

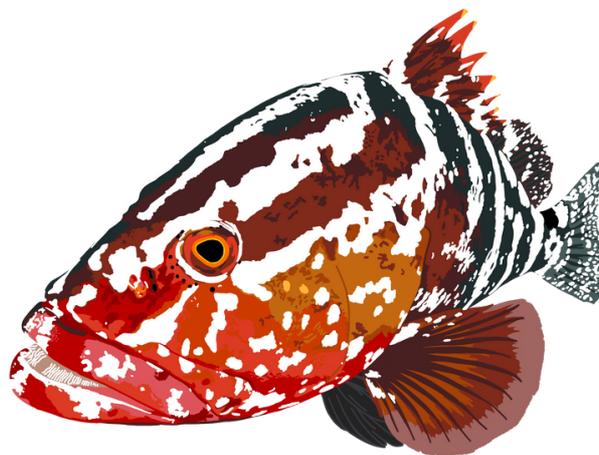


DEPARTMENT OF
ENVIRONMENT
CAYMAN ISLANDS GOVERNMENT

REEF ENVIRONMENTAL EDUCATION FOUNDATION

Grouper Moon Project Curriculum

Year 4



Grouper Moon-O

CREDITS

Year 4 Cayman Islands content written and created by Todd Bohannon. Special thanks to REEF's Grouper Moon Project Education and Scientific staff, Cayman Islands Ministry of Education Staff, and Cayman Islands Department of Environment Staff. Thank you to REEF and the LP Family.

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Reef Environmental Education Foundation

PO Box 370246, Key Largo, FL 33037

305-852-0030

reefhq@REEF.org

www.REEF.org



Grouper Moon-O

The Thinking Behind:

Games can be a powerful teaching tool in any classroom. They can engage student's learning in a fun, hands-on, collaborative style. Games can also provide an effective entry point for a wider range of students to engage with and understand complex concepts, which this activity does, using a deck of Uno cards. To understand why the Grouper Moon Project has been such a successful conservation story, students need to understand the world of the Nassau Grouper.

When the Cayman Islands first instituted protections for the Nassau Grouper aggregation site on Little Cayman in 2003, the population was estimated to be around 1,700 fish. After eight years of protection, the aggregation had only grown by about 1,500 fish, which is not a lot of fish. Today, however, after 20 years of protection, the grouper aggregation on Little Cayman now has an estimated population of over 8,000 fish! The Grouper Moon Project is truly an amazing conservation success story! But this leads us to an important question: why did it take so long for the grouper population to recover? This multi-faceted question highlights a number of key biological and environmental factors about the Nassau Grouper and the coral reef ecosystem.

The life of a Nassau Grouper is an incredible rollercoaster ride of a story filled with a variety of challenges each fish must overcome before they make it to the aggregation site to spawn. Nassau are a long-lived fish that can live upwards of 20 years or more in the wild. Their lives begin as gametes floating around in the open ocean for 30 days, after which they must travel back to the shores of their home reef to seek shelter among the turtle grass. Navigating predators, climate change, fishers and invasive species are just a few of the many challenges the Nassau faces on its multi-year journey towards adulthood.

In this fun, cooperative card game, students will work to maintain a healthy Nassau Grouper population while overcoming the variety of biological and environmental challenges every Nassau must face.

Learning Objectives:

- Students will be able to describe the life cycle of a Nassau Grouper.
- Students will be able to identify multiple ecological challenges that the Nassau Grouper faces at different stages of development.
- Students will learn various conservation methods being used to protect the Nassau Grouper.
- Students will develop their organizing (sequencing, manipulating materials), analyzing (discussing), interpreting (identifying cause and effect), citizenship (working in a group) skills.

National Science Curriculum Alignment: Year 4

- Recognize that living things can be grouped in different ways.
- Observe similarities and differences among animals and among plants.
- Find out about other animals, including how they grow, feed, move, and use their senses.
- Investigate a local habitat, including the relationship between the animals and plants found there, and develop skills in classifying animals and plants by observing external features.



Grouper Moon-O

Materials

- One deck of Uno cards (per group)
- Impact Cards (cut out, shuffled, and faced down)
- Impact Card Descriptions (printed out or posted somewhere accessible to students)
- Nassau Grouper Lifecycle Poster

Uno Deck Set-Up

- Suits: Red, Blue, Green, Yellow
- 12 Wild Cards - Negative Impact Cards
- 76: Number Cards (0-9) x100 fish.
- 8: Reverse Cards: Positive Impact Cards
- 8: +2 Cards: Positive Impact Cards
- 8: Skip Cards (Remove Skip Cards)

Game Instructions:

In Grouper Moon-O, each player begins with 5 number cards, representing your Nassau Grouper population.

Each number card represents that many grouper x's 100. So a Red 5 card is equal to 500 fish, and so on.

During each round, players move in clockwise order, drawing an impact card and following the directions.

These impact cards represent a range of biological and ecological factors the Nassau Grouper face during over the course of its life.

Play continues until all Impact cards have been used. The player with the largest grouper aggregation at the end wins the game.



Grouper Moon-O Directions

Goal of the game is to have the biggest aggregation by the end of the round

Players will start with a small grouper aggregation. Numbered cards will represent Nassau.

Word Cards will be collected into one, facedown deck of positive and negative impact cards.

Remaining number cards will be a second, facedown, deck.

Each turn, players pick up one fish card to add to their aggregation.

Each turn, players pick up one impact card. Each card will require players to pick up or put down fish cards, respective to the specific card. Displaced fish cards go to the bottom of the deck.

Once an impact card is played, it is set aside.

Once all impact cards have been used, game is over.

Procedures:

1. Separate Number Cards for Deck A, Wild Cards, +2 Cards, Reverse Cards for Deck B.
2. Cut out Impact cards and place them into separate, positive and negative card decks.
3. Shuffle Decks
4. Deal 5 Cards to each player from Deck A. Place Deck A and Deck B Face Down, side by side.
5. Player whose cards create the highest sum plays first, then play goes clockwise.
6. Each turn, the player pulls one card from each deck.
7. The number card is added to your hand. Each number card represents that number of fish x's 100. So a "2" is equal to 200 fish, etc.
8. The card from Deck B is placed in a discard pile, face up.
 - a. Wild Cards represent a negative impact on your Nassau Grouper aggregation. Draw one negative impact card from your negative impact card deck. Number cards removed from your hand go in the Deck A discard pile, face up.
 - b. "Reverse" and "+2" Cards represent positive impacts on your aggregation. Place card on discard pile, face up. Draw a positive impact card from the positive impact card deck. Add corresponding number cards to your hand.
 - c. Filter cards back into the bottom of the deck if needed.
9. When Deck B is used up, the game is over. The person with the largest aggregation wins.
10. Players may need to flip through Deck A (numbered cards) to find specific cards.



Grouper Moon-O Impact Cards:

Negative Impact Cards: (this should be a printout for each game) (each one should be read aloud as it is played.)

1. *Poachers Fish Grouper Aggregation: -100 fish (Local fishers poach grouper during the winter spawning event.)*
2. *Stony Coral Tissue Loss Disease: -200 fish (Stony coral tissue loss disease (SCTLD) is a highly lethal coral disease that was first reported off the coast of Florida in 2014 and has since spread rapidly throughout the Caribbean. The disease affects over 20 coral species and is now present on reefs in 18 countries and territories.) Source: NOAA*
3. *Low Juvenile Recruitment Year: -300 fish (Weather conditions and the currents swept the Nassau larvae out into the open ocean instead of keeping them close to Little Cayman. Almost no larvae survive.)*
4. *Warming Ocean Temps: -400 fish (Rising ocean temperatures, caused by climate change, have an increasingly negative impact on the healthy development and survival of Nassau grouper eggs)*
5. *Ocean Acidification: -500 fish (Climate change is causing the oceans to become more acidic, which has an increasingly negative impact on the healthy development and survival of Nassau grouper eggs.)*
6. *More Predators: -200 (The increasing population of Nassau Grouper at the aggregation leads to more opportunist predators, like sharks, who eat the Nassau before they can spawn)*
7. *Land Development: -500 (Development along the Caymanian beaches releases pollution and nutrients into coastal ecosystems harming the health of the coral reef)*
8. *New Cruise Ship Port: -800 fish (New cruise ship ports are built, causing the destruction of near-shore reefs)*
9. *Lionfish Invasion Worsens: -900 fish (Lionfish are native to coral reefs in the tropical waters of the South Pacific and Indian Oceans. But you don't have to travel halfway around the world to see them. This is an invasive species that threatens the well-being of coral reefs and other marine ecosystems, including the commercially and recreationally important fishes that depend on them.) Source: NOAA*
10. *Chemical Spill or Sewage spill: -100 fish (Industrial chemicals and/or sewage spills along the coast, damaging water quality, reef corals and fish species.)*
11. *Illegal Fish Traps: -200 fish (Local fishers place fish traps along the reef, illegally trapping Nassau grouper in cages)*
12. *Grouper Protections Reduced: -300 fish (The Cayman Islands government removes protections in place for the Nassau, increasing fishing pressures on the grouper population)*
13. *Invasive Species Introduced: -500 fish (a predatory, invasive marine species, like the lionfish, is introduced to the reef ecosystem, reducing the population of the Nassau's food source)*
14. *Increased Hurricane Season: The hurricane season becomes longer, the number and intensity of hurricanes increases, as a result of climate change and a warming ocean.) -600 fish*
15. *Student Impact Cards: -??? Fish (Blank cards are for students to come up with their own impact cards)*



Grouper Moon-O Impact Cards:

Positive Impacts Cards:

1. *BOFFS (Big, Old, Fat, Fecund, Females): +100 fish (The population of older, bigger females increases at the aggregation. The larger, older females, produce significantly more gametes, leading to more baby Nassau.)*
2. *DOE Funding Increased: +200 fish (increased funding allows DOE to hire more staff to help enforce existing grouper protections)*
3. *Baby Grouper Extravaganza! +300 fish (The aggregation has a big juvenile recruitment year. Many baby grouper sightings are reported in lagoons all across Little Cayman)*
4. *Lionfish Culling: +400 fish (Lionfish are an invasive species, with no natural predator in the Caribbean. Like the Nassau, they are a reef predator and compete for prey. Local dive shops sponsor a Lionfish Derby (culling competitions) helping to keep populations low and providing more food for the Nassau)*
5. *Fish Traps Removed: +200 fish (Illegal fish traps were found and removed by DOE staff) +500 fish*
6. *Multi-National Protections Enacted: +600 fish (A coalition of Caribbean nations join the Cayman Islands in putting protections in place for Nassau Grouper populations, increasing the population throughout the Caribbean)*
7. *Environmental Protections Expanded: +700 fish (Increased Clean Water regulations are implemented, protecting reefs from industrial pollution)*
8. *Increased Marine Protected Areas: +800 (The DOE creates a new marine protected area. A marine protected area is a defined region designated and managed for the long-term conservation of marine resources, ecosystems services, or cultural heritage.) Source: NOAA*
9. *Healthy Reef Ecosystem: +900 (Cayman coral reefs experience an especially healthy, productive time of growth, leading to more cleaning stations, increased food available to the Grouper, and reduction in competition for food)*
10. *Mangrove Restoration Project: +200 fish (local marine conservation groups receive infusion of funding for mangrove restoration work, increasing the health of the reef ecosystem)*
11. *International Climate Change Accords Enacted: +400 (A coalition of countries enact international climate change accords, decelerating the warming trend of the oceans and other related climate impacts)*
12. *Public Support Increases: +300 (Ongoing marine science educational programs and conservation efforts leads to an increase in public awareness and a growing sense of stewardship for the reef)*
13. *Community Action: +400 (Multiple, community-led conservation projects kick off, including mangrove plantings, near shore nursery habitat enhancement, better run-off mitigation, beach clean-ups, and more, boosting the health of the reef ecosystem)*
14. *Blockbuster Family Movie: +600 fish (Disney/Pixar releases a new animated film highlighting the Caribbean coral reef and bringing widespread attention needed conservation efforts)*
15. *Student Impact Card: -??? Fish (Blank cards for students come up with their own impact cards)*



Grouper Moon-O Discussion Questions:

Reflection Questions:

1. Why has it taken so long for the Nassau Grouper population on Little Cayman to recover?
2. Describe one or more successful strategies for protecting the Nassau Grouper population in the Cayman Islands.
3. Describe one or more challenges the Nassau Grouper can face on its journey to the spawning aggregation site?
4. Describe an impact card (positive or negative) that you or your game team came up with. How many fish are gained or lost? Explain your decision.

