MARINE MEGAFAUNA FOUNDATION

SCIENTIST SERIES FOR STUDENTS

Grade 4

Module 2 Manta Life Cycle

Lesson Time
60 minutes

Essential Question
What is the life cycle of manta rays and skates?

Materials
Copies of Worksheets, Scissors, Glue sticks

Objectives- Students Will
Compare manta ray and skate life cycle
Analyze advantages and disadvantages

Florida State Standards Science SC.4.L.16.4
Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.
B. Life cycles vary among organisms, but reproduction is a major stage in the life cycle of all organisms.

NGSS CrossCuttingConcepts
Cause and Effect
Patterns

5C's
Collaboration
Critical Thinking

Background Information:

Manta rays and skates are marine animals found in Florida. Rays, skates, and sharks are closely related and belong to a group of fish called **elasmobranchs**.

Rays and skates live in all ocean basins around the world. The main difference between rays and skates is how they reproduce. Skates lay egg cases that can sometimes be found on the beach and are called "mermaid purses." Rays give birth to live young. In both rays and skates the difference between males and females is that males have claspers by the base of their tail. You can tell if a male is an adult by the size of claspers.

A nursery ground for manta rays usually is characterized either by an abundance of food (increased growth) or by a lack of predators (increased survival). This would be a habitat where they can more safely mature into adulthood. Mantas have a very conservative reproductive strategy, only producing one pup every 2-5 years.

Teacher Preparation:

1. Make copies of "Manta Ray" and "Clearnose Skate" Life Cycle (NOT double sided)
2. Make copies of Manta Ray vs. Clearnose Skate Chart

Procedures:

Pre-Lesson: Assess prior knowledge about Manta Rays. Show Introductory Video if needed.
https://www.youtube.com/watch?v=tC06JYwpnDE

Step 1: Engage: Phenomena

Ask: *What life cycle are you most familiar with?* If time allows, students can *Draw and label the parts of the life cycle you are familiar with.* Students may draw a caterpillar to butterfly or a seed to tree. If time allows students can share their diagrams. Show: The Stunning Life cycle of a Ladybug:
https://www.youtube.com/watch?v=ws_D5nXOAJg

Ask: *What was most interesting to you about the Ladybug life cycle? Does the offspring look like its parents?*

Step 2: Explore: Life Cycle

Individual or Partner work

Manta rays are found on the East coast of Florida. Clearnose Skates are found on the West coast of Florida. Students will fill out Life Cycle with partner. Students will cut out pieces and place the pieces where they think they will be. Discuss as a class and then the students will paste the pieces in the correct position. Use the "T-Chart" to fill out the details (in rectangles) about each life cycle phase.

Step 3: Explain: Discuss "T-Chart"

Ask: *What are the differences between the skate and manta ray life cycle? What are the similarities between the skate and manta ray life cycle? Why do organisms reproduce?*

Step 4: Elaborate: Critical Thinking

Partner Work

Students will work with partner to discuss the positives and negatives (advantages and disadvantages) of laying lots of eggs vs having one offspring at a time.

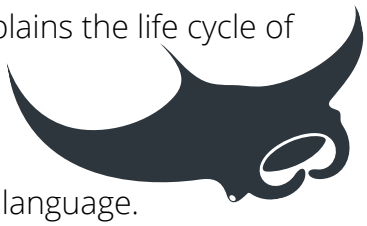
Explain: Neither the manta ray or skate "parent" their offspring.

Class Discussion: **Ask:** Why do you think manta rays "invest" more time into one offspring? Think about your positives and negatives to help you. **Explain:** They have few natural predators (mostly sharks). Having a large offspring helps it survive better. It takes a lot of energy for the female - that is why they "recover" for 2-5 years after.

Step 5: Evaluate: Student Review

Partner Work

One student explains the life cycle of the manta ray to partner, other student explains the life cycle of clearnose skate to their partner.



Linguistically diverse learners:

If needed make note cards of words such as: adult, juvenile, adolescent in native language.

Manta Ray Life Cycle

Name_____

Directions: Cut out the manta rays below and paste in correct location. In the rectangle, write the additional information from the Manta Ray vs. Clearnose Skate Chart.

Baby

Adults

mate at about 8-10 years old

Adult

can live for ~40 years

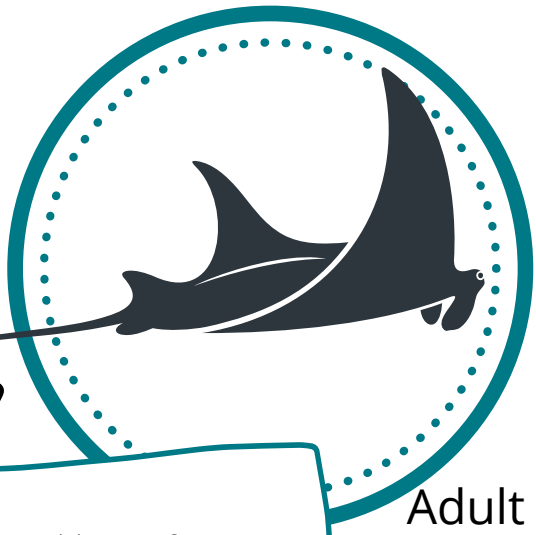
Manta Ray Life Cycle- Teacher Key

Name_____

Directions: Cut out the manta rays below and paste in correct location. In the rectangle, write the additional information from the Manta Ray vs. Clearnose Skate Chart.

Baby

- 1 pup born
Disc width at birth - six feet
Looks like burrito with wings folded



Adult
can live for
~40 years

- Adult Disc Width - 22 feet

Adults
mate at about 8-10 years old

- 1 year gestation
-Female has pups every 2- 5 years

Clearnose Skate Life Cycle

Name_____

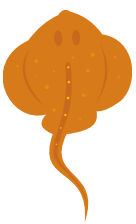
Directions: Cut out the skates below and paste in correct location. In the rectangle, write the additional information from the Manta Ray vs. Clearnose Skate Chart.

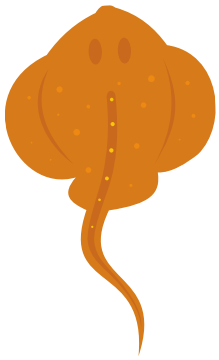
Egg

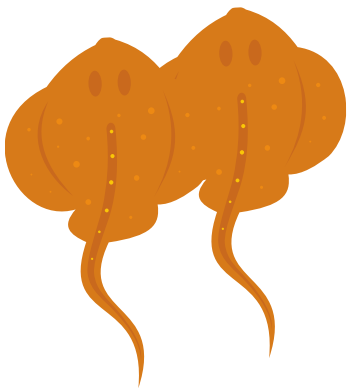
Adolescent/
Juvenile

Adult
(can live for maybe
5 years)

Adults
Females mate at about
2-6 years old







Clearnose Skate Life Cycle-Teacher Key

Name_____

Directions: Cut out the skates below and paste in correct location. In the rectangle, place the additional information from the Manta Ray vs. Clearnose Skate Chart.

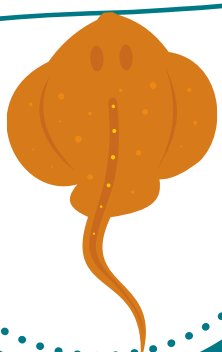
Egg

- 60 eggs
-Mermaids Purse" Egg case

Adolescent/ Juvenile

- Disc width: 3 inches at birth

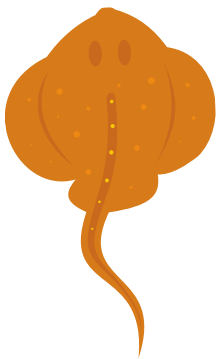
Adult
(can live for maybe 5 years)

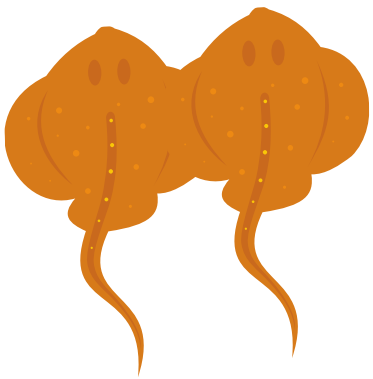


- Disc width: Adult: 20 inces

Adults
Females mate at about 2-6 years old)

- 12 week gestation





Manta Ray Vs. Clearnose Skate

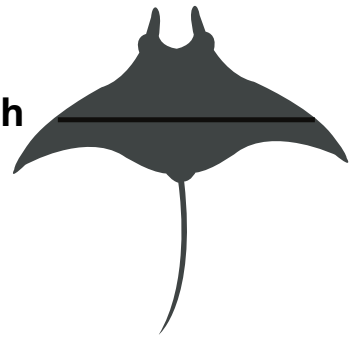
Name:_____

Directions: Use the completed diagram to add information to the Life Cycle page. After completing the Life Cycles answer question below.

Manta Ray

Adult Disc Width: 22 feet
At birth Disc Width: 6 feet
Gestation: 1 year
Offspring: Every 2-5 years
1 live pup
to fit inside womb, baby has wings folded over back like a burrito

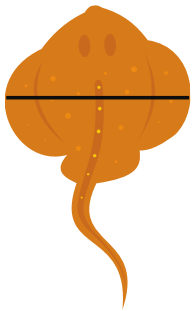
Disc width



Clearnose Skate

Adult Disc Width: 20 inches
At Birth Disc Width: 3 inches
Gestation: 12 weeks
"Mermaids Purse" Egg Case
Birth: 60 eggs

Disc width



Critical Thinking:

Life cycles vary between organisms. What are the positives and negatives to having lots of babies (skates) to only one every few years (manta ray)?

⊕ Manta Rays ⊖	⊕ Clearnose Skates ⊖

Manta Ray Vs. Clearnose Skate - **Teacher Key**

Name:_____

Directions: Use the completed diagram to add information to the Life Cycle page. After completing the Life Cycles answer question below.

Manta Ray

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1 live pup
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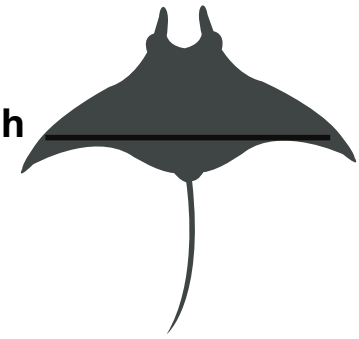
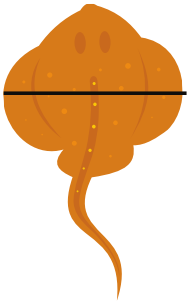


Clearnose Skate

Adult Disc Width: 20 inches
At Birth Disc Width: 3 inches
Gestation: 12 weeks
"Mermaids Purse" Egg Case
Birth: 60 eggs

Disc width



Critical Thinking:

Life cycles vary between organisms. What are the positives and negatives to having lots of babies (skates) to only one every few years (manta ray)?

Answers may vary-sample answers.....

⊕ **Manta Rays**	⊖ **Manta Rays**	⊕ **Clearnose Skates**	⊖ **Clearnose Skates**
Large size =less predators- higher survival	Large size=time and energy for mother-hard for populations to recover if threatened	With more babies more can have a chance of surviving	Many may get eaten due to small size

Exit Ticket **SC.4.L.16.4**

Name:

What is the main difference in the skate / manta ray life cycle?

TASK CARD

Name:

Write a short explanation on why YOU think the skate egg case is called a "mermaid's purse." Use your imagination!

TASK CARD

Name:

Why do you think some animals "parent" their offspring and some do not?

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Grade 4

Module 2 Manta Life Cycle

Meet the Scientist:

JESSICA PATE

Project Manager / Field Researcher, Manta Ray Program, Florida

Degree:

Masters in Science, Marine Biology,
Florida Atlantic University

What she does in the field:

Measure manta rays
Use drones to survey
Photograph rays from boat and record location
Present research to students and conservation/education groups
Remove fishing hooks from rays

Research Focus:

Jessica started her marine biology career working with sea turtles and magnetism in South Florida as part of her graduate degree.

She has traveled all over the world from Costa Rica to Honduras to Ghana to study marine life.

Jessica has also spent time working on a sailboat as a SCUBA diving Instructor and marine biologist.

When she was free diving in 2010 and saw a manta ray, her passion ignited. She realized that almost no one was studying manta rays. She founded he Florida Manta Project snd now collaborates with MMF to study manta rays in Florida.

MMF has many staff members in other countries. Jessica is one of the few scientists working in the United States. Her current research focuses on learning about the ecology of and human impacts to Florida manta rays. She recently published her first paper on a manta ray nursery grounds on the Atlantic coast of south Florida!

If you could interview Ms. Pate, what would you ask her? Write your question below:

_____
_____
_____
_____

Why do you think Ms. Pate's research on manta ray nurseries in Florida is important?

_____
_____
_____
_____
_____

Email Ms. Pate your question!
Jessica.pate@marinemegafauna.org

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SCIENTIST SERIES FOR STUDENTS

Grade 4

Module 2 Manta Life Cycle

Author:
HilaryPenner M.Ed

Scientific Advisory:
Jessica Pate, M.Sc
MMF Florida Project Manager

Grant provided by:

We value your feedback!
Please fill out this Teacher Evaluation form at shorturl.at/zIJT4
As a Thank You, your class will receive a
Manta ray Adoption Certificate!

We'd love to see your lessons in action!
Please send an email to florida@marinemegafauna.org and tag us in social media.

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@marinemegafauna

Marine Megafauna Foundation

Resources:

https://www.good.is/articles/florida-manta-ray-project

https://oceana.org/blog/%E2%80%9Cit%E2%80%99s-kevin%E2%80%9D-meet-young-manta-revealing-new-clues-about-his-species

https://marinebio.life/manta-ray-research-and-dont-eat-the-goat-with-jessica-pate/

https://watermark.silverchair.com/fsl012.pdf?token=AQECAHi208BE49Ooan9kkhW_Ercy7Dm3ZL_9Cf3qfKAc485ysgAAAngwggJ0Bgkqh

https://www.floridamuseum.ufl.edu/discover-fish/species-profiles/raja-eglanteria/