	<p>Duration</p> <ul style="list-style-type: none"> • 30 minutes
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Introduction

- Continue the discussion from the *Ocean Ecosystems* program about how we can avoid catching sea turtles in fishing nets. Guide the discussion to obtain the answer “we should not fish where the turtles are” or a similar answer.

Action

1. Place students in groups of two. Ensure that each group has a tracking sheet, a map of Biodiversity Bay and a token. The token will represent their fishing boat.
2. Read out the following story to the students as the goal of the game:

Your fishing boat is on a 20-day contract to collect the Blue Bingo fish in Biodiversity Bay. You will earn \$2 for each Blue Bingo caught. If you visit all designated fishing areas (A, B, C & D) by the end of the 20 days, whether they are open or closed, you will receive a \$1500 bonus. Your contract also states that you must keep track of the amount of time your boat visits a location. You can complete this task during or at the end of your contract in the *Keep track of your visits* section on the tracking sheet. On day 20, you must have your boat docked at the port. If you are late to dock, you will be penalized \$800 per space away from the port. You are allowed to dock earlier without any consequences.

It may be helpful to write the following summary on the board for your students:

- Blue Bingos = \$2 each
- Visit all designated fishing areas (open or closed) = \$1500
- Day 20 = be at PORT or \$800 fine per space away

3. Read out the following rules of the game:

- Boats will begin their journey from PORT
- Boats must move **before** the start of a new day to avoid overfishing a particular spot.
- Boats do not need to travel in any particular order (they can move forwards and backwards).
- Boats can only move 50 km a day.
- If your boat lands on a designated fishing area, you will catch 200 Blue Bingos.
- If your boat lands on a circle, you will catch 50 Blue Bingos.
- Endangered species are being tracked, if any are spotted near an area, fishing will be temporarily closed for that day.
- If an area is closed, you will not catch any fish.
- A closed area will be reopened the following day unless otherwise stated.

It may be helpful to write the following summary on the board for your students:

- Boats move before the start of a new day
- Designated fishing areas = 200 Blue Bingos
- Circle areas = 50 Blue Bingos
- Closed areas = 0 Blue Bingos

4. Once everyone understands the rules and students have placed their boat at PORT, the teacher may begin narrating the different events for each day (found below). After each day, give students time to fill out the tracking sheet (*Fishing location, # of Blue Bingos, Earnings, Fines*) and ensure they move their boat before proceeding onto reading the next day.

- **Day 1:** Today is a regular day.
- **Day 2:** ALERT! We have spotted sea turtles near Turtle Trail, all fishing in this area is closed today.
- **Day 3:** ALERT! We tracked the sea turtles' movement to designated fishing area A, all fishing in this area is closed today.
- **Day 4:** ALERT! We have spotted whales near designated fishing area B, to avoid them getting stuck in fishing nets, all fishing in this area is closed today.
- **Day 5:** WARNING! There is a large storm in the area. All locations are closed.
- **Day 6:** Today is a regular day.
- **Day 7:** ALERT! We have tracked multiple whale pods to the following areas: Jellyfish Junction, designated fishing area D and Plankton Path. All fishing in these areas are closed for today.
- **Day 8:** Today is a regular day.
- **Day 9:** Today is a regular day.
- **Day 10:** ALERT! The Blue Bingo population has been decreasing rapidly due to overfishing. All fishing locations are closed today. **For the next 10 days, all designated fishing areas have been limited to catching 100 blue bingos.**

It may be helpful to change the summary on the board with the new rule:

- Boats move before every day
- Designated fishing areas = ~~200~~ **100 Blue Bingos**
- Circle areas = 50 Blue Bingos
- Closed areas = 0 Blue Bingos

- **Day 11:** Today is a regular day.
 - Designated fishing areas are still reduced to 100 Blue Bingos.
- **Day 12:** ALERT! The population of the Red Rail fish have increased because of the reduction of its predator, the Blue Bingos. **Starting today, boats will be fined \$50 for landing on a circle because of the increase in bycatch.**
 - Fines will not apply on closed regions.
 - Designated fishing areas are still reduced to 100 Blue Bingos.

It may be helpful to change the summary on the board with the new rule:

- Boats move before every day
- Designated fishing areas = ~~200~~ 100 Blue Bingos
- Circle areas = 50 Blue Bingos + **\$50 fine (except when an area is closed)**
- Closed areas = 0 Blue Bingos

- **Day 13:** Today is a regular day.
 - Designated fishing areas are still reduced to 100 Blue Bingos.
 - \$50 fine for landing on a circle region still applies.
- **Day 14:** WARNING! There is a large storm in the area. All locations are closed.
 - Fines do not apply to closed regions.
- **Day 15:** ALERT! We tracked sea turtles to *Jellyfish Junction*, *Ocean Oasis* and *Coral Cave*. All fishing in these areas are closed today!
 - Designated fishing areas are still reduced to 100 Blue Bingos.
 - \$50 fine for landing on a circle region still applies.
 - Fines do not apply to closed regions.
- **Day 16:** ALERT! We tracked a whale pod to designated fishing area C, all fishing in this area is closed for today.
 - All other designated fishing areas are still reduced to 100 Blue Bingos.
 - \$50 fine for landing on a circle region still applies.
- **Day 17:** ALERT! Due to the large amount of sea turtles feeding on jellyfish in *Jellyfish Junction*, all fishing in this area will be closed today and for the remaining 3 days!
 - Designated fishing areas are still reduced to 100 Blue Bingos.
 - \$50 fine for landing on a circle region still applies.
 - Fines do not apply to closed regions.
- **Day 18:** ALERT! There are no more Blue Bingos in *Whitecap Waterway* or *Seaweed Shore* due to overfishing. Boats in these regions receive a \$200 fine for the bycatch of the Red Rails. (0 Blue Bingos caught + \$200 fine)
 - Designated fishing areas are still reduced to 100 Blue Bingos.
 - \$50 fine for landing on the other circle regions still apply.
 - *Jellyfish Junction* remains closed.
 - Fines do not apply to closed regions.
- **Day 19:** Today is a regular day.
 - Designated fishing areas are still reduced to 100 Blue Bingos.
 - \$50 fine for landing on a circle region still applies.
 - *Jellyfish Junction* remains closed.
 - Fines do not apply to closed regions.
- **Day 20:** Your contract is complete and you should be docked at the port! All boats that are not docked; today is a regular day.
 - Designated fishing areas are still reduced to 100 Blue Bingos.
 - \$50 fine for landing on a circle region still applies.
 - *Jellyfish Junction* remains closed.
 - Fines do not apply to closed regions.

5. Allocate some time for students to add up their earnings and fines. Students should also fill out *Keep Track of your visits*. In this table, they will mark how many times they visited each location. They do not need to worry about bonuses or penalties yet.
6. Once everyone is done calculating their earnings, fines and locations. Read out the following bonuses and penalties:

- Any boats that visited all designated fishing areas (A, B, C & D) will receive a \$1500 designated fishing area bonus. Mark your bonus on the tracking sheet if applicable.
- Any boats that are not docked at port on day 20 receives a late penalty of \$800 per space away from the port, including their current location. Mark your total penalty on the tracking sheet if applicable.
- In addition, a new law has been passed, any boats that visited a particular location more than twice receives a \$600 location penalty per additional visit for causing a reduction in the Blue Bingo population. Mark your total penalty on the tracking sheet if applicable.

7. Allocate some time for students to add up their total profit and expenses to be able to calculate their final total.

Consolidation/Extension

1. Ask students to share their final total with the class.
 2. Compare/Contrast the outcome of the *Ocean Ecosystems* program to that of this activity. Did they make more or less money? Why?
 3. Discuss the importance of tracking endangered species. Why is it important to close fishing areas to protect endangered species? How does this affect the fishermen's livelihood?
 4. Discuss the consequences of overfishing and its effects on populations. What happens to the food chain when a species has been overfished?
 5. Discuss the importance of sustainable fisheries. What impact would sustainable fisheries have on the environment, economy and industry?
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